Environmental Assessment

Sand Hills Wind Energy Facility
Albany County, Wyoming

May 2011

BLM

High Desert District Rawlins Field Office

The BLM's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

BLM/WY/PL-11/035+1430

WY-030-EA09-314

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Acronyms and Abbreviations

°F	degrees Fahrenheit
μg/m³	microgram(s) per cubic meter
AGL	above ground level
APE	area of potential effect
APLIC	Avian Power Line Interaction Committee
APP	Avian Protection Plan
APWRA	Altamont Pass Wind Resource Area
bgs	below ground surface
BLM	U.S. Department of the Interior, Bureau of Land Management
BLM PEIS	*Final Programmatic EIS on Wind Energy Development on BLM-Administered Land in the Western United States*
BMP	best management practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
DoD	Department of Defense
DOE	Department of Energy
DOE/FOE	Determinations of Eligibility and Finding of Effect
EA	Environmental Assessment
EAD	Economic Analysis Division
EIS	Environmental Impact Statement
EMF	electric and magnetic field
EO	Executive Order
EPA	U.S. Environmental Protection Agency

ESA	Endangered Species Act
FAA	Federal Aviation Administration
Facility	Sand Hills Wind Energy Facility
FEIS	Final Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FLPMA	Federal Land Policy and Management Act of 1976
FMV	fair market value
FPA	Federal Power Act, as amended
FPM	Field Project Manager
GIS	geographic information system
IM	Instructional Memorandum
KOPs	Key Observation Points
kV	kilovolt
LGIA	Large Generator Interconnection Agreement
LGIP	Large Generator Interconnection Procedures
LOS	levels of service
met	meteorological
MSW	Municipal solid waste
MTR	Military Training Route
MW	megawatt(s)
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NHD	National Hydrography Dataset
NHPA	National Historic Preservation Act of 1966
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory

NWP	Nationwide Permit
O&M	operation and maintenance
OSHA	Occupational Safety and Health Administration
PEM	palustrine emergent
PFYC	Probable Fossil Yield Classification
PM_{10}	particulate matter smaller than 10 microns
$PM_{2.5}$	particulate matter smaller than 2.5 microns
POD	Plan of Development
PUP	Pesticide Use Proposal
Rawlins RMP	*Record of Decision and Approved Rawlins Resource Management Plan*
ROD	Record of Decision
ROW	right-of-way
SCADA	supervisory control and data acquisition
SGIA	Small Generator Interconnection Agreement
SGIP	Small Generator Interconnection Procedures
SH 13	State Highway 13
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SPCC	Spill Prevention Control and Countermeasures
SWE or applicant	Shell WindEnergy, Inc.
SWPPP	Stormwater Pollution Prevention Plan
Tariff	Open Access Transmission Service Tariff
TMDL	total maximum daily load
US 30/287	United States Highway 30/287
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VMT	vehicle-miles traveled
VRM	Visual Resource Management

WAAQS	Wyoming Ambient Air Quality Standards
WDEQ	Wyoming Department of Environmental Quality
WEST	Western Ecosystems Technology, Inc
Western	Western Area Power Administration
WGFD	Wyoming Game and Fish Department
WPDES	Wyoming Pollution Discharge Elimination System
WQC	Water Quality Certification
WSEO	Wyoming State Engineer's Office
WWDC	Wyoming Water Development Commission
WWTF	wastewater treatment facilities
WYDOT	Wyoming Department of Transportation
WYNDD	Wyoming Natural Diversity Database

CHAPTER 1

Purpose and Need

1.1 Introduction

Shell WindEnergy, Inc. (SWE or applicant) submitted a request to the U.S. Department of the Interior, Bureau of Land Management (BLM), Rawlins Field Office for a right-of-way (ROW) on BLM-administered lands (Proposed Action). SWE proposes to construct, operate, and maintain the Sand Hills Wind Energy Facility (Facility) in Albany County, Wyoming. The Facility, which would be located approximately 30 miles west of Laramie, would have an aggregate nominal nameplate generating capacity of up to 50 megawatts (MW) of electricity and would include up to 25, 2.0-MW wind turbines.

The Facility's associated support infrastructure would consist of newly constructed and improved roads, transformers, underground 34.5-kilovolt (kV) collector lines, meteorological towers, an operation and maintenance (O&M) facility, and an interconnecting substation. Project infrastructure (e.g., roads, turbines) would cover an area of approximately 56 acres and would be primarily located on private land owned by Sand Hills Land and Cattle, LLC, and on federal lands managed by the BLM. Before construction activities begin, SWE would develop a lease agreement with Sand Hills Land and Cattle, LLC. Further, BLM requires that SWE submit a ROW application to evaluate.

In April 2003, GroWind Inc. submitted an interconnection request to the Department of Energy (DOE), Western Area Power Administration (Western) to interconnect the proposed Facility with Western's existing Miracle Mile-Snowy Range 1 115-kV transmission line. SWE acquired the project from GroWind in December 2005. Western, a power marketing administration within DOE, is evaluating an interconnection request from SWE for the Facility.

If approved, construction of the Facility can proceed and is anticipated to commence in summer 2011.

This Environmental Assessment (EA) has been prepared to analyze the environmental consequences of the Proposed Action. The EA is a site-specific analysis of potential impacts that could result from the implementation of the Proposed Action. This EA is being prepared in compliance with the National Environmental Policy Act of 1969 (NEPA), as amended (42 United States Code [USC] 4321 et seq.), and its implementing regulations found in 40 Code of Federal Regulations (CFR) Part 1500–1508.

This EA assesses the environmental impacts of the Proposed Action, two project alternatives and a No Action alternative, and guides the decisionmaking process. The BLM is the federal lead agency responsible for conducting the environmental review under NEPA, and Western is a federal cooperating agency on the EA.

1.2 Purpose and Need

1.2.1 Bureau of Land Management

The BLM is responsible for the development of energy resources on BLM-administered lands in an environmentally sound manner. BLM's purpose and need is to fulfill its Wind Energy Development Program policy (Instruction Memorandum No. 2009-043) by encouraging development of wind energy in acceptable areas consistent with the National Energy Policy of 2001 and the Energy Policy Act of 2005 (Public Law 109-58, August 8, 2005) and to "manage the…use of public lands to meet the needs of internal and external customers" (BLM Rawlins Resource Management Plan [RMP] 2008, Lands and Realty Goal). The BLM's National Environmental Policy Act Compliance for Utility-Scale Renewable Energy Right-of-Way Authorizations (Instruction Memorandum No. 2011-059) reiterates and clarifies existing BLM NEPA policy for BLM offices analyzing externally generated, utility-scale renewable energy ROW applications.

As part of an overall strategy to develop a diverse portfolio of domestic energy supplies for the future, the National Energy Policy of 2001 and the Energy Policy Act of 2005 encourage the development of renewable energy resources, including wind energy. The United States has significant potential for wind energy development, especially on federal lands in the western United States. Federal energy policies have led to an increased demand to develop cleaner, more abundant domestic supplies of energy. In accordance with the Federal Land Policy and Management Act of 1976 (FLPMA) Section 103(c), public lands are to be managed for multiple use that takes into account the long-term needs of future generations for renewable and non-renewable resources. The Secretary of the Interior is authorized to grant ROWs on public lands for systems of generation, transmission, and distribution of electric energy (Section 501(a)(4)).

Taking into account the BLM's multiple use mandate, the purpose and need for the Proposed Action is to respond to a FLPMA ROW application submitted by SWE to construct, operate, maintain, and decommission the Sand Hills Wind Energy Facility and associated infrastructure on public lands administered by the BLM in compliance with FLPMA, BLM ROW regulations, and other applicable federal laws and policies. This Proposed Action would, if approved, assist the BLM in addressing the management objectives in the Energy Policy Act of 2005 (Title II, Section 211) which establish a goal for the Secretary of the Interior to approve 10,000 MW of electricity from non-hydropower renewable energy projects located on public lands. This Proposed Action, if approved, would also further the purpose of Secretarial Order 3285A1 (March 11, 2009) that establishes the development of environmentally responsible renewable energy as a priority for the Department of the Interior. The BLM will decide whether to deny the proposed ROW, grant the ROW, or grant the ROW with modifications. Modifications may include modifying the proposed use or changing the route or location of the proposed facilities (43 CFR 2805.10(a)(1)).

This EA analyzes the impacts of the Proposed Action occurring on federal lands and the indirect impacts from the connected actions on private lands (see Section 1.6) to facilitate the BLM decisionmaking process of whether to approve, approve with modifications, or disapprove the ROW grant application submitted by SWE for the Sand Hills Wind Energy Facility. Through this process, the BLM's purpose is to avoid, minimize, rectify, reduce, eliminate, or compensate for potential environmental impacts to the extent possible as required by NEPA (40 CFR 1508.20), while encouraging the development of wind energy in acceptable areas as required by BLM policy (IM 2009-043).

1.2.2 Western Area Power Administration

SWE requests to interconnect its proposed Sand Hills Facility with Western's Miracle Mile-Snowy Range 1 transmission line. Western's purpose and need is to approve or deny the interconnection request in accordance with its Open Access Transmission Service Tariff (Tariff) and the Federal Power Act, as amended (FPA).

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 Federal Energy Regulatory Commission (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 (LGIP) and a Large Generator Interconnection Agreement (LGIA) in January 2005. In response to FERC Order No. 2006, Western submitted additional term revisions and incorporated Small Generator Interconnection Procedures (SGIP) and a Small Generator Interconnection Agreement (SGIA) 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 LGIP provides 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 must consider interconnection requests to its 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 to require Western to provide transmission service at rates it charges itself and under terms and conditions comparable to those it provides itself.

1.3 Shell WindEnergy, Inc. Interests and Objectives

The primary purpose of the Sand Hills Wind Energy Facility is to provide wind-generated electricity from a site in Wyoming 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.

The Facility would meet many needs in the energy arena:

- Help the State of Wyoming meet future interest in RPS for emissions reduction
- Meet regional energy needs in an efficient and environmentally sound manner by constructing the Facility near existing transmission infrastructure
- Develop an economically feasible wind energy project that supports commercially available financing

1.4 Conformance with the BLM Land Use Plan

The BLM's land use plans establish goals and objectives for management of BLM-administered lands. For the Proposed Action, the relevant land use plan is the BLM's *Record of Decision and Approved Rawlins Resource Management Plan* (Rawlins RMP) (BLM, 2008a). The Proposed Action is in conformance with the Lands and Realty goals and objectives of the Rawlins RMP, page 2-16. RMPs are developed to allocate appropriate resource and land uses for public lands. The Rawlins RMP establishes practices to manage and protect public lands and resources. The location of the proposed Facility is specifically identified in the RMP as an area that ranges from "outstanding" to "superb" for wind generation potential (Map 30-2 of the RMP). Additionally, the proposed Facility site is not within any Utility/Transportation Systems Avoidance Areas for the four alternatives evaluated in the Rawlins RMP Environmental Impact Statement (EIS).

1.5 Relationship to Statutes, Regulations, or Other Plans

The Proposed Action is consistent with federal guidelines for implementing NEPA, the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA outlined in 40 CFR Parts 1500-1508, and Department of the Interior and BLM policies and manuals (BLM NEPA Handbook H-1790-1). Included in these regulations is a requirement to analyze connected actions (40 CFR 1508.25(a)(1). The Facility requires access across public lands; therefore, all other components of the Facility are considered connected actions to the Proposed Action.

In accordance with BLM IM 2009-043, this EA is tiered to the analysis in the BLM's *Final Programmatic EIS on Wind Energy Development on BLM-Administered Land in the Western United States* (BLM, 2005a) and focuses on the critical project-specific issues of concern, including site configuration and micrositing considerations, monitoring program requirements, and appropriate project-specific stipulations. The *Record of Decision (ROD) for Implementation of a Wind Energy Development Program and Associated Land Use Plan Amendments* (BLM, 2005b) establishes policies and best management practices (BMPs) for wind energy development activities on BLM land and establishes minimum requirements for mitigation measures that have been incorporated into the Proposed Action. As stated in BLM IM 2009-043, offsite compensatory mitigation also was considered as appropriate for Proposed Action consistent with the policies in BLM IM 2008-204 (dated September 30, 2008), which replaced BLM IM 2005-069 (dated February 1, 2005).

In addition to NEPA, DOE must also consider Intentional Destructive Acts. Two recent decisions by the United States Court of Appeals for the Ninth Circuit mandate DOE review. DOE's Office of NEPA Policy and Compliance has determined that DOE NEPA documents, including EISs and EAs, should explicitly address potential environmental consequences of intentional destructive acts (i.e., acts of sabotage or terrorism). This applies to all DOE proposed actions, including nuclear and non-nuclear proposals.

The following federal, state, and local statutes, regulations, plans, programs, and policies are related to the Proposed Action:

- Wyoming State Land Use Plan (Wyoming State Land Use Commission 1979)
- Wyoming Weed Management Strategic Plan (June 2003)
- Wyoming State Comprehensive Wildlife Conservation Strategy (July 2005)
- Wyoming Partners In Flight Wyoming Bird Conservation Plan Version 1.0 (July 1, 2001)
- Final Wyoming Greater Sage-Grouse Conservation Plan (July 2003)
- State of Wyoming EO 2008-02, Greater Sage Grouse Core Area Protection (August 2008)
- FLPMA of 1976, as amended (43 USC 1701 et seq.)
- ROD for Implementation of a Wind Energy Development Program and Associated Land Use Plan Amendments
- Clean Water Act of 1977
- Clean Air Act of 1970, as amended
- Section 106 of the National Historic Preservation Act of 1966, as amended
- Archaeological Resources Protection Act of 1979
- Native American Graves Protection and Repatriation Act of 1990 and 43 CFR Part 10
- American Indian Religious Freedom Act of 1978
- Endangered Species Act of 1973, as amended
- Taylor Grazing Act of 1934
- Federal Aviation Administration, Tower Height Approval
- Executive Order 11988, Floodplain Management
- Executive Order 11990, Protection of Wetlands
- Executive Order 12898, Environmental Justice
- Executive Order 13186, Migratory Bird Treaty Act, as amended
- RMP and Final EIS for Public Lands Administered by BLM, Rawlins Field Office, Rawlins, Wyoming

- BLM's 6840 Manual, Special Status Species Management
- Spill Prevention, Containment, and Countermeasure Plan (Wyoming Department of Environmental Quality, administering the U.S. Environmental Protection Agency permit program Section 311, Federal Water Pollution Control Act as amended by the Clean Water Act [40 CFR 112])
- Wind Energy Protocol between Department of Defense and BLM, July 2008
- Sensitive Species List U.S. Fish and Wildlife Service (USFWS) Endangered, Threatened, Proposed, and Candidate Species, Wyoming Counties
- Wyoming National Pollutant Discharge Elimination System Construction General Permit for Storm Water Wyoming Water Quality Rules and Regulations Chapter 2, Section 6
- Wyoming State Historic Preservation Office, Wyoming Antiquities Act of 1935 and the Wyoming Environmental Quality Act of 1973
- Wyoming Standards and Guidelines for Rangeland Health
- State Lands Special Use Lease (Wyoming Statute 36-5-114)
- Albany County Comprehensive Plan (Albany County, 2008)
- Albany County Telecommunication and Utility Overlay Zone (Sections 5 and 7, Albany County Zoning Resolution, Adopted August 1, 1997, Amended September 2002)
- Albany County Zoning Certificate (building permit) would be required for the construction of the Project's O&M building. The zoning certificate is processed through the Albany County Planning Department and approved by the Albany County Board of County Commissioners (Sections 1 and 5, Albany County Zoning Resolution, Adopted August 1, 1997, Amended September 2002).

1.6 Identification of Issues

Issues were identified through consultation and coordination with federal, state, and local agencies, interest groups, and interested individuals. As part of the BLM internal interdisciplinary process to identify issues and concerns, Rawlins Field Office resource specialists thoroughly reviewed SWE's Proposed Action and identified issues and concerns related to certain aspects of the human environment and other resources. Additionally, the BLM conducted separate meetings and site visits with Native American tribal representatives to identify cultural resources concerns. Based on this coordination, BLM determined that the following issues are key areas for assessment in the EA:

- Biological resources (plover, raptors, bats)
- Cultural resources, including Native American cultural concerns

1.7 Decisions to Be Made

1.7.1 Grant of Right-of-Way (BLM)

The BLM must decide whether to issue, issue with conditions, or deny the request for an ROW for the project components located on public lands. Facility components on private lands are addressed only for NEPA analysis to adequately consider the full range of effects that may result as indirect effects (H-1790-1). In reaching its decision to issue the ROW, the BLM must find that the following conditions are met:

- The Proposed Action minimizes negative impacts to the natural, cultural, and visual resources on the public lands. Negative impacts can be minimized by:
  - Avoiding major bird and bat migration routes and areas of critical habitat for species of concern
  - Establishing siting criteria to minimize soil disturbance and erosion on steep slopes
  - Using visual resource management guidelines to assist in proper siting of facilities
  - Avoiding significant historic and cultural resource sites
  - Mitigating conflicts with other uses of the public lands
- The lands involved in the ROW grant are configured to minimize the amount of land involved, while still allowing an adequate distance between turbine positions and reasonable ROW boundaries.

1.7.2 Grant of Interconnection (Western)

Western must decide whether to issue, issue with conditions, or deny SWE's interconnection request under its tariff provisions. In reaching its decision to issue the interconnection, Western must evaluate the effects the proposed interconnection could have on the transmission system, and identify any system modifications necessary to accommodate the proposed interconnections. If the interconnections prove to be compatible, Western would make a decision to approve the proposed interconnections, subject to SWE's commitment to fund any necessary system modifications or upgrades.

CHAPTER 2

Proposed Action and Alternatives

2.1 Introduction

SWE proposes to develop a commercial wind energy facility that would comprise up to 25 wind turbine generators, a 34.5-kV electrical collection system, an O&M facility, an interconnecting road network, and an electrical transmission system. This chapter describes the proposed Facility (Proposed Action), the No Action Alternative, and alternatives to the Proposed Action.

The BLM considered several alternatives including site access, public land wind turbine location, and transmission line location and interconnection points during the scoping process, and these are described in Section 2.9 of this EA.

2.2 Proposed Action

The Proposed Action being evaluated in this EA is development of a commercial wind energy facility by SWE that would comprise up to 25 wind turbine generators, a 34.5-kV electrical collection system, an O&M facility, an interconnecting road network, and an electrical transmission system. Transmission facilities would include a substation (the Sand Hills substation) and an approximately 4.6-mile, 115-kV, overhead transmission line to connect the Facility with Western's existing Miracle Mile-Snowy Range 1 115-kV transmission line. Western would construct an interconnection switchyard to connect the Facility's new overhead 115-kV transmission line with Western's existing transmission line. Although the switchyard would be constructed by Western, it is a connected action for this EA because it would be funded by SWE and a part of the interconnection agreement between Western and SWE.

The Proposed Action has the following locational advantages compared with other sites considered in west-central Wyoming:

- Potential wind resource
- Large private landowner with interest in dual-income and compatible land use
- Few residential dwellings in the vicinity
- Mixed-use land with no major conflicting activities
- Low risk of adverse environmental impacts
- Flat, open terrain
- Access to public highways and county roads
- Other approved wind development nearby

SWE has developed a variety of environmental protection measures and BMPs that would be implemented to avoid, reduce, or minimize environmental impacts associated with construction and operation of the Facility. Numerous detailed plans associated with the Proposed Action, which are mentioned later in this EA, are contained in a Plan of

Development (POD) prepared for the Facility (SWE, 2009). The POD, which is incorporated by reference into this EA, is available at the BLM Rawlins Field Office.

2.2.1 Construction Schedule

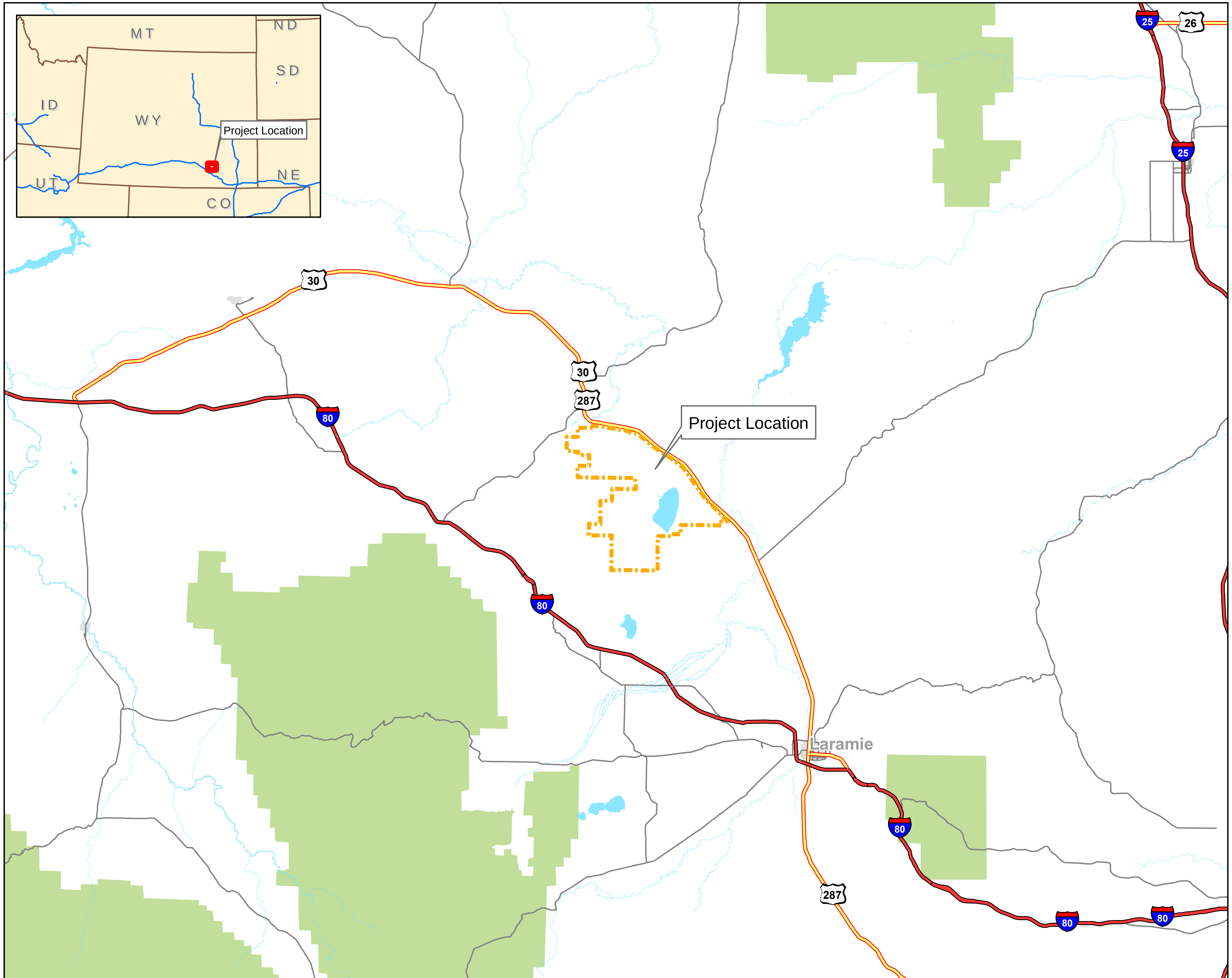
SWE would construct the Facility over a period of approximately 12 months. If the Proposed Action is approved and receives all the necessary permits, construction is anticipated to begin in fall 2012. Table 2-1 outlines a general construction schedule for the Proposed Action.

TABLE 2-1
Construction Schedule
Sand Hills Wind Energy Facility

Task/Milestone	Start	Finish
Obtain Approvals	2010 – First Quarter	2012 – Fourth Quarter
Road Construction	2012 – Fourth Quarter	2013 – First Quarter
Wind Turbine Foundation Construction	2013 – Second Quarter	2013 – Second Quarter
Electrical Collection System Construction	2013 – Third Quarter	2013 – Third Quarter
Switchyard Construction	2013 – Second Quarter	2013 – Third Quarter
Substation and Transmission Line Construction	2013 – Second Quarter	2013 – Third Quarter
Operation and Maintenance Facility Construction	2013 – Second Quarter	2013 – Third Quarter
Wind Turbine Assembly and Erection	2013 – Second Quarter	2013 – Third Quarter
Plant Energization and Commissioning	2013 – Third Quarter	2013 – Fourth Quarter
Plant Substantial Completion	2013 – Fourth Quarter	2013 – Fourth Quarter
Construction Punchlist Cleanup	2013 – Fourth Quarter	2013 – Fourth Quarter
Interconnection	2013 – Fourth Quarter	2013 – Fourth Quarter

2.2.2 Wind Energy Facility Location

The Facility would be located approximately 30 miles northwest of Laramie, Albany County, Wyoming. Figure 2-1 shows the Facility's general location and boundary. The site is currently used primarily for cattle ranching and is identified in Albany County land use plans as "agricultural" and "BLM-allowed" uses. The proposed Facility, including all appurtenant structures, would be located within the townships, ranges, and sections shown in Table 2-2. Table 2-3 presents townships, ranges, and sections according to land ownership of the site.



LEGEND

Project Boundary

N

0 2.5 5 10 Miles

1 inch = 8.79 miles

FIGURE 2-1
Facility Location
Sand Hills Wind Energy Project
Albany County, Wyoming

CH2MHILL

\\COBRA\PROJ\SAND_HILLS_WEF_347937\MAPFILES\POD_REVISIONS\SAND_HILLS_FIGURE_2_1.MXD SCUTLER1 12/27/2010 10:22:53

TABLE 2-2
Facility Location
Sand Hills Wind Energy Facility

Township	Range	Section
19N	75W	4, 5, 6, 7
	76W	1, 11, 12, 13, 14, 15
20N	75W	19, 30, 32, 33, 34
	76W	14, 15, 16, 21, 23, 24, 25, 26, 36

TABLE 2-3
Land Ownership
Sand Hills Wind Energy Facility

Owner	Township	Range	Section
BLM	19N	75W	4, 6
		76W	S ½ of 12
	20N	75W	30, 32
		76W	14, 26
Private	19N	75W	5, 7
		76W	1, 11, N ½ of 12, 13, 14, 15
	20N	75W	19, 33, 34
		76W	15, 16, 21, 23, 24, 25, 36

2.2.3 Major Wind Energy Facility Components

Wind turbines, roads, collector lines, and other permanent and temporary facilities would be sited within corridors up to 800 feet wide. Figure 2-2 is an overview of the Facility layout. Figures 2-3, 2-4, and 2-5 depict close-up views of the eastern, southern, and western layout areas, including the preliminary locations of the wind turbines, roads, collector lines, and other permanent and temporary facilities turbine corridors. Prior to construction, SWE would determine the exact location of these facilities within their respective corridors, and this decision would be based on various siting criteria, such as terrain, geotechnical considerations, and minimizing potential impacts.

SWE has based its turbine and tower specifications on the either Gamesa G80/G87/G90 2.0 MW, Vestas V90 2.0 MW, Vestas V90 3.0 MW or Siemens SWT2.3-93 2.3 MW models. The Siemens SWT2.3-93 wind turbine is the largest of the turbines being considered, and 22 turbines would be needed if this model were chosen. The area of disturbance discussed in this EA is based on the maximum area that would be disturbed using 25, 2.0 MW turbines. In addition to turbines, the following components would be constructed:

- Approximately 12.45 miles of newly constructed access roads and turnaround areas.
- Approximately 3.02 miles of improved existing roads.

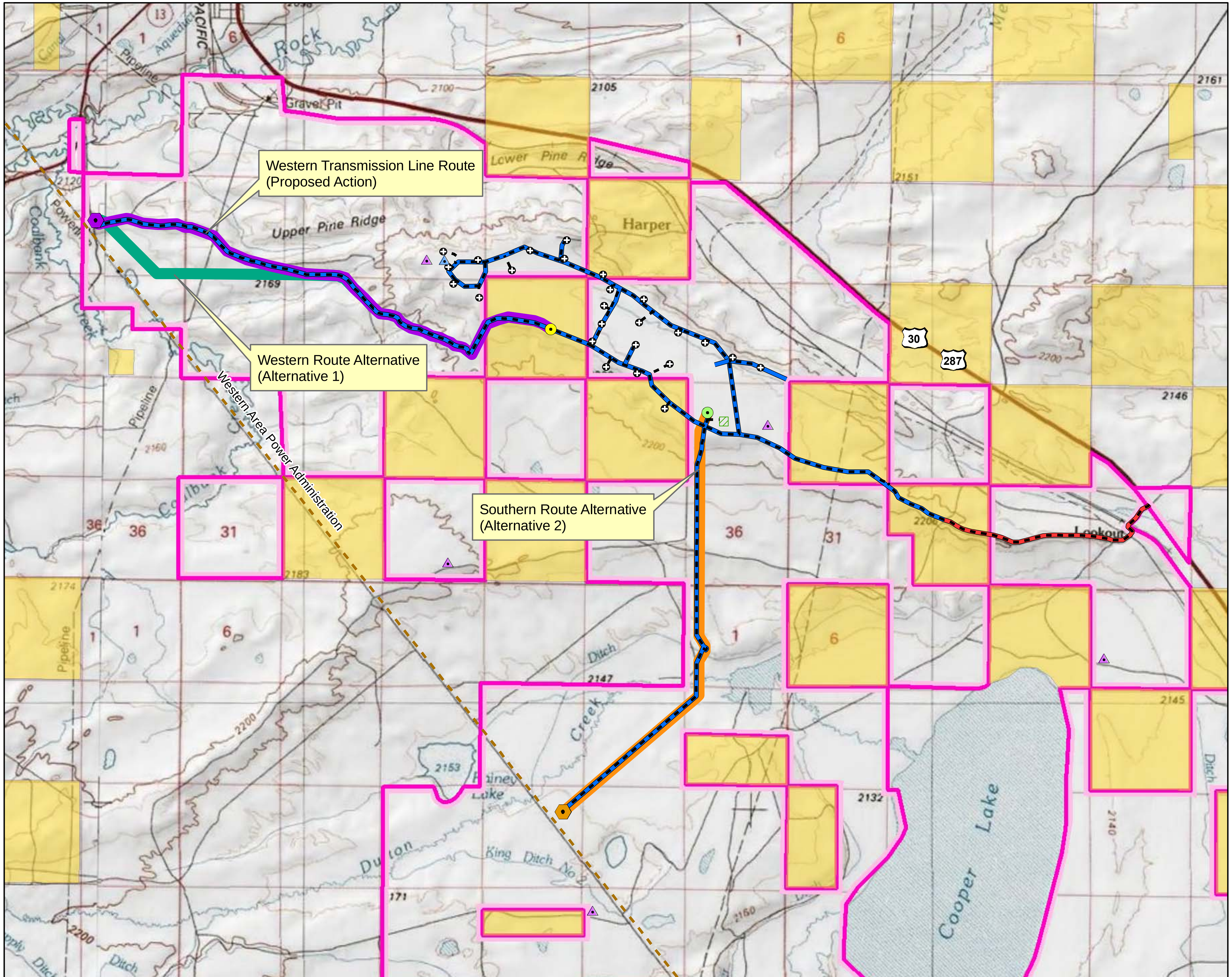
- One permanent meteorological tower (temporary meteorological towers at the site were approved under a separate environmental review process and are not evaluated in this EA).
- Site control and data acquisition system, which would be located within the O&M building or Sand Hills substation.
- 34.5-kV electrical collection system linking each turbine to the next (collector lines) and to the Sand Hills substation. The collector lines would be located underground within the road width.
- An interconnection switchyard and associated equipment, which would be constructed, owned, operated, and maintained by Western at the point of interconnection of the Facility with Western's existing Miracle Mile-Snowy Range 1 115-kV transmission line.
- 115-kV aerial transmission line connecting the substation and Western's switchyard at the Miracle Mile-Snowy Range 1 transmission line.
- An O&M facility, including shop facilities, a control room, a maintenance yard, a kitchen, an office, a washroom, and other structures typical of this type of facility.

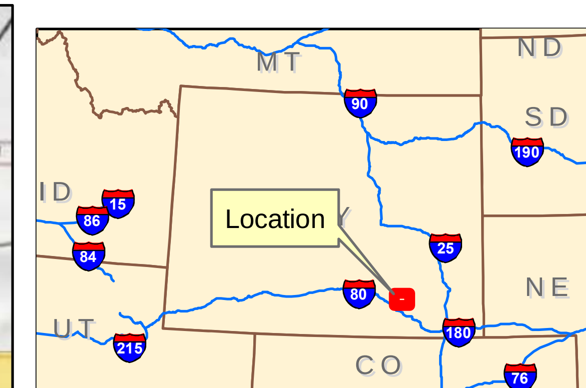
Table 2-4 presents the key Facility components and the acreage of disturbance of each component.

2.2.3.1 Wind Turbine Generators

Wind turbines consist of three main physical components that are assembled and erected during construction: the tower, the nacelle, and the rotor blades. The modern wind turbines under consideration have an approximate tower height of up to 263 feet and rotor diameters that range from 262 to 332 feet, depending on the model selected. Figure 2-6 shows a typical turbine tower and rotor blade. The areas used to erect the 25 turbines would be graded so that vehicles would not drive on vegetated areas.

- **Tower.** The tower is a freestanding, painted steel, conical- (tubular) type structure manufactured in multiple sections, depending on the required height. Towers would be delivered to the site and erected in three to four sections each. Each section would be bolted together via an internal flange, and an access door would be located at the base of each tower. An internal ladder would run to the top of the tower just below the nacelle. The tower would be equipped with interior lighting operated by manual switches inside the tower; interior lighting would not be visible outside the tower. The tower would be set on a spread-foot or caisson-type concrete foundation. The actual foundation design for each turbine would be determined on the basis of site-specific geotechnical information and structural loading requirements of the selected turbine model. It is estimated that a single foundation would require a maximum of approximately 400 cubic yards of concrete. Materials would be sourced commercially from Laramie. If required, a temporary batch plant would be placed within the laydown/staging area.





LEGEND

- Proposed Permanent Met Tower
- Temporary Met Tower
- Proposed Turbine Location
- Proposed South Substation
- Proposed West Substation
- Proposed South Switchyard
- Proposed West Switchyard
- Proposed Laydown Area
- Proposed Access Road
- New Roads
- Existing Roads
- Western Transmission Line Route (Proposed Action)
- Southern Route Alternative (Alternative 2)
- Western Route Alternative (Alternative 1)
- Bureau Of Land Management
- Sand Hills Leases

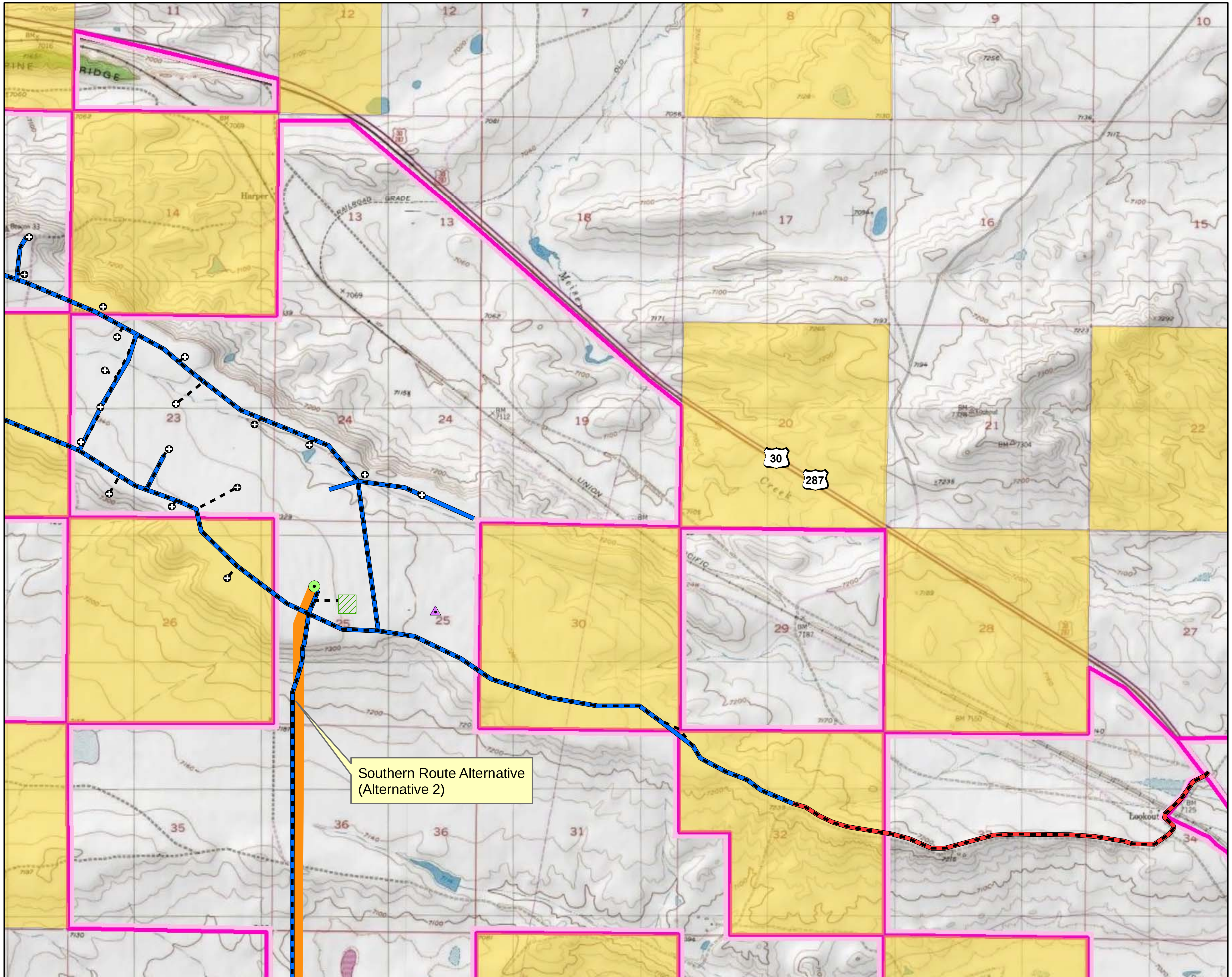
N

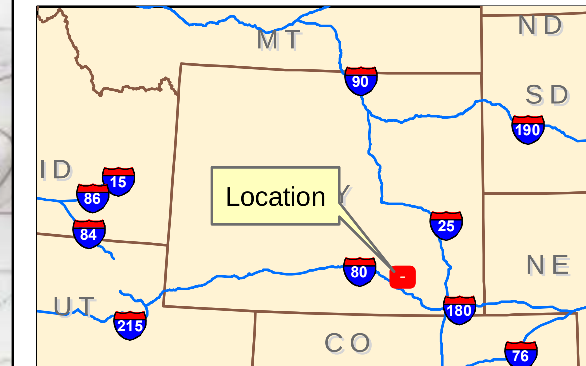
0 0.25 0.5 1 1.5 2 Miles

1 inch = 1 miles

FIGURE 2-2
Proposed Layout
Sand Hills Wind Energy Project
Albany County, Wyoming

CH2MHILL





LEGEND

- Proposed Permanent Met Tower
- Temporary Met Tower
- Proposed Turbine Location
- Proposed South Substation
- Proposed West Substation
- Proposed South Switchyard
- Proposed West Switchyard
- Proposed Laydown Area
- Proposed Access Road
- New Roads
- Existing Roads
- Western Transmission Line Route (Proposed Action)
- Southern Route Alternative (Alternative 2)
- Western Route Alternative (Alternative 1)
- Bureau Of Land Management
- Sand Hills Leases

N

0 0.25 0.5 1 Miles

1 inch = 0.49 miles

FIGURE 2-3
Facility Layout
Eastern Area
Sand Hills Wind Energy Project
Albany County, Wyoming

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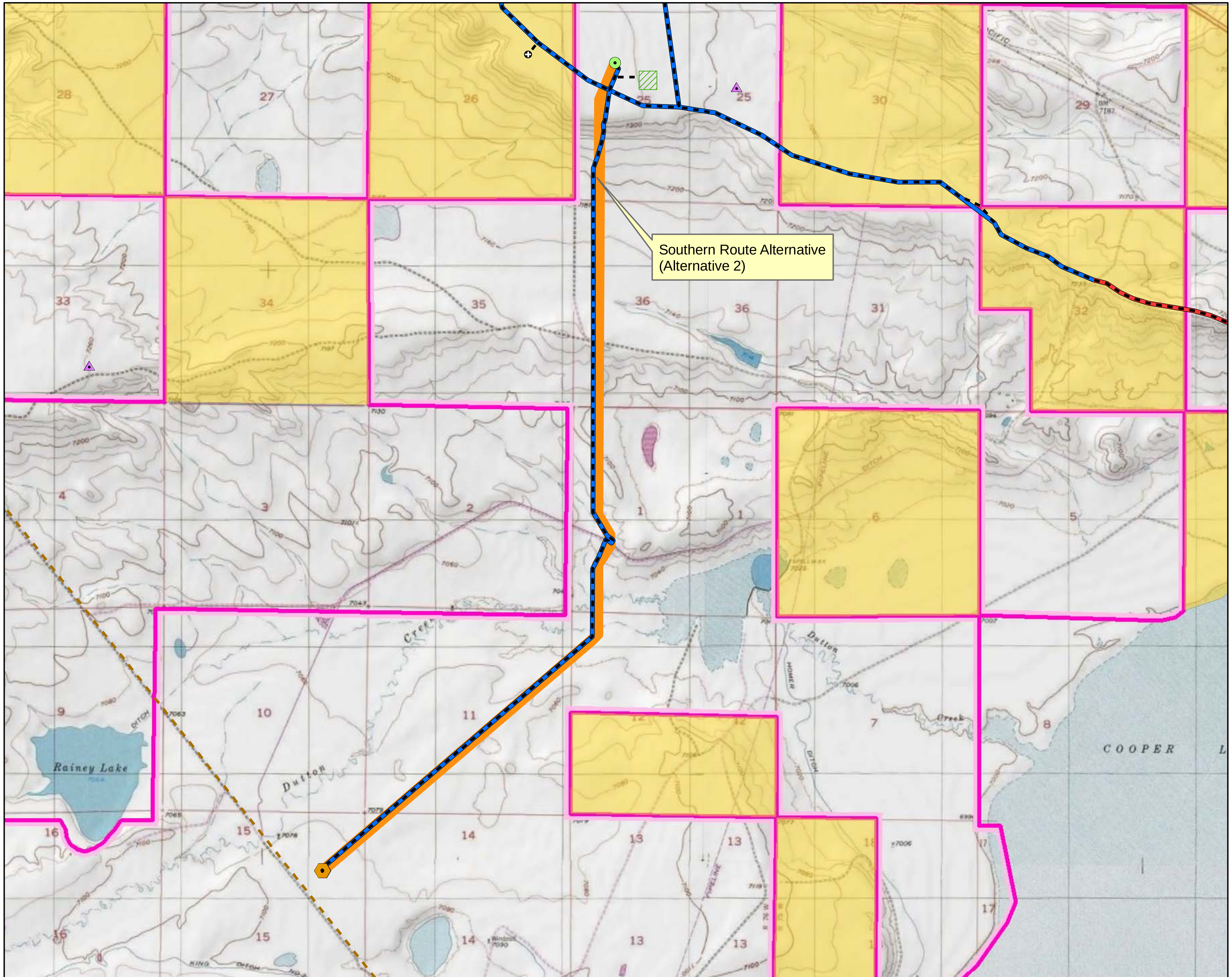

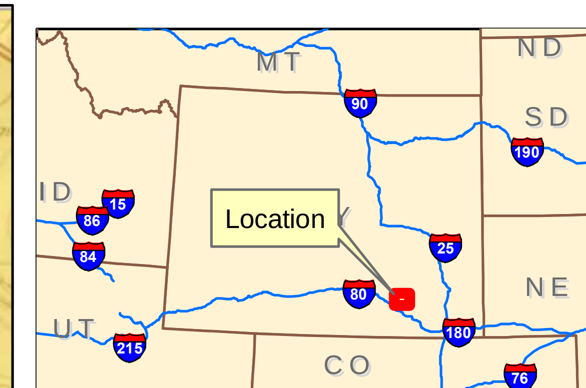

LEGEND

- Proposed Permanent Met Tower
- Temporary Met Tower
- Proposed Turbine Location
- Proposed South Substation
- Proposed West Substation
- Proposed South Switchyard
- Proposed West Switchyard
- Proposed Laydown Area
- Proposed Access Road
- New Roads
- Existing Roads
- Western Transmission Line Route (Proposed Action)
- Southern Route Alternative (Alternative 2)
- Western Route Alternative (Alternative 1)
- Bureau Of Land Management
- Sand Hills Leases

N

0 0.25 0.5 1 Miles

1 inch = 0.49 miles

FIGURE 2-4
Facility Layout
Southern Area
Sand Hills Wind Energy Project
Albany County, Wyoming

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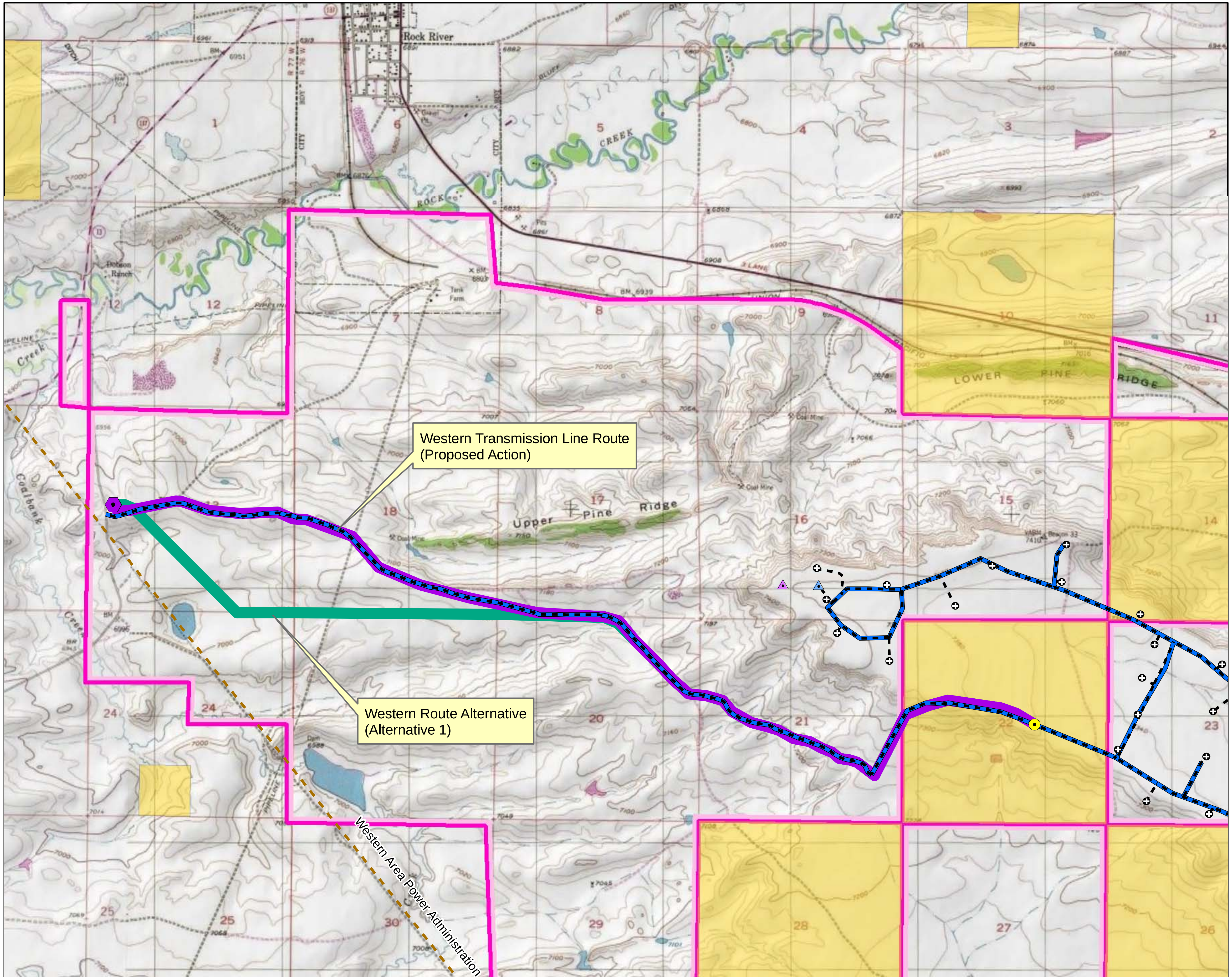

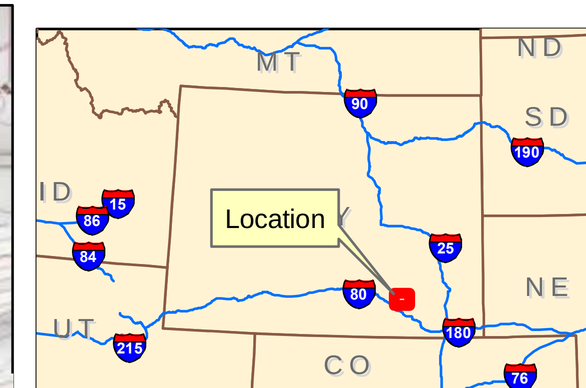

LEGEND

- Proposed Permanent Met Tower
- Temporary Met Tower
- Proposed Turbine Location
- Proposed South Substation
- Proposed West Substation
- Proposed South Switchyard
- Proposed West Switchyard
- Proposed Laydown Area
- Proposed Access Road
- New Roads
- Existing Roads
- Western Transmission Line Route (Proposed Action)
- Southern Route Alternative (Alternative 2)
- Western Route Alternative (Alternative 1)
- Bureau Of Land Management
- Sand Hills Leases

N

0 0.25 0.5 1 Miles

1 inch = 0.49 miles

FIGURE 2-5
Facility Layout
Western Area
Sand Hills Wind Energy Project
Albany County, Wyoming

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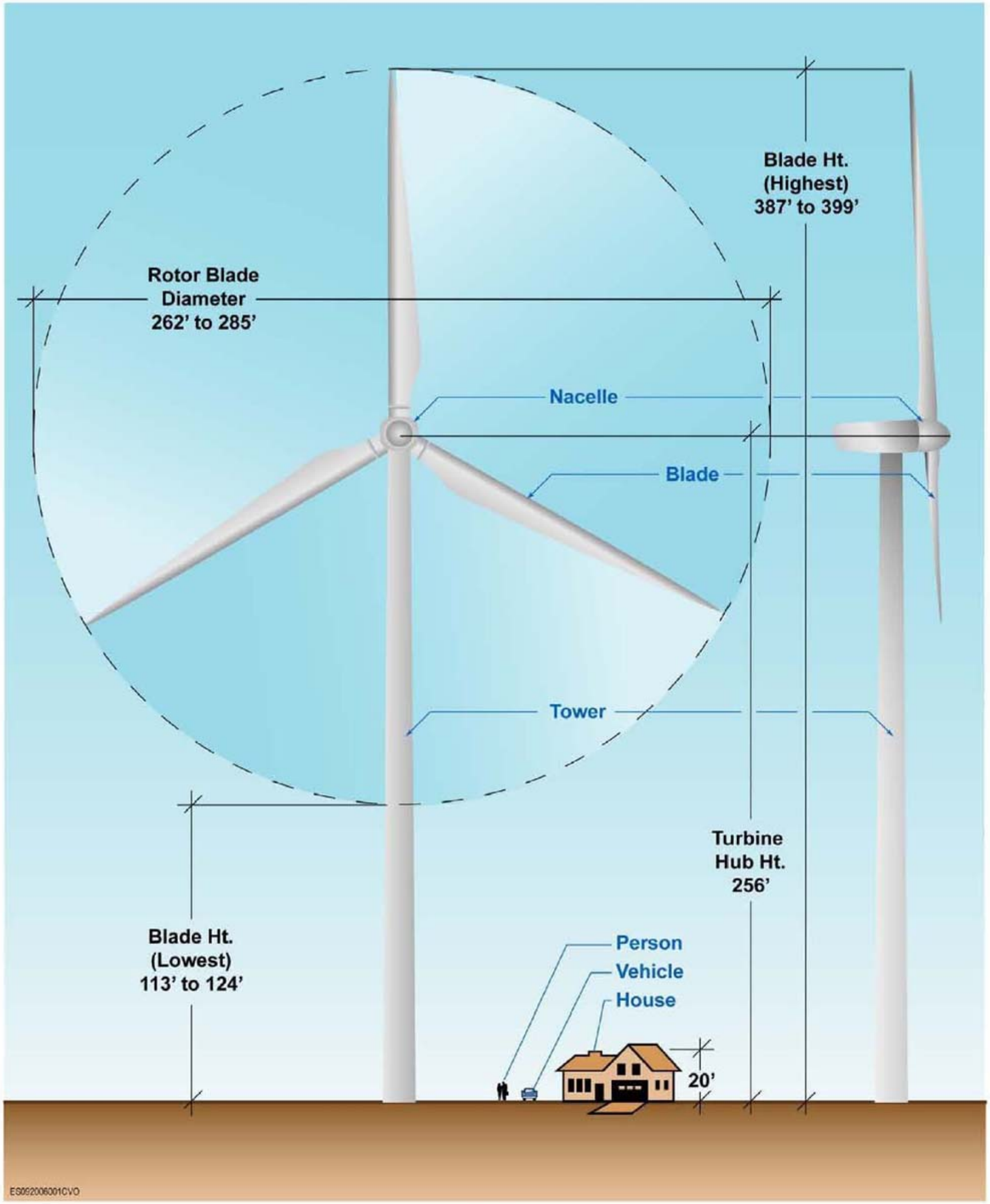


FIGURE 2-6
Diagram of a Typical Wind Turbine
Sand Hills Wind Energy Project
Albany County, Wyoming

TABLE 2-4
Temporary and Permanent Disturbance Estimates
Sand Hills Wind Energy Facility

Facilities	No.	Details	Disturbance (acres)					
			Permanent			Temporary		
			BLM	Private	Total	BLM	Private	Total
Turbine Pads/Towers	25	25-ft-diameter foundation 39,509 ft^2 acre workspace	0.02 (n=2)[a]	0.25 (n=23)	0.27 (n=25)	1.81 (n=2)	20.86 (n=23)	22.67 (n=25)
Sand Hills Substation	1	5 acres	5	0	5	0	0	0
Laydown/Staging Area/O&M Building[b]	1	10 acres	0	2	2	0	8	8
Interconnection Switchyard	1	5 acres	0	5	5	0	0	0
Meteorological Towers (permanent)	1	900 ft^2/tower	0	0.02	0.02	0	0	0
Meteorological Towers (temporary)	2	100 ft^2/tower	0	0	0	0	0.002	0.002
Underground Collection System		16 ft x 8.19 mi temporary disturbance	0	0	0	1.9	13.98	15.88
Site Access Road[c]		4.60 miles. 28 ft width[d]	5.77	5.46	11.23	0	0	0
Turbine String Road[e]		9.86 miles, 28 ft width, with additional 8 ft temporary ROW	3.98	29.46	33.44	1.14	8.43	9.57
Transmission Line Road		1.00 mile × 12 ft width	1.01	0.45	1.46	0	0	0
Disturbance Due to Turnouts		None required	0	0	0	0	0	0
Total[e]			**15.78**	**42.64**	**56.42**	**4.85**	**51.27**	**56.12**

[a] n = number of wind turbine pads/towers.
[b] O&M building footprint is 2 acres and would be located within the laydown disturbance area.
[c] Site access road is from State Highway 30/287 to the intersection at the laydown/staging area.
[d] Permanent road disturbance is calculated along existing roads as the difference between the existing road width (12 feet) and the resulting road width.
[e] Turbine string road is from the laydown/staging area and continues throughout the turbines and collector system.
Note: Roads calculations include the distance to the switchyards.

- **Nacelle.** The gearbox, generator, and various control equipment are enclosed within the nacelle, which is the housing of the unit that protects the turbine mechanics and electronics from environmental exposure. A yaw system would be mounted between the nacelle and the top of the tower on which the nacelle resides. The yaw system comprises a bearing surface for directional rotation of the turbine and a drive system consisting of a drive motor(s) to keep the turbine pointed into the wind to maximize energy capture. A wind vane and anemometer would be mounted at the rear of the nacelle to signal the controller with wind speed and direction information. All fluids required for the maintenance of the nacelles would be stored at the O&M building within the spill containment area and properly disposed of by authorized local contractors.
- **Rotor Blades.** Wind turbines are powered by three composite or fiberglass blades connected to a central rotor hub. Wind creates lift on the blades, causing the rotor hub to spin. This rotation is transferred to a gearbox where the speed of rotation is increased to the speed required for the attached electric generator that is housed in the nacelle. The rotor blades typically turn less than 20 revolutions per minute. The rotor blades are typically made from glass-reinforced polyester composite. The blades are non-metallic, but would be equipped with a sophisticated lightning-suppression system.

As noted previously, depending on the model selected, rotor diameters range from 262 to 332 feet. Table 2-5 provides a comparison of rotor diameters and total heights of the three turbine models being considered.

TABLE 2-5
Characteristics of Potential Turbines

	Model		
	Siemens 3.0-101 (largest)	**Vestas V90 3.0**	**Gamesa G87**
Tower type	Tubular	Tubular	Tubular
Tower height*	263 feet/80 meters	263 feet/80 meters	256 feet/78 meters
Rotor diameter	332 feet/101 meters	296 feet/90 meters	285 feet/87 meters
Total height (tower, nacelle, rotor)	429 feet/131 meters	411 feet/125 meters	399 feet/121.5 meters

*Total height does not include foundation.

2.2.3.2 Access Roads

Turbines have equipment transport and crane requirements that dictate road width and road turn radius. To allow safe passage of the large transport equipment used in construction, all-weather gravel roads would be built with adequate drainage and compaction to accommodate equipment transport vehicles in accordance with BLM's standards for road construction. The proposed access roads described below are designed to minimize disturbance, avoid sensitive resources (for example, cultural resource sites), and maximize transportation efficiency. All roads would be designed to meet BLM's standards.

- Site Access Road. The access road to the turbine strings would begin at an entry point from State Highway 30/287 and proceed west to the start of the turbine string road near the laydown/staging area (see Figure 2-2). The length of this road would be approximately 4.6 miles. This road would be 28 feet wide with no temporary disturbance. Approximately 2.3 miles of this road would include improvement of an existing 12-foot-wide gravel road.

- Turbine String Road. The proposed turbine string road (turbines and collector lines) would begin at the laydown/staging area and provide access to the Facility. The length of this road would be approximately 9.9 miles. During construction, the turbine string access road would be approximately 28 feet wide, with an additional 8 feet of temporary shoulder (4 feet on either side). The roads would be multi-directional and traffic would be managed to maintain safety. During operation, the turbine string road would be reduced to 28 feet wide with no shoulder.
- Transmission Line Access Road. The transmission line access road would be approximately 6 miles long, comprising 1 mile of new road and 5 miles of existing two-track road. The road would start from the Sand Hills substation, west of turbine #17, and connect with an existing, primitive two-track road before turning west into State Highway 13. Approximately 1 mile of new single-lane, 12-foot-wide road would be constructed. Minor improvements to the existing roads, such as blading and grading, would be made to accommodate the passing of vehicles.
- Switchyard Road. Access to the interconnection switchyard would be from State Highway 13, which is currently asphalt paved. Minor improvements would be made to this road. This road, approximately 100 feet long, would provide all-weather access to Western's switchyard.

Table 2-6 presents the length of the disturbed and existing roads and shows the area of disturbance by ownership (BLM, state, private) for the individual road components (site access road, turbine string road, transmission line road, switchyard road). Turnouts would be reclaimed after construction. Disturbance calculations presented in Table 2-6 represent the disturbed area of the transmission road. The calculations do not include the area associated with the existing road.

2.2.3.3 Electrical Collection System

A transformer at each wind turbine tower would increase the power generated from approximately 600 volts to 34.5 kV for delivery to the Sand Hills substation. The steel transformer box would be approximately 7 feet by 8 feet, with the concrete pad or foundation approximately 6 to 10 inches thick. The transformers would be connected to the underground electrical collection system that terminates at the substation.

The electrical collection system would consist of medium-voltage, high-density insulated underground cables connecting multiple turbines to the substation. These underground cables would be buried in trenches located within the roadbed of the turbine connector roads. In some cases, underground cable trenches would need to be located adjacent to the roadbed (but within the stated road width). The underground collector lines would terminate at the substation where voltage would be increased to 115 kV. The stepped-up power would then be delivered through the overhead transmission line to the point of interconnection to Western's existing Miracle Mile-Snowy Range 1 115-kV transmission line. The collection system would include approximately 8.19 miles of underground cable lines in an underground trench.

TABLE 2-6
Proposed Lengths and Disturbance Estimates for Roads and Collection System
Sand Hills Wind Energy Facility

	BLM			Private			Total		
	Length (miles)	Disturbance (acres)		Length (miles)	Disturbance (acres)		Length (miles)	Disturbance (acres)	
		Permanent[a]	Temporary		Permanent[a]	Temporary		Permanent[a]	Temporary
Existing road to be improved	1.15	2.23	0	1.87	3.63	0	3.02	5.86	0
New road to be constructed	2.91	8.52	1.14	9.54	31.74	8.3	12.45	40.26	9.57
Site access road	2.19	5.77	0	2.41	5.46	0	4.6	11.23	0
Turbine string road	1.17	3.98	1.14	8.69	29.46	8.43	9.86	33.44	9.57
Transmission line road	0.69	1.01	0	0.31	0.45	0	1.00	1.46	0
Underground collection system	0.98	0	1.90	7.21	0	13.98	8.19	0	15.88
Switchyard road	0	0	0	0	0	0	0	0	0
Disturbance due to turnouts	—	0	0	—	0	0	—	0	0
Total	**5.03**	**10.76**	**3.04**	**18.62**	**35.37**	**23.41**	**23.65**	**46.13**	**26.5**

2.2.3.4 Supervisory Control and Data Acquisition System

Each wind turbine generator contains electronic devices to constantly monitor turbine performance. Data from these monitoring devices can be read at each turbine. A supervisory control and data acquisition (SCADA) system would be installed to collect operating and performance data from each wind turbine and the entire Facility, and provide remote operation of the wind turbines. The wind turbines would be linked to a central computer via a fiber optic network. The host computer is expected to be located in the O&M building at the proposed site. The SCADA software would consist of applications developed by the turbine manufacturer or a third-party SCADA vendor. The communication cables for the SCADA system would be buried in the same trenches as the collector lines.

2.2.3.5 Sand Hills Substation

The electrical collection system would link each turbine to the next turbine and to the Sand Hills substation, located within the Facility boundary. The substation would step up the voltage from the electrical collection lines (34.5 kV) to the transmission level (115 kV) and provide fault protection. The basic elements of the step-up substation facilities include a control house, a bank of one or two main transformers, outdoor breakers, capacitor banks, relaying equipment, high-voltage bus work, steel-support structures, an underground grounding grid, and overhead lightning-suppression conductors. All of the main outdoor electrical equipment and control house would be installed on a concrete foundation. The exact footprint of the substation would depend largely on the utility requirements, the number of turbines used, and the resulting nameplate capacity, which would affect the number of 34.5-kV feeder breakers. It is anticipated that the Sand Hills substation would have a graveled footprint area of approximately 5 acres with a 12-foot-high chain-link perimeter fence and an outdoor lighting system.

2.2.3.6 Transmission Line

The transmission line connecting the Sand Hills substation to the switchyard would be approximately 4.6 miles of 115-kV overhead transmission line. SWE would own, operate, and maintain the transmission line interconnection from the Sand Hills substation to the switchyard.

2.2.3.7 Interconnection Switchyard

The Sand Hills substation would be connected to the interconnection switchyard, which would be owned, operated, and maintained by Western, located immediately adjacent to Western's Miracle Mile-Snowy Range 1 transmission line. Western requires the interconnection facility to the Miracle Mile-Snowy Range 1 115-kV line be a sectionalizing switchyard and have a primary and secondary source of power. A 115-kV, three breaker ring bus configuration would be installed to meet the sectionalizing requirements. The interconnection switchyard would have gated access with full perimeter fencing using a standard 7-foot chain link fence with a guard of three to four strands of barbed wire. The fence posts would be set in concrete. The interconnection switchyard would occupy approximately 5 acres (217,800 square feet) of land and include the following elements:

- SF6 power circuit breakers
- Motor operated, group operated disconnect switches with ground blades

- Instrument transformers for control, relaying and metering
- Metering equipment
- Relay and control equipment
- Communication equipment
- Control building – estimated 1,200 sq. ft.
- Distribution interconnect for station service power
- 115-kV transmission line tap structures
- Security fencing

2.2.3.8 Operation and Maintenance Facility

The O&M facility would include a main building with offices, spare parts storage, restrooms, a shop area, outdoor parking facilities, a turn-around area for larger vehicles, outdoor lighting, and a gated access with partial or full perimeter fencing. The O&M building would have a foundation footprint of about 50 feet by 100 feet and be located adjacent to the Sand Hills substation. The permanent footprint of the O&M facility (including parking area) would be about 2 acres. The O&M building would be painted to match the surrounding landscape color and would be landscaped with native species of grasses and shrubs matching those found on site prior to construction. Electricity would be sourced from a local utility and water would be supplied from existing water lines. Sewer would be either septic system or below-grade storage tank. Materials such as oil and paints would be stored in the O&M facility and properly disposed of by local authorized contractors.

2.2.3.9 Meteorological Towers

One new permanent meteorological (met) tower would be installed at the site during construction to collect meteorological data. The permanent met tower would be a freestanding structure. The tower would be approximately 262 feet high with an equilateral triangle base, with each side being roughly 25 feet long.

2.3 Preconstruction Surveys

2.3.1 Micrositing

SWE has included flexibility in preliminary facility siting to accommodate adjustments in the location of individual structures based on site-specific conditions and constraints. Certain adjustments of infrastructure locations have been required based on environmental and engineering constraints and private landowner participation. If necessary, any final adjustments to the exact location of facility structures within the surveyed footprint would be coordinated with the BLM to confirm that impacts to important resources would not result in significant adverse effects.

Wind energy facility site surveying would be completed to delineate the wind turbine array ROW boundaries, wind turbine tower locations and pad boundaries, substation and O&M facility boundaries, and access road and electrical collection cable centerlines. Transmission line surveying would delineate the transmission line ROW centerline and boundaries, transmission line tower structure locations and access road centerlines. Temporary use areas, cultural resource sites, and environmentally sensitive areas within the wind facility and the transmission line corridors would be field delineated, where appropriate, to assist in avoiding such areas during construction.

2.3.2 Geotechnical Investigations

Previous geotechnical investigations have been completed within the vicinity of the site. During construction, additional geotechnical site evaluations could be required to establish engineering data suitable for evaluation of potential turbine sites for finalizing the turbine layout and for use in designing turbine foundations. A detailed description of the types of geotechnical investigations that may be used are provided in Appendix A.

2.4 Construction

The Facility would use standard construction and operation procedures typically used for wind power projects in the western United States. These procedures, with minor modification to allow for site-specific circumstances and differences between turbine manufacturers, are summarized below.

2.4.1 Work Force

Approximately 110 to 120 workers per day, likely commuting from the Laramie area, would comprise the construction work force. The beginning and end of the construction period would involve a slightly lower number of workers compared to the middle months. Construction would be completed over an approximate 6-month period.

Up to 10 employees would work at the site on a permanent basis, including one office administrator, one foreman, and up to eight windsmiths/electricians. Employees would typically work 8-hour shifts, 5 days per week, with the exception of the windsmiths, who would rotate shifts to cover nights and weekends. SWE anticipates that the majority of permanent positions, with the exception of the foreman position, would be filled from the local Laramie labor force. Windsmith training would be provided to those who have a basic understanding of electrical work.

2.4.2 Construction Traffic

Construction of roads, structures, and electrical/communication lines would occur at about the same time, using individual vehicles for multiple tasks. The volume of material to be transported includes up to 25 turbines and towers and other associated equipment and infrastructure such as substation equipment, collector cables, permanent met towers, O&M building materials, concrete batch plant, rock crusher, and other miscellaneous items.

Transporter trucks would carry turbines, nacelles, towers, and blades to the site. In addition, trucks would transport cranes, heavy earthmoving equipment, and other equipment and building materials from the Laramie area, areas in Wyoming beyond Laramie, and out of state.

It is estimated that up to 7,470 truck round trips would occur during construction to deliver the turbine components and other related equipment to the site. Of these, up to 390 trips would be required for turbine components (including foundation component and concrete). In addition, there would be over 7,000 truck trips by other construction and trade vehicles.

This would include traffic from the workforce, potentially originating from Laramie. The majority of these truck trips are expected to occur in the first 2 to 3 months of construction during the road, foundation, and O&M building work. Subsequently, the turbine component deliveries are expected to take place over a 3- to 4-month period. These numbers are based on preliminary engineering completed to date and would be refined based on more detailed engineering and provided to BLM. Further details regarding construction traffic, along with a description of construction traffic management and safety, are provided in Chapter 4, Environmental Consequences.

2.4.3 Construction Practices

2.4.3.1 Staging/Equipment Laydown Area

The staging area would be used for the temporary storage of turbine components, construction equipment, and other supplies. In addition, the staging areas would be used during construction for storage of equipment and construction materials, equipment parking and refueling sites, crane assembly and disassembly, a batch plant (if needed), waste disposal and collection receptacles, sanitary facilities, and temporary modular office space. The area for staging/laydown would be reclaimed following the construction phase.

2.4.3.2 Road Construction

Preliminary roadway footprints, profiles, and sections were developed for the roads. Estimates of cut-and-fill required to construct the roads from the preliminary data were calculated using the InRoads® computer model. U.S. Geological Survey topographic maps were used to represent the existing ground in the InRoads® model. A horizontal alignment was created and overlaid on the digital terrain model. This alignment met the requirements for the type and size of trucks that would be delivering and constructing the proposed Facility. The roadway alignment would require the following design features:

- Less than 2 percent crown or inslope with ditch and culverts (included in the stated width), as required on uphill side.
- Maximum grade of 10 percent.
- Maximum allowable dip of 6 inches in 50 feet.
- Maximum allowable bump of 6 inches in 50 feet.
- On turns, the minimum inside radius would be 82 feet. The minimum outside radius would be 115 feet (so at the apex of a 180-degree turn, the road would be a minimum of 33 feet wide).

It is estimated that most roads would be constructed at-grade with minimal excavation to existing terrain. In areas where existing terrain is too steep to accommodate the road design requirements, additional excavation would be required. Approximately 1,800 cubic yards of cut material and 15,000 cubic yards of fill material would be excavated and placed on BLM lands. The new access road along the new southern transmission line would be a cross-country one-lane route, and cut and fill would not be required. The switchyard access road would be constructed in accordance with the Wyoming County Roads standards, as codified in Title 24, Chapter 3, Article 2 of Wyoming state statutes. The road between the interconnection switchyard and the Sand Hill substation would be constructed to provide all-weather access to Western's switchyard. Approximately 13,200 cubic yards of material would be excavated from private property to balance the required quantities of cut-and-fill. Table 2-7 shows the preliminary cut-and-fill volumes for access roads. Excavated fill from turbine foundations could also be used as road base material.

TABLE 2-7
Estimated Cut and Fill Volumes for Access Roads
Sand Hills Wind Energy Facility

Ownership	Cut (cubic yards)	Fill (cubic yards)	Total (cubic yards)
BLM	1,800	15,000	17,300
State	0	0	0
Private	13,200	0	0

Note: Cut-and-fill volumes are only for excavation and do not include rock fill that would be placed on all the roads at 1.037 cubic yards per linear foot of road.

The estimates generated for temporary and permanently disturbed areas, along with cut-and-fill volumes for the proposed roadways (as well as turbine pads and the O&M facility /Sand Hills substation area), are based on general assumptions and approximate locations of these Facility components. These estimates are approximated to depict worst-case disturbance scenarios. Final location of the road and the cut-and-fill volumes would be based on environmental permitting requirements, topography, and sound engineering principles. Figure 2-7 shows a diagram of the typical cross-section of the 28-foot-wide turbine string roads. Cut-and-fill slopes would be at a ratio of 2:1. Equipment clearance would require a minimum inside radius of 82 feet on all turns, and would be graded to within no more than 6 inches of rise or drop in any 50-foot length. If any deviations from the assumptions presented in this environmental analysis occur, subsequent NEPA analysis would occur.

Fill or road base material in excess of that generated from road cut activities would be obtained from a licensed offsite private source. Topsoil removed during road construction would be stockpiled at staging areas, and measures would be taken to minimize topsoil loss from wind erosion. The stockpiled topsoil would be re-spread on cut-and-fill slopes and then re-vegetated as soon possible following road construction. Roadways would be graveled, as required. Existing cattle guards, fence, and fence crossings would be restored to the original condition.

2.4.3.3 Wind Turbine Work Area and Crane Pads

At each turbine site, up to 26,000 square feet of laydown area would be required for off-loading and storage of the three or four tower sections, nacelle, rotor hub, and blades. In level or near-level terrain, the turbine work area would not need to be graded or cleared of vegetation.

Each wind turbine work area would include a crane pad adjacent to the turbine access road to allow a large track-mounted crane to access the turbine foundations. The crane pad would need to be nearly flat to allow the crane to lift the large and extremely heavy turbine components safely. The crane pad would be constructed using standard cut-and-fill road construction procedures.

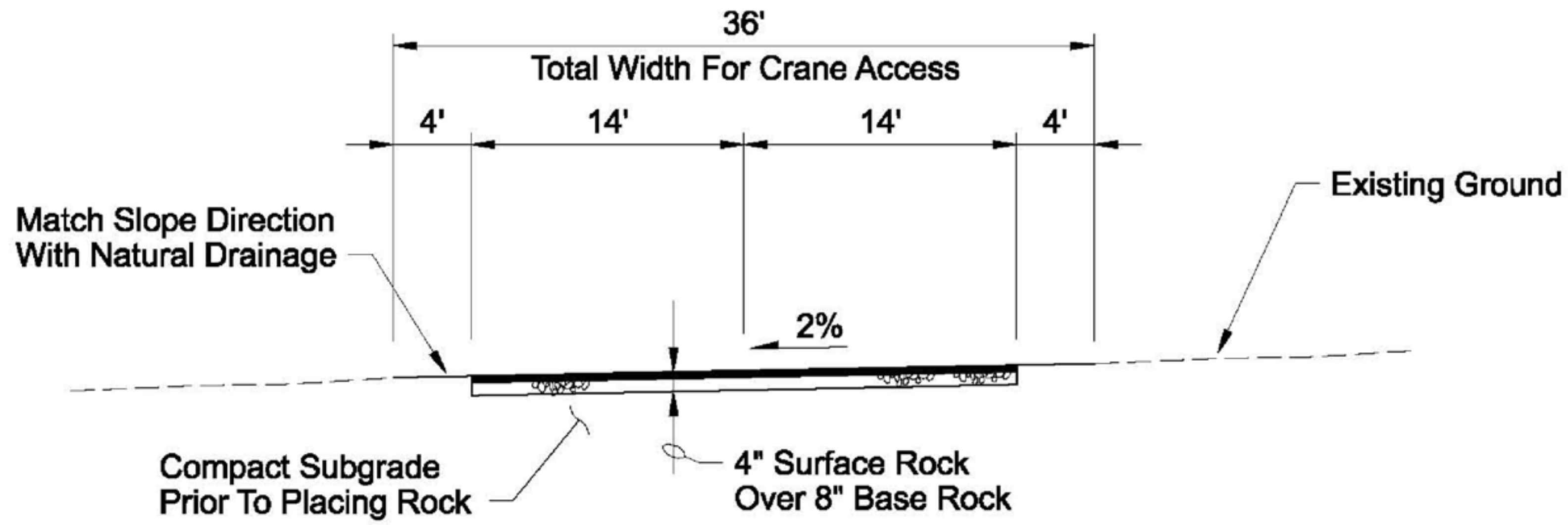
Although up to three cranes would be needed to assemble the turbine components, only one crane would be on the crane pad at any one time.

2.4.3.4 Turbine Foundations and Pads

Two foundation designs are typically used for wind turbine installations in the United States—a "mat" foundation or a "pier" foundation. These are typically defined for a specific project by the soil conditions and wind turbine requirements. Mat foundations are wide and shallow, and pier foundations are narrow and deep. The exact foundation type cannot be estimated until a final turbine type is chosen and a geotechnical investigation is completed. Expected soil conditions make it likely that most foundations would be pier design. The analysis conducted for this EA assumed the use of a mat foundation, which represents the most extensive footprint for turbine foundations. While the option remains for pier foundation, it would not result in as extensive disturbance. Therefore, this document analyzes the most extensive amount of disturbance and potential impacts associated with turbine foundations.

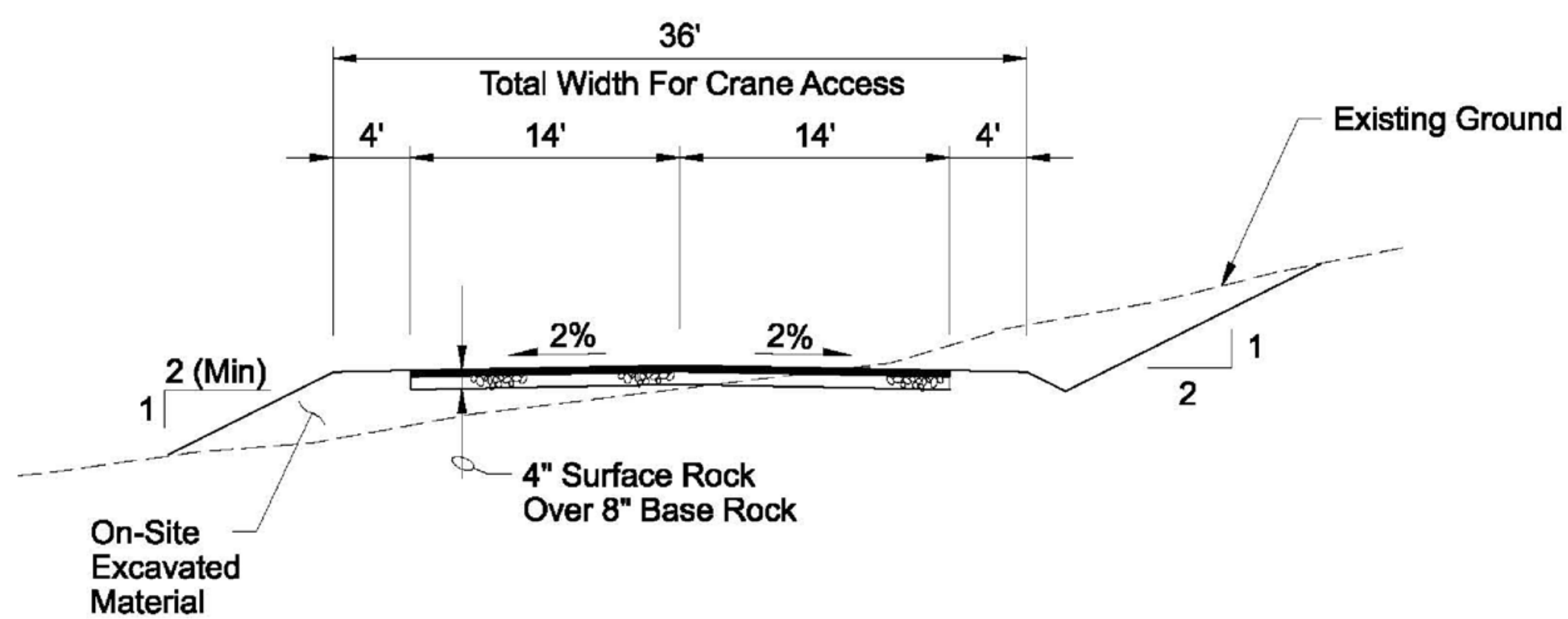
A 90-foot-diameter area would be cleared for foundation construction. The disturbance area and construction material estimated in this document would allow for the construction of either foundation type. The final turbine pad with access driveway would permanently cover approximately 3,500 square feet. The pier foundation involves making a roughly circular excavation approximately 16 feet in diameter and 25 to 30 feet deep. Fill would be temporarily stored onsite; part of the fill would be used to re-grade road surfaces and the rest of the fill would be disposed of offsite in a permitted location. Boreholes about 3 inches in diameter would be drilled to a depth of 2 feet below the foundation depth (27 to 32 feet deep). Packets of explosives about the size of soda cans (each containing about 2 pounds of explosives) would be lowered into the boreholes (one packet per each foot of depth), and the remaining space would be filled with sand. Rock within the excavation area would be fractured by delayed detonation blasting in interior and perimeter bore holes. Any excess materials generated from foundation activities would be disposed of at a licensed offsite private source.

Two sections of concentric steel conduit forms would be lowered into the foundation excavation. Concrete slurry would be pumped between the outside of the larger-diameter conduit and the perimeter of the excavation. Spoils from the excavation would be used to fill the inside of the smaller-diameter conduit. To ground the turbines adequately to prevent damage from electrical storms, 3-inch-diameter, 30-foot-deep holes could be required for placement of turbine grounding rods, as needed. These holes would be located adjacent to the turbine foundations within the 90-foot-diameter area that is cleared for foundation construction. Following placement of the grounding rods, the holes would be backfilled and capped with concrete.



Typical Section

1"=10'



Typical Section In Cut/Fill

1"=10'

Notes:

1. Typical Disturbance For Road Construction Is 28' Wide For Permanent Disturbance And An Additional 8' Width Temporary Disturbance.
   In Steeper Areas Where Cut/Fill Is Required To Accommodate Grade, Temporary Disturbance Width Will Be Greater.

0 5 10 15

Scale In Feet

FIGURE 2-7
Typical Roads Sections
Sand Hills Wind Energy Project
Albany County, Wyoming

2.4.3.5 Tower Erection

Tower erection requires the use of one large, track-mounted crane and two small cranes. The large crane would first raise the bottom conical steel tower section vertically and then lower it over the threaded foundation bolts. The large crane would then raise each additional tower section to be bolted through the attached flanges to the lower tower section. The crane would then raise the nacelle, rotor, and blades to be installed atop the tower. Two smaller, wheeled cranes would be used to off-load turbine components from trucks and to assist in the precise alignment of tower sections.

2.4.3.6 Underground Communication and Electrical Cables

Trenching equipment would be used to excavate trenches in or near the access roadbed to bury the insulated underground cables that would connect each turbine the Sand Hills substation. The trenches and underground cables would be installed under the roadbed or temporary shoulder. Large collector cables would be placed (and packed in sand or native materials depending on the soil properties at the site) within the trenches and covered to protect the cables from damage or possible contact. Optical fiber communication links would be placed in the same trenches as the collector cables. The depth and number of trenches would be determined by the size of the cable required and the thermal conductivity of the soil or rock surrounding the trench.

2.4.3.7 Transmission Line

Typically, a 75-foot-wide easement or ROW would be required for the 115-kV line. The overhead connection line would be hung from wood or steel monopoles approximately 55 to 80 feet high depending on span (Figure 2-8). Overhead wires would consist of three wires attached to non-specular (low reflectivity) conductors and two continuous ground wires.

2.4.3.8 Batch Plant

The concrete batch plant would be located on site within the laydown/staging area and would occupy an area of approximately 2 acres. Vegetation would be cleared, the ground leveled, and a 1-foot-high earth berm or other appropriate erosion control devices, such as silt fences and straw bales, would be installed around the area to contain water runoff. A Stormwater Pollution Prevention Plan would be developed after detailed road design is completed. Diversion ditches would be installed as necessary to prevent stormwater from running onto the site from surrounding areas. The batch plant would operate during construction hours for approximately 3 to 4 months of the 6-month construction period. The batch plant would require an approximately 250 kW standalone generator during operation. The generator would draw fuel from an approximately 500-gallon aboveground storage tank with secondary storage for spill prevention. It is estimated that the batch plant would consume from 2,000 to 4,000 gallons of water per day. A 4,000-gallon water tank would be on site and would be replenished as needed. Water would be purchased from an existing private water source permitted for commercial uses.

2.4.3.9 Portable Rock Crusher

To construct the roads and other infrastructure, a rock crusher would be required to provide appropriately sized aggregate for fill and road base. The rock crusher, if needed, would be located in a staging/laydown area and would have an average capacity of approximately 4,800 tons per day. The rocks would be supplied from a permitted commercial source. The crusher would operate during construction hours for approximately 3 to 4 months of the 6-month construction period. In accordance with BMPs, the rock-crushing area would be sprayed by a water truck to suppress dust. The crusher would contain several dust-suppression features including screens and water spray. Dust-control measures would be operating at all emission points during operation of the crusher, including start-up and shut-down periods, as required.

2.4.3.10 Water Source and Use

During construction, a total of approximately 2 million gallons of water would be required for road compaction, underground electrical collection line installation, dust suppression, and concrete mixing. Approximately half the water consumption would be for dust control with the other half used for all other construction activities. These usage rates are based on water consumption rates for similar wind energy construction projects in the western United States. Daily water use for construction would vary, depending on the timing of construction and the weather, because the need for dust control would be greater during the summer than at other times of the year.

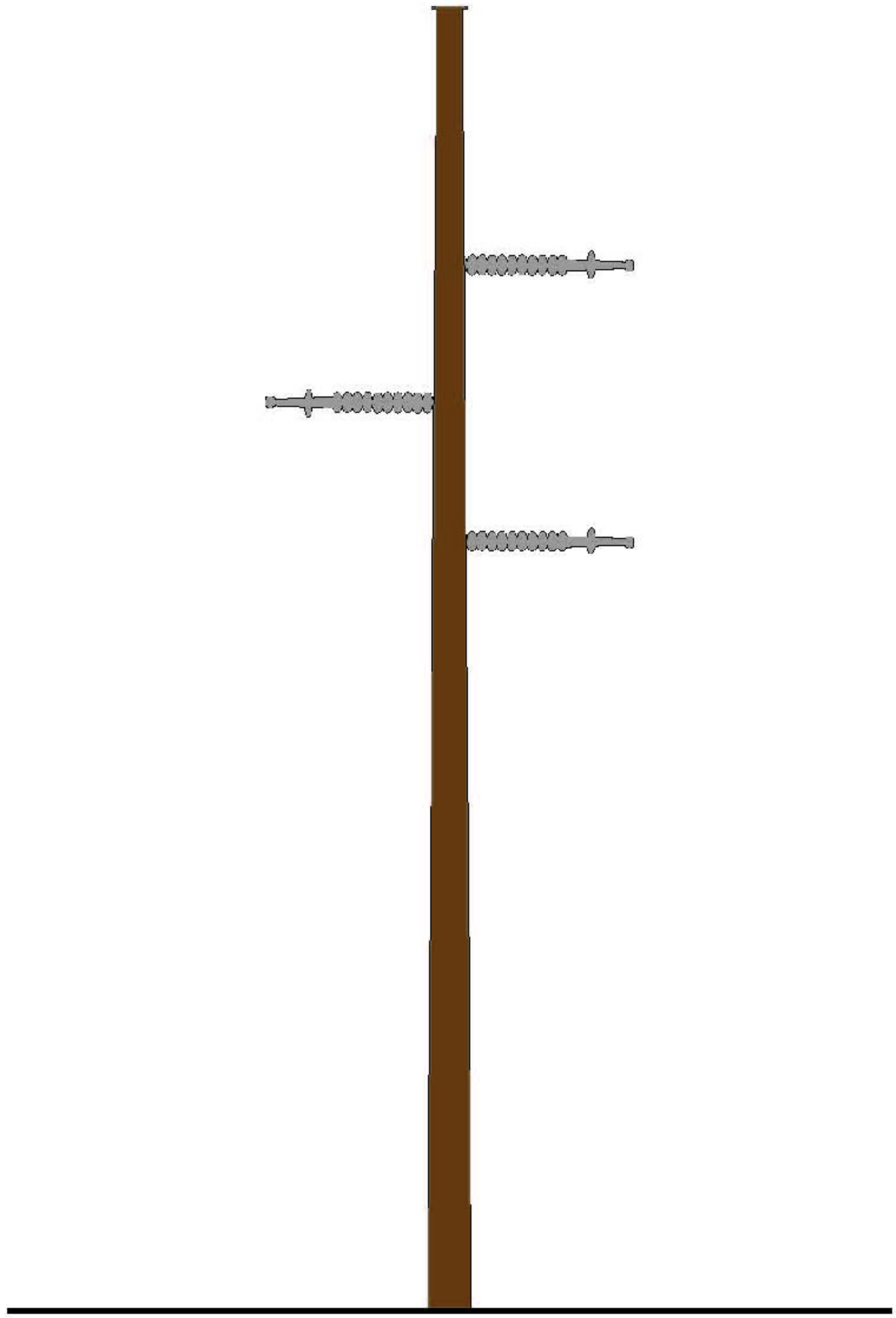
No wells would be drilled or springs developed for the Facility. Water needed for the construction activities would be provided through a nearby privately owned well with permitted water right issued through the Wyoming State Engineer’s office. Because truck use of roads during operation would be minimal, water would not be used for dust suppression.

2.4.3.11 Laydown Area

Construction contractors would require onsite mobile trailers to provide for management of and communication to the work force. The mobile trailers, located in the 10-acre laydown/staging area, would also house a first aid station, emergency shelter, restrooms, and hand-tool storage area for the construction workforce. The ground surface would be graveled to limit dust and mud within the area. Power for the mobile trailers would be from existing local power utility. Water would be trucked in, and sewer trucked out.

2.4.3.12 Interim Reclamation

When construction is complete, the cleared shoulders and drainage ditches on either side of the roads would be reclaimed and restored. Turbine pads would be reclaimed and restored around each turbine to a width that would accommodate future access only for routine maintenance and repair activities. The construction area for the transmission lines and Sand Hills substation and switchyard also would be reclaimed and restored to pre-construction conditions. Table 2-6 presents the type of disturbance that would remain (long-term disturbance) after construction and interim reclamation are complete.



Transmission Nominal Voltage:	115 kV
Type:	Single Pole
Typical Tower Height:	55–80 feet
Typical Right-of-Way Width:	90–130 feet

FIGURE 2-8
Typical Monopole-Frame Transmission Interconnect Line Support Structure
Sand Hills Wind Energy Project
Albany County, Wyoming

A Facility-specific Reclamation Plan has been prepared by SWE, in coordination with BLM guidance, and is included in Appendix B. Reclamation procedures would be implemented to minimize the disturbance associated with construction. BLM reclamation goals emphasize eventual ecosystem reconstruction that returns the land to a condition approximate to or better than that which existed before it was disturbed. BLM's reclamation goals also emphasize re-creating the successional pathway that restores the plant cover and species composition of the site to its pre-disturbance direction and boundaries (BLM, 2008a). SWE would meet these goals by complying with the BLM's Wyoming Reclamation Policy for all surface-disturbing activities, as described in Instruction Memorandum No. WY-2009-022 issued in March 2009), the Rawlins RMP (BLM, 2008a) and Final Environmental Impact Statement (FEIS) Reclamation Plan (BLM, 2008c), the *Final Programmatic EIS on Wind Energy Development on BLM-Administered Land in the Western United States* (BLM PEIS) (BLM, 2005a), Sand Hills Wind Energy Facility Reclamation Plan and Weed Management Plan and various other applicable planning and management guidelines, policies, documents, and regulations.

2.4.3.13 Construction Cleanup

Final cleanup and restoration would occur immediately following construction. Waste materials would be removed from the area and recycled or disposed of at approved facilities. Construction-related waste would be properly handled in accordance with state and federal regulations and permit requirements. The waste would be removed to a permitted disposal facility. This waste could include trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials.

Excess material (soil, rocks, vegetation), excluding top soil, developed during the construction would be disposed of at an offsite location. The offsite disposal area would be a private facility licensed to accept such material.

2.4.3.14 Sanitation Facilities

SWE would contract with a county- or state-approved local sanitation company to provide and maintain appropriate sanitation facilities. The sanitation facilities would be located at each of the crane assembly areas, the batch plant, the substation, and the laydown area; when necessary, additional facilities would be placed at specific construction locations.

2.4.3.15 Hazardous Materials Management

Construction, operation, and maintenance would result in the temporary use and storage of small amounts of hazardous materials. Such materials would mostly include fuels, lubricants, and hydraulic fluids associated with construction equipment, as well as cleaning and maintenance compounds.

It is expected that small amounts of hazardous waste could be generated during construction, resulting in a conditionally exempt small quantity generator status. Potential hazardous waste streams would be associated with spent aerosol cans and other construction-related solvent use. It is estimated that this waste generation would be on the order of dozens of cans and potentially several gallons of solvent waste. No underground storage tanks are currently located on site or proposed. The Facility would be subject to National Pollutant Discharge Elimination System (NPDES) requirements for the protection of surface water quality. Conditions of approval would require the implementation of NPDES BMPs during construction, including provisions that construction equipment be properly maintained to minimize leaks of motor oils, hydraulic fluids, and fuels.

Construction equipment and O&M vehicles would be properly maintained at all times to minimize leaks of motor oils, hydraulic fluids, and fuels. During construction, refueling and maintaining vehicles that are authorized for highway travel would be performed offsite at an appropriate location. Construction vehicles that are not highway-authorized would be serviced at the site by a maintenance crew using a specially designed vehicle maintenance truck. During operation, O&M vehicles would be serviced and fueled at the O&M building or at an offsite location. A Spill Prevention, Control and Countermeasure plan would be prepared and would contain information regarding training, equipment inspection and maintenance, and refueling for construction vehicles, with an emphasis on preventing spills.

The Hazardous Materials Management Plan would contain specific information regarding the types and quantities of hazardous materials, as well as their production, use, storage, transport, and disposal. This plan would be included as a requirement of the ROW grant for the Proposed Action.

2.5 Public Access and Safety

2.5.1 Public Access

The Facility would be located on private property and public (federal) lands. Consequently, some public access to the federal lands would be restricted during construction. The restrictions, such as limited road access, would be implemented to ensure public safety. Perimeter security fencing would be installed around the Sand Hills substation and the interconnection switchyard (see Section 2.5.2). The fencing would not interfere with existing ranch activities. Authorized users, such as grazing permittees and communication site personnel, would continue to have access during the construction period.

2.5.2 Fencing

The Sand Hills substation would be fenced with 12-foot-high, chain-link fence to prevent public and wildlife access to high-voltage equipment. Safety signs would be posted in conformance with applicable state and federal regulations around all towers (where necessary), transformers, other high-voltage facilities, and roads. The interconnection switchyard perimeter fencing would be standard 7-foot chain link fence with a guard of three to four strands of barbed wire. The fence posts would be set in concrete. The fencing is required for security and to keep wildlife and cattle away from project components.

2.5.3 Tower Lighting Requirements

Federal Aviation Administration (FAA) regulations require lighting on structures over 200 feet tall and through its Notice of Proposed Construction or Alteration (Form 7460.1), the FAA would review design and lighting features prior to construction (14 CFR Part 77).

Although coordination with the FAA has not been initiated, based on the lighting and marking requirements of similar projects and the FAA Obstruction Marking and Lighting

Advisory Circular (AC70/7460-1K), a likely adequate lighting setup for the proposed Facility can be determined.

2.6 Environmental Compliance and Variance Procedures

SWE has established an inspection and monitoring program to be implemented where federal lands managed by the BLM would be affected by the Facility. The compliance monitoring program would be implemented under the direction of the BLM and is included in Appendix E. The program would be implemented by a Field Project Manager (FPM) who would provide oversight of the project activities. The FPM and the Compliance Manager would work with the contractors' key personnel to ensure compliance with SWE's obtained environmental permits, agency agreements, and approved mitigation measures. The inspection program would describe the measures that SWE and its contractors would implement to construct and operate the proposed Facility in compliance with all federal, state, and local permits and requirements. SWE has committed to providing funding to hire a third-party Compliance Monitoring Contractor to oversee the compliance monitoring program during construction of the Facility. The overall objective of the compliance monitoring program is to monitor and document SWE's compliance with the environmental requirements during construction.

The environmental compliance inspection plan would demonstrate how SWE would incorporate permit requirements into the various Facility-related documents, implement the identified mitigation measures through its environmental inspection and resource monitoring program, provide worker environmental training, and address procedures for noncompliance.

2.7 Operation and Maintenance

2.7.1 Routine Operation and Maintenance

Routine maintenance of the turbines would be necessary to maximize performance and detect potential difficulties. Routine activities would consist primarily of daily travel by windsmiths, who would test and maintain the wind facilities. O&M staff would travel in pickups or other light-duty trucks. Most servicing and repair would be performed within the nacelle, without using a crane to remove the turbine from the tower. Occasionally, the use of a crane or equipment transport vehicles could be necessary for cleaning, repairing, adjusting, or replacing the rotors or other components of the turbine. Cranes used for maintenance activities would not be as large as the track-mounted cranes needed to erect the turbine towers. Over time, it would be necessary to clean or repaint the blades and towers, and periodically, exchange lubricants and hydraulic fluids in the mechanisms of the turbines. All lubricants and hydraulic fluids would be stored, used, and disposed of in accordance with applicable laws and regulations. When necessary, repainting would be performed by licensed contractors in compliance with applicable laws and regulations.

2.7.2 Monitoring

Monitoring of Facility operations would be conducted from computers located in the base of each turbine tower and from the O&M building using telecommunication links and computer-based monitoring. In addition to the Facility monitoring, wildlife monitoring would be implemented in conjunction with Facility construction and operation, as discussed in Appendix I, Wildlife Monitoring Program.

2.7.3 Hazardous Materials and Pollution Prevention

Hazardous materials are those chemicals listed in the U.S. Environmental Protection Agency (EPA) Consolidated List of Chemicals Subject to Reporting under Title III of the Superfund Amendments and Re-authorization Act of 1986. No extremely hazardous materials (as defined by 40 CFR 335) are anticipated to be produced, used, stored, transported, or disposed of as a result of Facility construction or operation. Production, use, storage, transport, and disposal of hazardous materials associated with operation would be in strict accordance with federal, state, and local government regulations and guidelines. Potentially hazardous materials used during operation and maintenance would be stored in the O&M building in approved aboveground containers with appropriate spill containment features.

Turbine lubricants used in the turbine gearbox are potentially hazardous. The gearbox would be sealed to prevent lubricant leakage. The gearbox lubricant would be sampled periodically and tested to confirm that it retains adequate lubricating properties. When the lubricants have degraded to the point where they no longer contain the needed lubricating properties, the gearbox would be drained, and new lubricant would be added.

Transformers contain mineral oil for heat dissipation. The smaller transformers are sealed. The larger ones, such as the 115-kV transformer in the Sand Hills substation, would not be sealed. The larger transformers would be equipped with pumps to circulate the oil and fans for cooling. The transformers would also contain nitrogen for moisture and corrosion control. The transformers are sealed and contain no moving parts. The transformer oil would not be subject to periodic inspection and does not need replacement for smaller transformers. The mineral oil is routinely inspected in larger transformers like the 115-kV transformer and is periodically replaced or removed, filtered, and replaced. Secondary containment may be required for the Sand Hills substation in case of transformer failure.

2.7.4 Decommissioning

Decommissioning refers to the dismantling of Facility infrastructure and re-vegetation of the site upon completion of the Facility's operating life. The leases have a 20- to 25-year term, with an additional 20- to 25-year extension, and the anticipated operational period could be greater than 30 years. Upgrading and replacing equipment can extend the operating life indefinitely, assuming future demand exists (after the first term) for the electricity generated. Therefore, the estimated operational period depends primarily on the demand for power, which would be expected to increase for the foreseeable future. Because Western would own the switchyard, the decision of whether to decommission the switchyard would be made by Western.

Decommissioning would involve removing the turbines, support towers, transformers, substation, and the upper portion of foundations. Generally, wind turbines, electrical components, and towers are either refurbished and resold or recycled for scrap. All unsalvageable materials would be disposed of at authorized sites in accordance with applicable laws and regulations.

Site reclamation after decommissioning would be based on site-specific requirements and techniques commonly employed at the time the area would be reclaimed. Techniques could include re-grading, spot replacement of topsoil, and revegetation of all disturbed areas with an approved native seed mix. Turbine towers and substation foundations would be removed to a depth of 6 inches below grade.

2.8 Alternatives

NEPA requirements for the Proposed Action and alternatives direct federal agencies to consider the Proposed Action and alternatives that would accomplish the agency's purpose and need. The BLM is directed by NEPA to, "study, develop and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources…" (NEPA Sec. 102(2)E). The alternatives described in this section, along with the Proposed Action, will be considered to facilitate the BLM decisionmaking process of whether to approve, approve with modifications, or disapprove the ROW grant application submitted by SWE for the Sand Hills Wind Energy Facility.

Several criteria were considered during the formulation of alternatives. An alternative was required to meet the BLM's purpose and need for the Proposed Action (see Section 1.2) in that it must meet the requirements of supporting the viable development of a wind energy facility and the necessary electrical transmission within a suitable area (consistent with the applicant's interests and objectives); all alternatives would need to address unresolved conflicts concerning uses of available resources in the Proposed Action area; and, an alternative must be consistent with the applicable BLM RMP and other statutes, regulations, and plans (see Section 1.4).

The alternatives evaluated in this EA are the Proposed Action, described in Section 2.8; the No Action Alternative; and Alternatives 1 and 2, which present alternatives to the proposed transmission line access route. Figure 2-2 depicts the locations of Alternatives 1 and 2 relative to the Proposed Action's transmission line access road. The evaluation of the alternatives, including the three action alternatives (Proposed Action, Alternative 1, and Alternative 2) and the No Action Alternative is provided in Chapter 4 of this EA.

2.8.1 No Action Alternative

Under the No Action Alternative, the BLM would deny SWE's ROW application, and SWE would not construct and operate the Sand Hills Wind Energy Facility.

Under the No Action Alternative, Western would not execute an interconnection agreement with SWE and the Facility would not be interconnected with Western's transmission system. Western's determination not to approve the interconnection request could make the Proposed Action infeasible. SWE could continue to pursue the project by applying for interconnection with another transmission provider in the vicinity, however Western can not speculate on whether access to alternative transmission is a technically and economically feasible option for SWE. The electrical generation capacity of the Facility could change depending on the transmission capacity of the alternative transmission provider and other factors could make SWE's Facility infeasible. For the purposes of this EA, which discusses the potential impacts of Western's decision on the interconnection request, the No

Action Alternative is considered to result in the proposed Facility not being constructed, and consequently the environmental impacts associated with the proposed Facility would not occur.

2.8.2 Alternative 1—Western Realignment of Transmission Line Access Route

Alternative 1 would be similar to the Proposed Action's transmission line access route except that a small portion of the proposed line would be rerouted based on the presence of sensitive cultural resources. This alternative is being evaluated to consider minimizing potential impacts on cultural resources.

The Proposed Action transmission line access route would extend in a westerly direction from the Sand Hills substation west of turbine #17 on BLM-managed lands in Section 14 to the proposed interconnection switchyard on private property in Section 22. At the western terminus of the Proposed Action transmission line access route, the switchyard would connect with an existing, primitive two-lane road before turning west into State Highway 13.

Under Alternative 1, the location of the Sand Hills substation and the switchyard would be the same as for the Proposed Action. The transmission line access route would extend southeast from the switchyard approximately 1 mile and then be positioned east-west for approximately 2.2 miles where it would rejoin the Proposed Action's route to the switchyard. Approximately 1.0 mile of new, single-lane, 12--foot-wide road would be constructed.

Minor improvements would be made to State Highway 13 to allow construction traffic access to the proposed interconnection switchyard.

All other Facility components would remain as described for the Proposed Action, and SWE would obtain all relevant permits and conduct all identified measures in compliance with relevant federal, state, and local permit conditions.

2.8.3 Alternative 2—Southern Transmission Line Access Route

Alternative 2 is an alternate transmission line route that would connect the Facility to the existing 115-kV transmission line south of the site. This alternative would require the Sand Hills substation and switchyard to be constructed in a different location than the Proposed Action (see Figure 2-2). The Alternative 2 route would depart from the Alternative 2 Sand Hills substation location on privately owned land in Section 35 and travel approximately 4.7 miles to the Alternative 2 switchyard location at Western's existing transmission line. The transmission line road would be up to 25 feet wide (with no shoulder) located within the transmission line ROW. As for the Proposed Action, this alternative switchyard road would be built to conform to the Wyoming Department of Transportation's Wyoming County Road standards. Inclusive of the road width, the Alternative 2 route would occupy 14.22 acres of permanent disturbance on private lands. Temporary turnouts (0.1 acre of area) spaced approximately 1 mile apart would be located along the transmission line access road during construction and reclaimed after construction. Where the road crosses the Wheatland Irrigation District canal, SWE would improve the existing crossing for access during switchyard construction and maintenance. Alternative 2 would also cross Dutton Creek, which would require raised road surface with culverts for drainage.

The proposed Alternative 2 transmission line route is drained by tributaries to Dutton Creek, which is a perennial stream primary fed by snowmelt in the upper reaches in the Medicine Bow Mountains and spring fed in the lower reaches (Tullis, 2008; Hargett, 2009). An irrigation ditch system conveys most of the flows from Dutton Creek into a series of reservoirs and small lakes, where flows eventually enter landlocked Cooper Lake (Tullis, 2008). Flows in Cooper Lake are variable, depending on the balance between rainfall and evaporation. Alternative 2 would cross Dutton Creek, a perennial water body that flows into landlocked Cooper Lake. The proposed transmission line would also cross Dutton Creek.

Dutton Creek is a Class 2AB waterway protected for all beneficial uses, including drinking water and game fish (Wyoming Department of Environmental Quality [WDEQ], 2001). Cooper Lake, the unnamed ephemeral tributary to the Laramie River, and an unnamed ephemeral tributary to Cooper Lake are Class 3B waters protected for the following beneficial uses: other aquatic life, recreation, wildlife, agriculture, industry, and scenic value (WDEQ, 2001). Named drainages within the proposed Alternative 2 transmission line route (i.e., Dutton Creek) may contain adequate hydrology to support wetlands. The proposed transmission line would cross several PEM wetlands identified on the National Wetland Inventory maps associated with Dutton Creek.

The transmission line route mainly is characterized as dry uplands with some wetter floodplain areas present near Dutton Creek. The main drainage feature through the site is Dutton Creek and it presents associated herbaceous riparian floodplain and wetland areas. Dutton Creek flows from the west to the east to Cooper Lake, located approximately 2 miles east of the survey area. Just north of Dutton Creek is an unnamed water transport aqueduct, which appears to collect water from Dutton Creek and a reservoir upstream of the Facility area and transport it eastward toward the Laramie River.

Hydrology in the region is characterized by semi-arid conditions with very little overall precipitation. Annual precipitation in nearby Laramie averages around 10 inches of rainfall and 42 inches of snowfall. Much of this precipitation arrives in very intense short-duration storms that create flash flood conditions during the thawed periods. As commonly occurs in other dry areas of the west, drainage systems near the Facility are heavily influenced by cycles of intense flooding followed by dry periods. This hydrologic regime favors the formation of vegetated ephemeral gullies and swales instead of intermittent and perennial streams and generally limits the formation of wetlands to stream corridors, permanent springs, or well-defined depressions that serve as natural catch basins. Because of the presence of Dutton Creek, its floodplain, and several surface water features in the vicinity, there is relatively abundant water in the area compared with many other places within the Laramie Basin Ecoregion. Hydrology of the area has been altered by the unnamed water transport aqueduct and the construction of reservoirs upstream and downstream of the Facility site.

The field delineation identified potentially jurisdictional wetlands and waters of the U.S. The transmission line access road would impact approximately 0.077 acre of wetlands and potentially jurisdictional water bodies. The total disturbance from the proposed 25-foot-wide road to the Dutton Creek crossings is 0.063 acre. SWE would obtain any necessary permit(s) and easement(s) from the U.S. Army Corps of Engineers and/or the Wheatland Irrigation District respectively, as required, prior to construction.

SWE would also coordinate with WDEQ and include turbidity monitoring and a possible turbidity waiver. Because the 100-year floodplain crosses Dutton Creek, the access road to Western's interconnection switchyard would be constructed to allow passage of 100-year flood flows. This route would be cleared of snow by SWE in winter to allow emergency access by Western to its switchyard.

Groundwater within the area associated with Alternative 2 occurs in the Upper Laramie subbasin. The Upper Laramie subbasin includes the upper reaches of the Laramie River and the little Upper Laramie River and is primary located in Albany County. As with the Proposed Action area, about 96 to 98 percent of the total groundwater use in the Upper Laramie subbasin is for agricultural, industrial, and municipal purposes (Wyoming Water Development Commission [WWDC], 2009). Primary beneficial uses of groundwater in the vicinity of Alternative 2 are for agricultural and domestic purposes. Groundwater wells in the area vary in depth from 21 to 300 feet below ground surface (bgs) with static water levels ranging from 4 to 197 feet bgs (Wyoming State Engineer's Office [WSEO], 2009).

Alternative 2 is located within a zone that has been determined to not be hydrologically connected to the North Platte River. The WSEO would regulate surface and groundwater use/supply for the Facility to comply with applicable regulations and the Platte River Implementation Agreement.

2.9 Alternatives Considered but Dismissed from Further Consideration

2.9.1 Alternative Turbine Locations

SWE initially proposed a wind energy facility that included alternative turbine arrays at the site. Specifically, this array included turbines on the western edge of the plateau on private lands. Based on agency comments of potential resource impacts, particularly to cultural resources, SWE modified the facility design to avoid placing turbines on private lands on the western edge of the plateau. With that redesign to avoid impacts to cultural resources, this alternative turbine location approach was eliminated from further consideration.

2.9.2 Alternative Facility Locations

SWE has applied for and received a site testing and monitoring permit from the BLM for the proposed site. This location was identified based on its high potential as a wind resource, its close connection to the existing Western transmission lines, its easily accessible site location via US 30/287, and a private landowner amenable to development. No other locations were analyzed by SWE because of the high wind energy resource potential of the proposed site and, therefore, alternative site locations were eliminated from further consideration.

2.9.3 No Construction on Federal Lands

Under this alternative, the proposed Facility would be constructed entirely on private lands. This alternative was not feasible because BLM lands (Sections 14, 22, 26, 30, and 32) are dispersed throughout the proposed site. Without access across BLM lands, the roads and collector lines would be discontinuous, resulting in construction and operation costs that would make the Proposed Action infeasible.

2.9.4 Other Alternative Transmission Line Route and Interconnection Point Location

An alternative transmission line route to the point of interconnection with Western's existing transmission line was examined early in the planning process by SWE. That route extended from the western turbine-string-road turnaround to the proposed switchyard. Subsequent to the BLM's Native American consultation, SWE retracted consideration of that route and the BLM eliminated it from detailed analysis in this EA based on adverse impacts that would have occurred with cultural resources.

CHAPTER 3

Affected Environment

3.1 Introduction

This chapter describes the affected environment for resources potentially affected by implementation of the Proposed Action. The affected environment for this EA includes public and private lands in the vicinity of the proposed Facility, which is described in detail in Chapter 2.

In compliance with NEPA and CEQ guidelines, this EA focuses on resources potentially subject to impacts from the Proposed Action, as determined through the BLM's internal review and scoping. The BLM identified issues or concerns related to the resource areas described in this section (see Section 1.7, Identification of Issues). Resources that would not be affected or are not found in the affected environment have been considered but are not discussed further in this EA.

Based on the configuration of the two alternatives evaluated in this EA, which are alternative ways to implement the transmission line interconnect route (see Chapter 2), this chapter also includes a discussion of the affected environment of those alternatives. For Alternative 1, which is an alternate route of the Proposed Action's western route to interconnect the Facility, the discussion of the affected environment is covered by the Proposed Action description in the resource categories below because Alternative 1 is in the same general vicinity as the Proposed Action. For Alternative 2, which is a separate southern route to interconnect the Facility substation to the switchyard at a revised location (see Figure 2-2 in Chapter 2), this chapter presents a brief summary of that affected environment separate from the Proposed Action.

No BLM-designated Wilderness Study Areas, Areas of Critical Environmental Concern, or other BLM-designated sensitive areas are located in or near the Facility site. Likewise, no prime farmland, as defined by the Natural Resources Conservation Service (NRCS), or Conservation Reserve Program lands occur in the affected environment.

3.2 Land Use

3.2.1 Land Ownership

Land ownership and jurisdiction includes both federal and private landowners. The BLM is the federal jurisdictional entity, and Sand Hills Land & Cattle, LLC owns the private holdings. The Facility would occupy approximately 16 acres of BLM-administered land and approximately 56 acres of private land. The majority of the Facility footprint would occur on the privately owned land (see Figure 2-2), which would be leased by SWE from the landowner.

3.2.2 Air Space

In accordance with a protocol signed in 2008 between the BLM and the Department of Defense (DoD), the BLM is required to consult with the DoD on compatibility of turbine siting on public lands with military activities. Because up to four wind turbines are proposed on public lands, the BLM is required to consult with the DoD on potential effects of the Proposed Action.

The Facility site is in an area identified by the DOD as Military Training Route (MTR) IR-416. This MTR is used by Buckley Air Force Base to train and maintain combat skills and requirements. The MTR is defined as being 300 feet above ground level (AGL) to approximately 6000 feet AGL with 5 nautical miles either side of the centerline throughout. Four existing wind energy facilities are located within this MTR.

3.2.3 Livestock Grazing

The Facility site is currently used for livestock grazing. The area is separated into grazing allotments administered by the BLM, although the lands may be owned by the BLM or other federal, state, or private entities. Grazing allotments that include parts of the Facility site include the Lookout Ranch, Upper Pine Ridge, and Cooper Lake allotments. The Lookout Ranch and Upper Pine Ridge allotments encompass the plateau region of the Facility site, and the Lookout Ranch and Cooper Lake allotments extend across the areas below the plateau. Additional information on the three allotments and their associated pastures is provided in Table 3-1.

TABLE 3-1
Range Allotment Information
Sand Hills Wind Energy Facility

Allotment Number	Allotment Name	Pasture	Livestock Type	Number of Head	Total BLM-Permitted AUMs	Total BLM Acres	Grazing Season
09069	Cooper Lake	Farm	Cattle	408	230	875	1 May – 20 Sept
		Homers	Cattle	412	329	1,270	1 May – 20 Sept
		Eleven Sections*	Cattle	244	321	1,845	1 May – 20 Sept
09138	Lookout Ranch	Sandhills	Cattle	364	769	4,235	1 May – 20 Sept
09203	Upper Pine Ridge	—	Cattle	883	977	3,366	1 May – 20 Sept

*The pasture is not within the Facility site.

BLM lands in the Facility area are currently being managed to enhance livestock grazing while maintaining a balance between economic uses and enhancement of wildlife habitat, watershed, and riparian ecosystem areas. Grazing systems are designed to achieve the resource objectives outlined in the standards, and allotment management plans are maintained or revised as needed. The BLM estimates that, of the 80 largest allotments (which collectively make up 76 percent of the public land in the Rawlins planning area), 75 percent have grazing systems or adequate management for the resources present (BLM, 2008b).

3.3 Soils

The majority of the Facility site is located on top of a relatively flat, elongated northwest- to southeast-trending, gravel-capped plateau. Soils at the site fall into two general categories: (1) soils formed on the flat surface of the plateau, and (2) a mixed series of soils formed in the eolian/slopewash/residuum/alluvium complex around and below the edges of the plateau.

Soils on the surface of the plateau have developed on underlying sand and silt materials formed from erosional processes, alluvial terrace gravels, and shale and sandstone bedrock (CH2M HILL, 2006a). These soils are shallow to very deep, well-drained, fine-loamy soils, and they are shallow-acting due to carbonate accumulation. Other physical soil properties include moderate or moderately slow permeability and medium runoff. The water erosion potential of these soils is moderate, due in part to the relatively flat topography (1 to 20 percent slope), and their susceptibility to wind erosion is high.

Soils on the sideslopes of the plateau have developed on lateral outcrops of the various sedimentary deposits that form the plateau. Soils are of varying depths and textures, mostly fine- to coarse-loamy and very-fine sandy to fine sandy loams. These soils have moderately slow to moderately rapid permeability, are generally well drained, and have slow to rapid runoff. The water erosion potential of these soils is high, due in part to slopes ranging up to 45 degrees, and their susceptibility to wind erosion is also high.

The transmission line corridor, transmission line road, and road to the switchyard cross multiple soil types, including those described above for the top and sideslopes of the plateau. Below the plateau, the soils on the relatively level (slopes from 0 to 15 degrees) area below the plateau were formed in alluvium derived from mixed sources (NRCS, 2009). Soils grade from fine-loamy into salty clay loams to clays with low bearing strength and are generally very deep. Surface accumulations of salts and hummocky microrelief may be common. These soils have slow to moderately slow permeability, are well-drained to poorly drained, and exhibit medium or rapid runoff depending on slope and surface crusting. The water erosion potential of these soils ranges from medium to high, and their susceptibility to wind erosion is high (NRCS, 2009).

3.4 Geology

The upper surface of the area in which the Facility would be located consists of an unconsolidated Quaternary (2 million years ago to present) fluvial terrace. Local geologic features include flat, gravel-capped benches and terraces that formed during Pleistocene basin-excavation events. Other surficial geologic features include eolian deflation basins that are intermittently filled with ponds (Mears et al., 1986). The geology of the immediate area surrounding the plateau includes sandy and silty loess, alluvium, terrace gravels, pediment, landslide debris, and sedimentary rocks, including sandstone, siltstone, and claystone.

Field reconnaissance of the site conducted on August 28, 2006, and a review of available literature indicate that geologic hazards at the site would likely be limited to potential erosion hazards, slope failures, and earthquakes. Erosion potential is discussed under soils in Section 3.3, and slope failures and seismic hazards are discussed in Sections 3.4.2 and 3.4.3, respectively.

3.4.1 Slope Failures

In general, the slopes on the edges of the plateau appear to be stable; no unstable areas or evidence of large-scale land sliding were observed at the site. Furthermore, interviews with the local ranch manager did not indicate evidence of historical slides (Dunmire, 2006). A shallow surficial slump scar was observed on the northern slope of the plateau. This slump scar appears to be associated with an erosional gully or possibly with minor sloughing of the surficial soil layer.

3.4.2 Seismic Hazards

A review of site geology and available literature suggests that the risk of ground rupture related to fault displacement in the vicinity is low. No mapped faults exist on the site, and there are no known exposed active faults with a surficial expression in Albany County (Case et al., 2002).

The potential for earthquakes in the area is low. The most substantial earthquake to have occurred in the area—a magnitude 5.5, intensity VI event on October 18, 1984—had an epicenter approximately 4 miles west-northwest of Toltec, approximately 50 miles north of the site, and was felt in Wyoming, South Dakota, Nebraska, Colorado, Utah, Montana, and Kansas (Case et al., 2002).

3.4.3 Paleontological Resources

The Proposed Action area lies within the Laramie basin, which is a deeply down-folded area in southeastern Wyoming between the Laramie Mountains to the east and south and the Medicine Bow Mountains to the west. Table 3-2 provides a summary of the geological units within the vicinity of the Facility's area of potential effect (APE) for paleontological resources.

TABLE 3-2
Facility Components and Affected Geologic Units
Sand Hills Wind Energy Facility

	Towers and Pads	Substation	Transmission Lines	Switch Yard	Roads
Quaternary Alluvium (Q_{al})			X	X	X
Quaternary Colluvium (Q_c)			X		X
Quaternary Terrace Deposit (Q_{t4})					X
Quaternary Terrace Deposit (Q_{t4})			X		X
Quaternary Pediment Deposits (Q_p)	X	X	X		X
Tertiary Wind River Formation (Tw)			X		X
Tertiary Hanna Formation (Th)[a]	X[b]				X

[a]The Tertiary Hana Formation was first mapped as the Dutton Creek Formation in the Facility area, this name has since been abandoned (Gill et al., 1970)

[b]Confirmed by paleontologist in the field prior to site work.

Source: Hyden, 1965; McAndrews, 1964a, 1964b, and 1965

The geological units were considered in the context of the BLM's Probable Fossil Yield Classification (PFYC) listing for Wyoming. The highest PFYC (5 – "Very High") is assigned to the Wind River Formation and to the Hanna Formation. These sedimentary units yield fossils that document vegetation and vertebrate communities during the dawn of the Age of Mammals (the Paleocene and early Eocene epochs of the Cenozoic; Woodburne, 2004).

The other five recognized Quaternary units have no formal names and do not possess previously designated PFYCs. Therefore, it is appropriate to assign initial PFYCs to these units to guide further management efforts and to understand potential impacts to paleontological resources from implementation of the Proposed Action. The guidelines presented in BLM Instructional Memorandum No. 2008-009 were followed to establish these initial PFYCs. Quaternary units Q_{t4} and Q_{t5} are assigned a PFYC of 3b (Unknown Potential). This classification is assigned to units that have "geologic features and preservational conditions that suggest significant fossils could be present…" but not enough is known of the unit in this particular area. Units Q_{al}, Q_c, and Q_p are assigned a PFYC of 2 (Low Potential) in part because a substantial extent of this surficial material is Holocene in age and, therefore, younger (10,000 B.P.), and in part because the subaerial deposition and subsequent exposure of alluvium, colluvium, and older pediment gravels is not conducive to fossil preservation. An exception is within one-quarter mile of lowland stream crossings where terminal Pleistocene fluvial strata may be inset into the valley bottom. In this area a designation of PFYC = 3b is appropriate based on its unknown potential.

3.4.4 Mineral Resources

Other than mineral materials, such as sand and gravel, no known economic mineral resources occur in the vicinity of the site. Sand and gravel resources typically occur along stream and intermittent drainage bottoms. No current leases, mining claims, or materials permits are located within the area, and all lode claims are closed. The area outside the Facility footprint does, however, include lands that are prospectively valuable for oil and gas resources.

3.5 Water Resources

3.5.1 Surface Water

The Proposed Action area is located in the North Platte River Watershed, as designated by the WDEQ Division of Water Quality. The nearby major streams include Rock Creek, Threemile Creek, Coalbank Creek, Dutton Creek, Cooper Creek, Meiser Creek, and the Laramie River. Several reservoirs, ponds, lakes, and ditches are located within the Facility area including Cavender Reservoir, Cooper Lake, Homer Ditch, and King Ditch No. 1 and 2.

The majority of the area is drained by an unnamed ephemeral tributary to the Laramie River (Hargett, 2009). Laramie River is a Class 2AB waterway protected for all beneficial uses, including drinking water and game fish (WDEQ, 2001). Cooper Lake, the unnamed ephemeral tributary to the Laramie River, and an unnamed ephemeral tributary to Cooper Lake are Class 3B waters protected for the following beneficial uses: other aquatic life, recreation, wildlife, agriculture, industry, and scenic value (WDEQ, 2001). Artificial canals and ditches in the area of the proposed Facility are Class 4A waters that are not known to support fish populations (WDEQ, 2004). Streams within the Facility area are supporting designated beneficial uses. No streams have been placed on the WDEQ's Section 303(d) list of impaired waters, and no streams require a total maximum daily load (TMDL) assessment (WDEQ, 2008).

According to FEMA flood insurance rate maps, a 100-year floodplain exists along the Rock Creek, Threemile Creek, Coalbank Creek, Meiser Creek, Dutton Creek, Cooper Creek, and Cooper Lake floodplains, indicating that there is a potential for flooding in these areas during a 100-year flood (FEMA, 1986).

3.5.2 Groundwater

Groundwater occurs in the Above Pathfinder Dam subbasin, a subbasin within the Platte River Basin Watershed. The Above Pathfinder Dam subbasin lies within southern Fremont County, the southwestern portion of Natrona County, most of Carbon County, and a small portion of Albany County. Three major North Platte River tributaries, including the Sweetwater River, Medicine Bow River, and Grand Encampment River, are also located in the Above Pathfinder Dam subbasin. Approximately 96 to 98 percent of the total groundwater use in the Pathfinder subbasin is for agricultural, industrial, and municipal purposes (WWDC, 2009).

Primary beneficial uses of groundwater in the vicinity of the site are for agricultural and domestic purposes. Groundwater wells in the area vary in depth from 21 to 300 feet below ground surface (bgs) with static water levels ranging from 4 to 197 feet bgs (WSEO, 2009).

With the exception of a very small area in the northern area of the Facility, the majority of the Facility is located within a zone that has been determined to not be hydrologically connected to the North Platte River. The WSEO would regulate surface and groundwater use/supply for the Facility to comply with applicable regulations and the Platte River Implementation Agreement.

3.6 Wetlands and Jurisdictional Waters

Wetlands are areas that are inundated by surface water or groundwater with a frequency that under normal circumstances would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction (Executive Order [EO] 11990, 1977). Wetlands serve a variety of functions related to water quality, wildlife habitat, and flood control. Wetlands and jurisdictional waters are protected by provisions of the Clean Water Act (CWA) Section 404, and EO 11990, Protection of Wetlands.

Dependent upon the connectivity of wetlands to navigable waters, wetlands and waters may or may not be jurisdictional under the CWA Section 404. Waters are determined to be jurisdictional if they are hydrologically connected to navigable water. Thus, jurisdictional waters could include ephemeral drainages (drainage channels that contain water only intermittently and typically after a precipitation event) that connect to navigable waters.

An evaluation of existing data for waters and wetlands in the vicinity of the Facility consisted of a review of the following sources:

- U.S. Geological Survey (USGS) quadrangle maps (Rock River, WY [USGS, 1979] and Cooper Lake North, WY [USGS, 1979])
- National Wetland Inventory (NWI) maps (Rock River, WY [USDI, 1992] and Cooper Lake North, WY [USDI, 1992]).

3.6.1 Wetlands

A palustrine emergent (PEM) wetland identified on the NWI maps in the Facility area occurs near Turbine 24. This wetland is classified as PEMCh (seasonally flooded and diked). Results of the field reconnaissance indicated an earthen dam constructed across a small ephemeral drainage. This dammed area likely serves as a cattle watering source during years with sufficient precipitation. Review of this area indicated upland vegetation and no evidence of hydric soils or frequent hydrology in either the area behind the dike or the ephemeral drainage. Lack of a channelized bed in the ephemeral drainage also indicated that water flows were not frequent enough to create a channelized bed. Additionally, there was no physical evidence of water flows around the dam, thus isolating the drainage from potential downstream connections.

A PEM wetland identified on the NWI maps is located near the origin of the site access road at US 30/287. This wetland is classified as PEMAh (temporarily flooded and diked) and occurs in the area where the site access road is proposed for improvement.

Surveys of surface water features that would be occupied or crossed by Facility components would be conducted after final micrositing is complete to comply with the CWA and the appropriate Nationwide Permit.

3.6.2 Water Bodies

A single small ephemeral drainage identified in the National Hydrography Dataset (NHD) runs through the northern part of the Facility area and would be crossed by a turbine access road in two locations (near the northern turbines) and where the site access road begins at US 30/287. The stream is an intermittent/ephemeral stream shown in the NHD as connected to the Laramie River.

3.7 Vegetation

Vegetation communities characterizing the Proposed Action area were evaluated through review of existing data, a site visit completed in 2009 by the BLM and Western, and habitat mapping surveys completed by Western Ecosystems Technology, Inc.(WEST) in 2009.

The Facility is located within the Wyoming Basin Ecoregion, which consists of broad intermountain basins interrupted by isolated hills and low mountains that merge to the south into a dissected plateau (BLM, 2005b; EPA, 2002). The Wyoming Basin is an expansive ecoregion of high, open, and arid country nearly surrounded by mountain ecoregions. Situated in the rain shadow of the Rocky Mountains, the Wyoming Basin generally receives little precipitation. Vegetation communities in the lower elevation areas of the Wyoming Basin are typified predominantly as shrub steppe, defined by sagebrush (*Artemisia* spp.) interspersed with areas of short to mixed grass prairie. Elevation, aridity, snow accumulation, prevailing winds, and other factors all affect the species composition, morphology, and density of sagebrush-grassland communities in the Wyoming Basin ecoregion. Average annual precipitation in the area from 1961–1990 was between 10.1 and 15 inches (USGS, 2005).

Based on the results of the site visit and habitat mapping surveys conducted in 2009 (Johnson et al. 2009a), the site is characterized predominantly as short grass prairie grassland interspersed with sagebrush and bare patches of soil and rock. The majority of the ridge top is established in grassland/sagebrush. Threadleaf sedge (*Carex filifolia*) and mutton bluegrass (*Poa fendleriana*) are the dominant grass-like/grass species present. Forbs observed during the site visits include death camas (*Zigadenus elegans*), milkvetches (*Astragalus* spp. and *Oxytropis* spp.), larkspur (*Delphinium geyeri*), onion (*Allium* textile), biscuitroot (*Lomatium* spp.), stemless goldenweed (*Stenotus acaulis*), scarlet globmallow (*Sphaeralcea coccinea*), sandwort (*Arenaria* sp.), phlox (*Phlox* spp.), bladderpod (*Lesquerella* sp.), Platte thistle (*Cirsium canescens*), holly leaf clover (*Trifolium gymnocarpon*), miners candle (*Cryptantha caespitosa*), bluebell (*Mertensia* spp.), prickly pear cactus (*Opuntia polyacantha*), and pincushion cactus (*Pediocactus* spp.). Shrubs observed during the site visit include fringed sagebrush (*Artemisia frigida*), Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), gray horsebrush (*Tetradymia canescens*), winterfat (*Krascheninnikovia lanata*), bud sagewort (*Artemisia spinescens*), and mountain mahogany (*Cercocarpus montanus*). Dominant shrubs on the plateau are fringed sagebrush and winterfat.

Surveys were conducted for the presence of two BLM sensitive plants, Nelson's milkvetch (*Astragalus nelsonianus*) and Beaver Rim phlox (*Phlox pungens*), in areas identified as potentially suitable habitat from modeling completed by the Wyoming Natural Diversity Database (WYNDD) for the BLM. No individuals of either species were located during the field survey (Johnson et al., 2009a). Surveys for the Nelson's milkvetch were conducted within the appropriate flowering/fruiting period; therefore, it can be concluded that this species is not present within the Proposed Action area. The surveys for Beaver Rim phlox were conducted outside the flowering and fruiting period and it is not possible to distinguish this species from other phlox species based on vegetative characteristics alone; therefore, Beaver Rim phlox may be present within the area of potential habitat where undetermined phlox species are present.

Noxious or invasive weeds were not common in the Proposed Action area, although isolated locations of black henbane (*Hyoscyamus niger*), cheatgrass (*Bromus tectorum*), alyssum (*Alyssum desertorum*), and Canada thistle (*Cirsium arvense*) were observed. Black henbane, cheatgrass, and alyssum are BLM-listed invasive species. Cheatgrass is a concern because it out-competes native grasses and increases the potential for wildland fire. Canada thistle is on the Wyoming Weed and Pest Control Act State Designated List (USDA, 2006).

3.8 Wildlife Habitats and Species

Existing information and available data for wildlife habitats and species in the Proposed Action area were assessed from several sources, including the Wyoming Game and Fish Department (WGFD), BLM, WYNDD, and USFWS. Field investigations in support of this EA were conducted during the summer (May through June) and fall (September through October) 2006 and during summer and fall 2009 by WEST (Johnson et al. 2009a—see Appendix C).

Wildlife habitats within 0.25 mile of all Facility features were mapped in 2009 by WEST. No white-tailed prairie dog (*Cynomys leucurus*) colonies were observed within the survey area. Based on this mapping effort, approximately 4,442 acres (39%) of the area surveyed contain sagebrush cover ranging from 5 to 20 percent, which may provide suitable greater sage-grouse (*Centrocercus urophasianus*) brood rearing habitat. Another 2,318 acres (20.4%) of the area surveyed has sagebrush cover of approximately 30 percent, which may provide suitable nesting habitat for sage-grouse and other sage brush obligate wildlife. Most of the remainder of the surveyed area, 3,225 acres (28.4%), is classified as shortgrass prairie, which provides habitat for mountain plovers (*Charadrius montanus*), swift foxes (*Vulpes velox*), and other grassland associated species.

3.8.1.1 Amphibians and Reptiles

Based on past observation in the area, four species of amphibians could potentially occur in the vicinity of the site (WYNDD, 2006): tiger salamander (*Ambystoma tigrinum*), Great Plains toad (*Bufo cognatus*), Great Basin spadefoot toad (*Spea intermontana*), and northern leopard frog (*Rana pipiens*). Suitable habitat, typically consisting of moist to wet areas, is extremely limited and the Facility design avoids these areas. Although no reptiles were recorded in the WYNDD (2006) records or during field surveys, common reptile species that could occur in the area based on suitable habitat include bullsnake (*Pituophis catenifer sayi*) and prairie rattlesnake (*Crotalus viridis viridis*) (Cerovski et al., 2004).

3.8.1.2 Birds

Avian Surveys

WEST completed avian use surveys twice weekly from May 8 through June 9, 2006, and from September 14 to October 9, 2006, and weekly from July 31 to August 25, 2009 (Johnson et al., 2006 and Johnson et al., 2009a). Thirty-two unique bird species were observed during the 2009 surveys and 35 were observed during the 2006 surveys. Between the two surveys, 49 total unique species were detected (Johnson et al., 2009a; see Appendix C). During the 2009 study, 23 single or groups of large birds were observed within 800 meters (2,625 feet), and a total of 260 passerines and other small birds in 30 groups, were recorded flying within 100 meters (328 feet) of the survey points in the Sand Hills Wind Resource Area (SHWRA). For all large bird species combined, 78.3 percent of birds were observed flying below the likely zone of risk, 17.4 percent were within the zone of risk, and 4.3 percent were observed flying above the zone of risk for typical turbines that could be used at the site. Bird types most often observed flying within the turbine zone of risk were vultures (100%) and raptors (14.3%). On the basis of 1 month (fall of 2006; Johnson et al., 2006) of data collected on passerines and small bird use during migration periods surveys, 100 percent of the passerines and small birds were observed flying below the zone of risk.

During avian use surveys completed in 2006 and 2009, no obvious flyways or concentration areas were observed (Johnson et al., 2009a; see Appendix C), and no strong association with topographic features within the study area was noted for raptors or other large birds. These conclusions are based on 3 months of avian use surveys, and provide insufficient data to conclude that such important bird use areas are not present on or near the Facility site.

Based on fixed-point bird use data collected for the SHWRA, mean summer raptor use was 0.93 raptors/plot/20-minute survey in 2009. When combined with raptor use estimates from the spring and fall of 2006, overall raptor use of the area was estimated at 0.66 raptors/plot/20-minute survey. Raptor use of the study area was low-to-moderate relative to raptor use at 36 other wind energy facilities across the western United States that implemented similar protocols to the present study and had data for three or four seasons. Mean raptor use in the Sand Hills study area ranked thirteenth compared to the other facilities. The sampling intervals for the Facility are less than other projects to which it is compared, based on the short duration of the 2006 and 2009 studies.

A regression analysis of raptor use and raptor collision mortality for 13 new-generation wind-energy facilities where similar methods were used to obtain raptor use estimates showed a significant (R^2 = 69.9%) correlation between raptor use and raptor collision mortality. Using this regression to predict raptor collision mortality, the SHWRA yields an estimated fatality rate of 0.10 fatalities/megawatt/year, or ten raptors per year for each 100 megawatts of wind-energy development. Based on species composition of the most common raptor fatalities at other western wind-energy facilities and species composition of raptors observed at the SHWRA during the surveys, the majority of the fatalities of diurnal raptors would likely consist of ferruginous hawks (*Buteo regalis*), golden eagles (*Aquila chrysaetos*), and red-tailed hawks (*Buteo jamaicensis*).

One ground-based raptor nest survey was completed by WEST in August 2009 within 1 mile of the Facility site to supplement raptor nest survey data available from a helicopter-based survey completed in the region by WGFD in April 2009. The raptor nest data indicated that active raptor nest density of the survey area and a 1-mile buffer during 2009 was 0.13 nests per square mile (Johnson et al., 2009a). Twenty raptor nests were detected in or within 1 mile of the site during the 2009 surveys, of which seven were active in 2009 and 13 were inactive or unknown status. The seven active nests included two ferruginous hawk nests, one golden eagle nest, three prairie falcon (*Falco mexicanus*) nests, and one red-tailed hawk nest. The 13 inactive or unknown status nests included six ferruginous hawk nests, one golden eagle nest, three prairie falcon nests, one red-tailed hawk nest, and two unidentified species raptor nests.

Golden Eagles

In July 2010, the BLM Washington Office issued Instructional Memorandum (IM) No. 2010-156 to address issues of concern related to potential impacts of renewable energy projects on golden eagles (*Aquila chrysaetos*). The purpose of the IM is to provide direction for complying with the Bald and Golden Eagle Protection Act, including its implementing regulations (September 11, 2009, Eagle Rule (Rule) 50 CFR parts 13 and 22) for golden eagles, and to identify steps that may be necessary within the habitat of golden eagles to ensure environmentally responsible authorization and development of renewable energy resources. If implementation of the Proposed Action has the potential to result in impacts on golden eagles or their habitat, the BLM will require an Avian Protection Plan (APP) as a condition of the ROW grant. The APP will be developed by the applicant, in coordination with the USFWS and the BLM, to evaluate options to avoid and minimize the project impacts. The APP must address siting, operations, and monitoring. The USFWS has deemed that an APP is appropriate and needed to avoid and minimize potential take related from construction and operation of the Sand Hills Facility (USFWS, 2010); however, the BLM authorized officer will not issue a Notice to Proceed until the USFWS letter of concurrence for the APP is received in accordance with BLM IM No. 2010-156. The Proposed Action is required to comply with this IM and therefore further consideration of potential impacts on eagles and other migratory birds is warranted during through the development of a USFWS-approved APP for the Facility.

Eagle Use

Baseline eagle studies completed to date for the Facility include weekly 20-minute point count surveys of 800-meter plots distributed throughout the area proposed for development. Weekly surveys were completed twice daily from May 8 to June 9 and September 14 to October 17, 2006, and once daily from July 31 to August 25, 2009. A total of 181 20-minute fixed-point bird use surveys were conducted during 13 site visits. A total of 12 golden eagle observations were recorded during this sampling effort. No eagles were observed during the spring 2006 surveys, four were observed during fall 2006, and eight were observed during summer 2009; however, due to the redistribution of survey points between survey periods, these indices are not directly comparable or accurate measures of relative seasonal risk. All of the eagle observations are associated with the perimeter of the plateau or the lower elevations away from the area specifically planned for WTG installation. Table 1 presents details on the 12 eagle sightings documented during avian use surveys (see Figure 2 of the draft APP prepared for the Facility).

A potential indicator of the importance of habitat in a particular area to golden eagles is the extent of use relative to other areas on the landscape. Data collected to evaluate the Proposed Action area indicate that during the avian use studies, eagle use was more common away from the plateau top and in the lower elevation areas surrounding the Facility. In the 2009 study, the highest overall raptor use was recorded at survey points 9 and 10, located along the southern route alternative transmission line, and 33percent of all eagle observations were recorded at Point 10. The remaining eagle use in 2009 was documented at points 2 and 7, both positioned along the northern rim of the plateau and closer to the confirmed nest sites.

At points 2 and 7, golden eagles were observed perched on the ridge and riding thermals outside the area proposed for WTG installation. In 2006, no eagles were observed during the spring studies, but four were observed in September and October. The nearest of these fall observations was approximately 1 mile from the proposed WTGs. This difference in eagle use could be associated with lower quality foraging habitat, lack of perch sites or foraging opportunities, less desirable thermal or wind characteristics, or by general land use activity differences that make the proposed Facility area less attractive to eagles than the surrounding landscape. Although eagle use during the nonbreeding seasons appears to be very low based on the data collected, only 3 months of avian use surveys were completed and, therefore, does not preclude that eagle use varies seasonally or spatially across the Facility site.

Nesting Territories

Raptor nest surveys were conducted in 2006 and again in 2009. In addition, ground-based surveys of raptor nests within 1 mile of proposed Facility were completed in 2006 and 2009, to identify potential eagle nesting territories in and near the Facility site. The nesting survey area was determined in accordance with the BLM to ensure compliance with BLM setback and timing restrictions associated with avoiding impacts to nesting raptors. WGFD also completed a 2009 helicopter survey of raptor nests in and near the proposed Facility site. These data (WGFD, 2009), as well as existing BLM raptor nest data (BLM, 2011), were used to evaluate risk to nesting eagles. Active and inactive nests of all raptor species were recorded. Each nest site identified within the 2009 BLM raptor nest data that occurred within the survey area was specifically evaluated by WEST during the August 2009 survey to determine status and condition. Additionally, in spring of 2009, active nests were recorded and these are used in the analysis of eagle nesting territories within a 10-mile buffer of the Facility. Results from all surveys are combined and presented in Figure 3 of the draft APP prepared for the Facility.

No eagle nests were located within the proposed WTG area. Three occupied golden eagle nests were located within 10 miles of the Facility site during the 2009 WGFD and WEST surveys: one approximately 1 mile north of the area proposed for WTG installation, one approximately 1 mile west of the proposed interconnecting switchyard, and one approximately 6.5 miles east of the WTG area and approximately 2 miles east of the Facility entrance from Highway 30/287. One golden eagle nest in the BLM database, located approximately 1 mile west of the WTGs, was large enough to have been used by eagles, but has been confirmed as a ferruginous hawk nest in past years (Johnson, personal communication, 2011). This nest may represent a historical nesting territory or alternate nest site of the nearby eagle pair.

Two active bald eagle nests were documented within 10 miles of the proposed Facility during the 2009 WGFD survey. One was located approximately 3 miles north and another approximately 6 miles west of the proposed WTGs. Both were within the cottonwood riparian area of Rock Creek, which is consistent with typical bald eagle nest sites in Wyoming that are most often constructed in mature cottonwood groves.

Negative data from WGFD's 2009 survey does not mean a BLM nest can be confirmed absent, and WEST's ground-truthing included nests within only 1 mile of the proposed Facility; however, these data do give an indication of how eagles may use the project vicinity for nesting. However, it can be concluded that at least two bald eagle nesting territories and three golden eagle nesting territories were present within 10 miles of the proposed Facility site in 2009, and up to 15 golden eagle nests could have historically occurred within 10 miles of the area proposed for development.

Golden eagles were detected in the vicinity of the site during the 2006 (n=4 observations) and 2009 (n = 3 observations) avian use surveys. Additionally, one active golden eagle nest was documented within 1 mile of the site during WEST's review of WGFD 2009 raptor nest data (Johnson et al., 2009a). One of the three golden eagles observed during 2009 avian use surveys was flying at altitudes within the potential rotor swept area.

3.8.1.3 Mammals

The grassland/sagebrush habitat in the area has been influenced by environmental stresses including cattle grazing and drought and supports a limited number of mammal species. Mammal species and/or species signs observed during field investigations in 2006 include pronghorn (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), Wyoming ground squirrel (*Spermophilus elegans*), desert cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicus*), white-tailed jackrabbit (*Lepus townsendii*), swift fox(*Vulpes velox*), and coyote (*Canis latrans*).

Two potential bat hibernacula sites were located just outside of the 0.25-mile buffer survey area (Johnson et al., 2009a). The two sites were very small caves created by overlapping rock structures. Caves and mine shafts may provide important habitat for bat maternal colonies and may also be important hibernacula. However, for a shaft or cave to serve as bat habitat it should have a dark zone. Caves or shafts used as hibernacula also must have an isothermal zone (nonfluctuating annual temperature). Generally speaking, if it is possible to see the bottom or end of the cave, it will not be used by bats, and shafts or caves over 100 feet in depth are preferred habitat. The small caves observed near the proposed Facility do not exhibit any of these characteristics because they are much too shallow to have either an isothermal zone or dark zone. Because of this, combined with the fact that they are outside the required survey area, no additional sampling was conducted to determine if bats were using the caves.

Acoustic bat detection data collected on 77 nights (July 31 to October 15, 2009) are summarized in Table 3-3. Anabat units were operable 98.7 percent of the sampling period, recording 322 bat passes. Overall bat use was low, averaging 2.0 bat passes per detector night. Bat activity was highest from late-August to mid-September with peaks of activity occurring on August 27 (27 bat passes) and September 9 (also 27 bat passes). The approximate 3-week span from August 18 through September 11 accounted for 63.0 percent of all calls recorded during the survey period (203 bat passes recorded during this period).

Of the 11 species of bats with the potential to occur in the study area (Johnson et al., 2009b), five are known fatalities at wind-energy facilities (eastern red bat [*Lasiurus borealis*], little brown bat [*Myotis lucifugus*], big brown bat [*Eptesicus fuscus*], silver-haired bat [*Lasionycteris noctivagans*], and hoary bat [*Lasiurus cinereus*]). Using the bat acoustic data collected, it was not possible to determine bat species present in the study area (except for hoary and eastern red bats), but it was possible to distinguish high-frequency, mid-frequency, and low-frequency species. Most passes (64.6 percent of all bat passes) were by low-frequency bats, suggesting higher relative abundance of species such as hoary, silver-haired, and big brown bat, although the fringed bat (*Myotis thysanodes*) also emits calls in the low-frequency range. About 22 percent of the passes were by high-frequency bats, which in the SHWRA would likely include primarily long-legged bat (*Myotis volans*) and/or western small-footed bat (*Myotis ciliolabrum*). The remaining 13.4 percent were composed of mid-frequency species, which in the SHWRA would be limited to eastern red bat, western long-eared bat, and little brown bat.

Species identification for specific passes was possible only for the hoary and eastern red bat. No eastern red bat calls were detected during the survey. Hoary bats comprised 6.8 percent of the total passes detected within the study area and comprised 10.6 percent of all low-frequency passes recorded. Low-frequency bat passes peaked from late August through early September, mid-frequency passes peaked in early September, and high-frequency passes peaked in mid-August

TABLE 3-3
Acoustic Bat Detection Rates for the Sand Hills Facility Area from July 31 to October 15, 2009
Sand Hills Wind Energy Facility

Anabat Station	Location	Bat calls/detector night
SH1g	Ground	1.64
SH2g	Ground	2.34
SH2h	Elevated on Met tower	2.02
Ground mean		1.99
Elevated mean		2.02
Overall mean		2.00

A discussion of the potential occurrence of federally listed and BLM sensitive bats in the area is provided in Section 3.9, Threatened, Endangered, and Sensitive Plant and Animal Species.

3.8.1.4 Big Game

No big game crucial winter ranges designated by the WGFD would be directly affected by the Proposed Action. Crucial winter range for pronghorn is present immediately north and west of the site. During the avian surveys completed in 2006 and 2009, both pronghorn and mule deer were observed in the area.

Pellet count surveys for big game were completed in spring and fall of 2007 by WEST (Johnson et al., 2008), but were discontinued based on the low detection rates and limited abundance of pellets combined with the fact that the Facility was sited to avoid impacts to big game crucial winter ranges.

3.9 Threatened, Endangered, and Sensitive Plant and Animal Species

3.9.1 Federally Listed Species

The Endangered Species Act (ESA) (16 USC 1531) was passed by Congress in 1973 to conserve and recover listed threatened and endangered species and the habitats upon which these species depend. The Act authorizes the determination and listing of species as endangered and threatened; prohibits unauthorized taking, possession, sale, and transport of endangered species; provides authority to acquire land for the conservation of listed species, using land and water conservation funds; authorizes establishment of cooperative agreements and grants-in-aid to States that establish and maintain active and adequate programs for endangered and threatened wildlife and plants; authorizes the assessment of civil and criminal penalties for violating the Act or regulations; and authorizes the payment of rewards to anyone furnishing information leading to arrest and conviction for any violation of the Act or any regulation issued thereunder. Section 7 of the ESA requires federal agencies to ensure that any action authorized, funded or carried out by them is not likely to jeopardize the continued existence of listed species or modify their critical habitat. In full, the statutory definition of "take" includes "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (ESA Section 3(18)). The term harm is defined to include any act which actually kills or injures fish or wildlife, and emphasizes that such acts may include significant habitat modification or degradation that significantly impairs essential behavioral patterns of fish or wildlife (50 CFR Part 222 [Docket No. 980414094-9287; I.D. No. 091797A [*Federal Regiser*: Nov 8, 1999 (Volume 64, Number 215]). The ESA is administered by USFWS for inland states including Wyoming.

Six federally listed or candidate species (two mammals, one bird, one amphibian, and two plants) potentially occur within Albany County (USFWS, 2008). Additionally, the Preble's meadow jumping mouse (*Zapus hudsonius*) also may occur, but the species was delisted from threatened status in Wyoming on July 9, 2008. Also, on June 29, 2010, USFWS reinstated a proposal to list mountain plover (*Charadrius montanus*) as a threatened species under the ESA. Table 3-4 shows the species name, listing status, habitat, and potential for occurrence, which was determined by reviewing WYNDD records, habitats present in the area, and ecological surveys completed for the Proposed Action.

Water depletions and effects on water quality in the Platte River system could also affect five additional federally listed species and/or their critical habitats in downstream reaches in other states. These species (interior least tern [*Sternula antillarum*], pallid sturgeon [*Scaphirhynchus albus*], piping plover [*Charadrius melodus*], western prairie fringed orchid [*Platanthera praeclara*], and whooping crane [*Grus Americana*]) occur in downstream reaches in other states.

No water depletions to the Colorado River system will occur.

TABLE 3-4
Federally Listed Species Potentially Occurring in Albany County
Sand Hills Wind Energy Facility

Species/Listing Name	Scientific Name	Status	Habitat	Potential for Occurrence[a]
Black-footed ferret	*Mustala Nigripes*	Endangered	The black-footed ferret is found almost exclusively in prairie dog colonies in basin-prairie shrublands, sagebrush-grasslands, and grasslands. It is dependent on prairie dogs for food and all essential aspects of its habitat, especially prairie dog burrows where it spends most of its life underground. An experimental population is present in the Shirley Basin, approximately 30 miles northwest of the site.	None
Blowout penstemon	*Penstemon haydenii*	Endangered	Blowout penstemon occurs in the Sandhills of Nebraska and south central Wyoming in sand dunes. Primarily occurs on sand dunes or in valleys/depressions created by wind with shifting sands or lightly cultivated soils.	None

TABLE 3-4
Federally Listed Species Potentially Occurring in Albany County
Sand Hills Wind Energy Facility

Species/Listing Name	Scientific Name	Status	Habitat	Potential for Occurrence[a]
Canada lynx	*Lynx Canadensis*	Threatened	In the contiguous United States, the boreal forest is at its southernmost extent, transitions into other vegetation communities, and is naturally patchy. Lynx are specialized predators of snowshoe hare (*Lepus americanus).*	None
Greater sage-grouse*	*Centrocercus urophasianus*	Candidate	Basin-prairie shrub, mountain-foothill shrub	Low – Nearest occupied lek approximately 4 miles south of the proposed Facility
Mountain plover[b]	*Charadrius montanus*	Proposed	Shortgrass prairie	High – Confirmed Present
Preble's meadow jumping mouse	*Zapus hudsonius preblei*	Delisted in Wyoming, July 9, 2008	Heavily vegetated, shrub-dominated riparian areas and immediately adjacent upland habitats where available open water exists during their active season.	None
Ute ladies'-tresses orchid	*Spiranthes diluvialis*	Threatened	Populations of the Ute ladies' tresses orchid are known from three general areas: near the base of the eastern slope of the Rocky Mountains in southeastern Wyoming and adjacent Nebraska and north-central and central Colorado; in the upper Colorado River Basin; and in the Bonneville Basin along the Wasatch Front. USFWS	Low
Wyoming toad	*Bufo baxteri*	Endangered	The Wyoming toad is a glacial relic found only in Albany County, Wyoming.	None

[a] None- species does not occur, or highly unlikely to occur

Low – species not detected in baseline studies, may occur, but unlikely due to habitat geographic range, or other suspected constraints;

Moderate – species not detected in baseline studies, possible due to suitable habitat and conditions, may occur as migrant;

High - confirmed present or likely due to habitat, distribution, or other supporting data

[b] Discussed in detail below

Mountain Plover

Mountain plover were observed in the area during 2006 and 2009 avian use surveys. Additionally, the majority of the area proposed for wind turbine installation is composed of suitable habitat for mountain plover, which is designated as "occupied" by the BLM. Occupied habitat is defined as an area where broods and/or adults have been found in the current year or documented in at least two of the past 5 years. The BLM and USFWS are conferencing under Section 7 of the ESA and the biology of this species is discussed in detail in the Conference Assessment.

BLM Sensitive Species

The BLM is required to use all methods and procedures that are necessary to improve the condition of special-status species and their habitats to a point where their special status recognition is no longer warranted (BLM, 2001) The special-status species policy for management of ESA-listed and BLM sensitive plant and animal species and the habitats on which they depend is described in the BLM Sensitive Species Policy and List (BLM, 2010). Special-status species include those that are proposed for listing, officially listed as threatened or endangered, or are candidates for listing as threatened or endangered under the provisions of the ESA; those listed by a State in a category such as threatened or endangered implying potential endangerment or extinction; and those designated by each BLM State Director as sensitive. Therefore, if sensitive species are designated by the BLM State Director, the protection provided by the policy for candidate species shall be used as the minimum level of protection.

BLM sensitive species potentially affected by the Proposed Action were identified in coordination with the BLM Rawlins Field Office and surveys were completed by WEST in 2006 and 2009. Forty BLM sensitive species (31 animals and 9 plants) potentially occur within the Proposed Action area. The potential for occurrence in the Proposed Action area was determined by reviewing WYNDD records, habitats present in the area, and ecological surveys completed for the Proposed Action. Table 3-5 shows the species name, habitat, and potential for occurrence within the Proposed Action area.

TABLE 3-5
BLM Sensitive Species Potentially Occurring in or near the Proposed Action Area
Sand Hills Wind Energy Facility

Species/Listing Name	Scientific Name	Habitat	Likelihood of Occurrence Within Proposed Action Area[a]
Mammals			
Black-tailed prairie dog	*Cynomys ludovicianus*	Short-grass prairie	Low – No colonies detected within 0.25 mile of site
Fringed myotis	*Myotis thysanodes*	Conifer forests, woodland-chaparral, caves and mines	High
Long-eared myotis	*Myotis Evotis*	Conifer and deciduous forests, caves, and mines	High
Pygmy rabbit	*Brachylagus idahoensis*	Basin-prairie and riparian shrub	Low
Spotted bat	*Euderma maculatum*	Cliffs over perennial water, basin-prairie shrub	High
Swift fox	*Vulpes velox*	Grasslands	High – Confirmed present

TABLE 3-5
BLM Sensitive Species Potentially Occurring in or near the Proposed Action Area
Sand Hills Wind Energy Facility

Species/Listing Name	Scientific Name	Habitat	Likelihood of Occurrence Within Proposed Action Area[a]
Townsend's big-eared bat	*Corynorhinus townsendii*	Forest, basin-prairie shrub, caves, and mines	High
White-tailed prairie dog	*Cynomys leucurus*	Basin-prairie and riparian shrub	Moderate – No colonies detected within 0.25 mile of site
Wyoming pocket gopher	*Thomomys clusius*	Meadows with loose soil	Moderate
Birds			
Baird's sparrow	*Ammodramus bairdii*	Grasslands, weedy fields	High
Bald eagle	*Haliaeetus leucocephalus*	River floodplains, lakes, reservoirs	High – nests documented 3 and 6 miles away from proposed WTGs
Brewer's sparrow	*Spizella breweri*	Basin-prairie shrub	High – Confirmed present
Burrowing owl	*Athene cunicularia*	Grasslands, basin-prairie shrub	Moderate – no prairie dog colonies in area
Columbian sharp-tailed	*Tympanuchus phasianellus columbianus*	Grasslands	None
Ferruginous hawk	*Buteo regalis*	Basin-prairie shrub, grassland, rock outcrops	High – Confirmed present
Greater sage-grouse	*Centrocercus urophasianus*	Basin-prairie shrub, mountain-foothill shrub	Moderate – Nearest occupied lek approximately 4 miles south of the site
Loggerhead shrike	*Lanius ludovicianus*	Basin-prairie shrub, mountain-foothill shrub	Moderate
Long-billed curlew	*Numenius americanus*	Grasslands, plains, foothills, wet meadows	Low
Mountain plover	*Charadrius montainus*	Shortgrass prairie habitat	High – Confirmed present
Northern goshawk	*Accipter gentilis*	Conifer and deciduous forests	Low
Peregrine falcon	*Falco peregrinus*	Tall cliffs	Low
Sage sparrow	*Amphispiza belli*	Basin-prairie shrub, mountain-foothill shrub	High

TABLE 3-5
BLM Sensitive Species Potentially Occurring in or near the Proposed Action Area
Sand Hills Wind Energy Facility

Species/Listing Name	Scientific Name	Habitat	Likelihood of Occurrence Within Proposed Action Area[a]
Sage thrasher	*Oreoscoptes montanus*	Basin-prairie shrub, mountain-foothill shrub	High – Confirmed present
Trumpeter swan	*Cygnus buccinators*	Lakes, ponds, rivers	Low
White-faced ibis	*Plegadis chihi*	Marshes, wet meadows	Low
Yellow-billed cuckoo	*Coccyzus americanus*	Open woodlands, streamside willow and alder groves	Low
Fish			
Hornyhead chub	*Nocomis biguttatus*	Lower Laramie and North Laramie River watersheds in small to medium sized, moderate to low gradient, clear gravelly streams, preferring pools and slow to moderate runs and is often associated with aquatic plants. Requires gravel areas free of silt	Moderate
Amphibians			
Boreal toad (Northern Rocky Mountain population)	*Bufo boreas boreas*	Wet and dry meadows of Upper Muddy Creek and Powder Rim areas	Low
Columbia spotted frog	*Rana luteiventris*	Ponds, sloughs, small streams	Low
Great Basin spadefoot	*Spea intermontana*	Spring seeps, permanent and temporary waters	Low
Northern leopard frog	*Rana pipiens*	Beaver ponds, permanent water in plains and foothills	Low
Plants			
Beaver rim phlox	*Phlox pungens*	Sparsely vegetated slopes on sandstone, siltstone, or limestone substrates, 6,000–7,000 amsl	Moderate – potential habitat present
Cedar rim thistle[b]	*Cirsium aridum*	Barren, chalky hills, gravelly slopes, and fine textured, sandy, shaley draws 6,700–7,200 feet amsl	Low
Gibbens' beardtongue	*Penstemon gibbensii*	Sparsely vegetated shale or sandy-clay slopes 5,500–5,700 feet amsl	Low
Laramie columbine	*Aquilegia laramiensis*	Crevices of granite boulders and cliffs 6,400–8,000 feet amsl	Low

TABLE 3-5
BLM Sensitive Species Potentially Occurring in or near the Proposed Action Area
Sand Hills Wind Energy Facility

Species/Listing Name	Scientific Name	Habitat	Likelihood of Occurrence Within Proposed Action Area[a]
Laramie false sagebrush	*Spaeromeria simplex*	Cushion plan communities on rocky limestone ridges and gentle slopes 7,500–8,600 feet amsl	Low
Limber pine	*Pinus flexilis*	Timberline and at lower elevation with sagebrush. Associated species are Rocky Mountain lodgepole pine, Engelmann spruce, whitebark pine, Rocky Mountain Douglas-fir, subalpine fir, Rocky Mountain juniper, Mountain Mahogany, and common juniper	Moderate
Meadow milvetch	*Astralagusdiversifolius*	Sagebrush valleys and closed basin drainages in moist alkaline meadows at 6,500–6,620 feet amsl	Low
Nelson's milkvetch	*Astragalus nelsonianus* or *Astragalus pectinatus var. platyphyllus*	Alkaline clay flats, shale bluffs and gullies, pebbly slopes, and volcanic cinders in sparsely vegetated sagebrush, juniper, and cushion plant communities at 5,200–7,600 feet	None – Potential habitat evaluated by WEST (Johnson et al., 2009a)
Persistent sepal yellowcress	*Rorippa calycina*	Riverbanks and shorelines, usually on sandy soils near high waterline. Also found in playas and man-made reservoirs that are not wet year-round.	Moderate

[a] None- conclusive evidence that species does not occur, or highly unlikely to occur

Low – species not detected in baseline studies, may occur, but unlikely based on habitat geographic range, or other suspected constraints;

Moderate – species not detected in baseline studies, possible based on suitable habitat and conditions, may occur as migrant;

High; confirmed present or likely to be present based on habitat, distribution, or other supporting data

[b] Not listed as a BLM-sensitive species in the BLM Rawlins Field Office, but included based on their conservation status and importance to the BLM Rawlins Field Office.

Source: BLM, 2010.

Greater Sage-grouse

Wyoming BLM Instructional Memorandum WY 2010-12 requires evaluation of greater sage-grouse within 11 miles of a project area. Important habitats and features to sage grouse would include leks, nesting and brood rearing habitat, winter concentration areas, and greater sage-grouse core area as identified by the Governor's Executive Order (EO 2008-2)

Eighteen greater sage-grouse leks are present within 11 miles of the proposed Facility. One lek designated as occupied by the WGFD (Cooper Lake - 31) is located approximately

0.5 mile east of the transmission line proposed in Alternative 2. No other known leks are documented within 2 miles of the proposed Facility.

Habitats within 0.25 mile of Facility infrastructure were mapped (Johnson et al., 2009a). Based on this mapping effort approximately 3,263 acres (35.2 percent) of the survey area contain sagebrush cover ranging from 5 to 20 percent, which may provide suitable greater sage-grouse brood-rearing habitat. Another 1,772 acres (19.1 percent) of the area has sagebrush cover of approximately 30 percent, which may provide suitable nesting habitat for sage-grouse. Most of the remainder of the area is classified as shortgrass prairie. Pellet count surveys for greater sage-grouse were completed in spring and fall of 2007 by Johnson et al. (2008), but were discontinued after no greater sage-grouse droppings were recorded in 150 sample plots in the area of the currently proposed WTGs.

Wintering concentration area is located approximately 2 miles east of the site and pellet studies completed in spring and fall of 2007 indicated use by greater sage-grouse in this area. Some suitable sagebrush habitat is present in the proposed Facility area (Johnson et al., 2009a); thus, wintering populations of this species may occur on site. The proposed Facility is located outside the area identified by the Governor's Executive Order (EO 2008-2) as greater sage-grouse core area; however, core area is located approximately 9 miles east of the site.

3.9.2 Wyoming Sensitive Species

The WGFD has developed a matrix of habitat and population variables to determine the conservation priority of native, breeding bird and mammal species in the state. Six classes of Native Status Species are recognized, of which, classes 1, 2, and 3 are considered to be the highest priorities for conservation attention. Wyoming species of special concern generally are not afforded protection or management under state regulations. Alternatively, these species are tracked with regard to their abundance and distribution by the WYNDD as part of the Nature Conservancy's Natural Heritage Network.

The potential occurrences of listed and sensitive species and potentially suitable habitats were evaluated through literature and database reviews, regulatory agency correspondence, biological surveys conducted from May through June and September through October 2006, a site reconnaissance conducted in August 2006, and during surveys completed in summer and fall 2009.

In addition to the federally listed and BLM-sensitive species described above, WYNDD also identified the following plant species as known to occur in the vicinity of the site: Ward's goldenweed (*Oonopsis wardii*), white larch-leaf beardtongue (*Penstemon laricifolius* var. *exilifolius*), and strict-leaved pondweed (*Potamogeton strictifolius*). Pondweed and persistent sepal yellowcress require moist to wet habitat; thus, no suitable habitat exists in the area for these species. Potentially suitable habitat for the goldenweed and beardtongue is also absent from the area.

3.10 Air Quality and Noise

3.10.1 Climate

The Facility site is located in the Wyoming basin physiographic region, which is generally characterized as desert and semi-arid steppe (Martner, 1986). Steppe climate typically results in large seasonal variations in temperature (cold winters and warm summers) and low precipitation levels. The area is about 7,400 feet above mean sea level.

The mean annual temperature in the site vicinity (Medicine Bow) is 42 degrees Fahrenheit (°F), and the mean maximum summer and minimum winter temperatures are 84°F and 12°F, respectively (Western Regional Climate Center, 2002). The average total precipitation and snowfall are 10 inches and 41 inches, respectively.

3.10.2 Air Quality

The EPA Office of Air Quality Planning and Standards and the WDEQ Air Quality Division set National Ambient Air Quality Standards (NAAQS) and Wyoming Ambient Air Quality Standards (WAAQS), respectively. These standards identify the following criteria pollutants: nitrogen dioxide, sulfur dioxide (SO_2), carbon monoxide (CO), particulate matter smaller than 10 microns (PM_{10}) and smaller than 2.5 microns ($PM_{2.5}$), ozone, and lead. The NAAQS and WAAQS are listed in Table 3-6.

TABLE 3-6
National and Wyoming Air Quality Standards
Sand Hills Wind Energy Facility

Pollutant	Averaging Time	NAAQS (µg/m^3)	WAAQS (µg/m^3)
Carbon Monoxide	1 hour 8 hour	40,000 10,000	40,000 10,000
Lead	Calendar Quarter	1.5	1.5
Nitrogen Dioxide	Annual	100	100
Ozone [a]	1 hour 8 hour	— 157	— 157
Particulate Matter (PM_{10}) [b]	24 hour Annual	150 50	150 50
Particulate Matter ($PM_{2.5}$) [c]	24 hour Annual	65 15	65 15
Sulfur Dioxide	3 hour 24 hour Annual	1,300 365 80	1,300 260 60

[a] 8-hour ozone standard is met when the average of the annual fourth-highest daily maximum 8-hour average ozone concentration is less than or equal to 0.08 ppm (157 µg/m^3). The 1-hour ozone standard was revoked on June 15, 2005.

[b] Not more than one exceedance of the 24-hour average concentration per year

[c] Not to exceed the 98th percentile of the 24-hour average concentration

Source: NAAQS, 40 CFR Part 50. Wyoming Air Quality Standards and Regulations, Chapter 2, Sections 1-11 (WAQSR, 2006).

µg/m^3 = micrograms per cubic meter

Albany County is in an attainment area and is not in maintenance for any criteria pollutant (WAQSR, 2006; BLM, 2004). Attainment is achieved when the existing background concentrations for criteria air pollutants are less than the maximum allowable ambient concentrations defined in the NAAQS and WAAQS.

The only ambient air monitor located in Albany County is the 406 Ivinson Monitor Station, which measures PM_{10}. Air monitors for other pollutants are located over 80 miles from the site. Air monitors are typically located in areas where air quality is a concern. Therefore, based on the lack of air monitors, it is unlikely that air quality in the area is a concern. The 2008 background air concentrations measured at the 406 Ivinson Monitor Station are provided in Table 3-7.

TABLE 3-7
Criteria Air Pollutant Concentrations Measured in the Albany County, Wyoming
Sand Hills Wind Energy Facility

Pollutant	Averaging Time	Measured Background Concentration ($\mu g/m^3$)	Percent of NAAQS and WAAQS Standard
Particulate Matter (PM_{10})	24 hour	68	31
	Annual	25	32

Source: EPA, 2009.
(Data taken from the 406 Ivinson Monitor Station – 2008 Values)

Although no background air quality monitoring has been conducted, the site is located in a rural setting with minimal industrial sources or vehicular traffic emission contributions to the airshed. The majority of emissions in Albany County are likely attributable to fugitive dust from agricultural and construction activities. Additionally, smoke from wildfires and prescribed burning can impact ambient air quality on a seasonal basis. The frequent windy conditions that make the area a candidate for wind energy development can contribute to episodes of reduced visibility.

3.10.3 Noise

Noise is defined as an unwanted sound. Noise levels are measured in units of A-weighted decibels (dBA), which are roughly proportional to loudness as perceived by the average person.

The Facility is located in a rural setting, and the primary land use is cattle grazing. Noise levels in the area are affected by the following factors:

- The site's general setting, specifically isolated and rural in this area
- The nature of the noise sources or activities occurring in those settings
- The proximity of the noise receptor to the noise source or activity
- Time of day
- Various attenuating factors that can mute or interrupt noise waves, such as vegetation, topographic features, buildings, and atmospheric conditions.

The rural and remote area is characterized by rural noise levels estimated at 30 dBA (nighttime) to 45 dBA (daytime) (British Wind Energy Association, 1994). Potential noise sources near the site include I-80 and the Union Pacific Railroad to the east of the site. However, these transportation routes are remote from the site and not readily heard.

Although no background noise monitoring has been conducted, the remoteness of the site, the absence of nearby noise sources, and the general land use (cattle grazing) result in a typically quiet, rural setting. No noise-sensitive receptors, including residences, parks, or schools, are located within 1 mile of the site. The closest residence is located more than 1,000 feet from the site boundary.

3.1 Visual Resources

3.1.1 Introduction

Visual and aesthetic resources are the natural and built features of the landscape that contribute to the public's experience and appreciation of the environment. Visual resource or aesthetic impacts are generally defined in terms of a project's physical characteristics and potential visibility and the extent to which the project's presence would change the perceived visual character and quality of the environment in which it would be located. To provide a basis for assessing the Proposed Action's potential effects on the visual resources of the Facility site and area around it, this section documents the existing visual conditions on the site and in the surrounding area.

3.1.2 Visual Conditions In and Around the Proposed Action Area

3.1.2.1 Facility Site

The Facility site is located on a portion of a large ranch in Albany County, approximately 30 miles northwest of Laramie and approximately 2 miles southeast Rock River. The ranch, which is operated by Sand Hills Land and Cattle, LLC, consists of a combination of privately owned land and land leased from the BLM (Figure 2-2).

The Proposed Action area lies at the border between two physiographic regions: the Shirley Basin and the Laramie Basin Rolling Plains. The Facility site is a steep-sided, flat-topped plateau approximately 1 mile wide and 5 miles long. The plateau and the nearby areas where access roads and the existing Western transmission line are located (Figure 2-2) are open in appearance and characterized by close-cropped vegetation, barbed wire fencing, and a network of unpaved access roads. The most prominently visible built features on the site include a pair of water storage tanks, two meteorological towers, a communications project, and wooden H-frame towers in the transmission corridor. The plateau rises above the surrounding area and serves as a landmark in the area's landscape. Rows of coniferous trees grow along the tops of narrow ridges to the north of the plateau and frame the views toward the plateau, reinforcing its visual distinctiveness in the surrounding landscape.

Rocky Mountain Power's existing High Plains and McFadden Ridge wind energy projects are located approximately 3 miles west and southwest of the Facility. The High Plains project consists of 66 GE 1.5-MW WTGs and was constructed in 2008 and 2009. McFadden Ridge was proposed as a two-phase project with 59 WTGs. Nineteen additional GE 1.5-MW WTGs were installed in 2009, bringing the total existing WTGs in the McFadden Ridge project to 85. Plans for a third phase are currently under evaluation and not publicly available at this time.

The lands in the study area under the jurisdiction of the BLM have all been given a Visual Resource Management (VRM) designation of Class III under the Rawlins Resource Management Plan, which governs the management of BLM lands in this area. Class III objectives seek to "partially retain the existing character of the landscape." BLM policies permit "moderate changes to the existing landscape, although management activities associated with these changes should not dominate the view of the casual observer" (BLM, 2008a).

3.1.2.2 Potential Visibility and Selection of Key Observation Points

Using the viewshed feature of the Arc Info geographic information system (GIS) program, analyses were undertaken to determine the potential visibility of the Proposed Action in the area extending out 30 miles from the site. Because of the rural nature of the surrounding region, the number of people who have close views of the Proposed Action is relatively small. The greatest concentrations of nearby viewers are in the community of Rock River, approximately 2.4 miles from the closest planned turbine, and along US 30/287, where turbines would be visible as close as 0.6 mile from the roadway. Another potentially sensitive viewshed was identified along the I-80 corridor 13 miles to the southwest. Viewers in other places from which the turbines have the potential to be visible—like the town of Medicine Bow, 19 miles to the northwest; and Laramie, 30 miles to the southwest—are located so far from the site that the turbines would appear as very small elements in the overall landscape and would have a negligible effect on views.

This analysis focuses on the views from the nearby areas, which have the greatest potential for being affected by the Proposed Action. In Rock River and along US 30/287, representative viewpoints were selected to serve as Key Observation Points (KOPs) from which photographs were taken of views toward the Facility site. These photographs were used to characterize existing viewing conditions and to provide the basis for preparing simulations of the views as they would appear with the Facility in place. KOP 1 is the viewpoint selected to represent views from the town of Rock River, and KOP 2 is the viewpoint selected to represent views from US 30/287. KOP 3 provides a viewpoint along the I-80 corridor. The locations of these viewpoints are shown in Appendix D.

3.1.2.3 Views toward the Facility Site

Analysis Approach

The scenic quality of the views toward the Facility site seen from each of the KOPs was assessed based on field observations made in August 2006 and October 2009, review of methods for assessment of visual quality, and review of research on public perceptions of the environment and scenic beauty ratings of landscape scenes. The final assessment of scenic quality was based on professional judgment that took a broad spectrum of factors into consideration, including:

- Natural features, including topography, water courses, rock outcrops, and natural vegetation

- The positive and negative effects of man-made alterations and built structures on visual quality
- Visual composition, including an assessment of the vividness, intactness, and unity of patterns in the landscape. Vividness is defined as the memorability of the visual impression received from contrasting landscape elements as they combine to form a striking and distinctive visual pattern. Intactness is defined as the integrity of visual order in the natural and man-built landscape, and the extent to which the landscape is free from visual encroachment. Unity is defined as the degree to which the visual resources of the landscape join together to form a coherent, harmonious visual pattern. Unity refers to the compositional harmony of intercompatibility between landscape elements (U.S. Department of Transportation Federal Highway Administration, 1988).

The final ratings assigned to each view fit within the rating scale summarized in Table 3-8. Development of this scale builds on a scale developed for use with an artificial intelligence system for evaluation of landscape visual quality (Buhyoff et al., 1994), and incorporates landscape assessment concepts applied by the U.S. Forest Service and the U.S. Department of Transportation.

TABLE 3-8
Landscape Scenic Quality Scale
Sand Hills Wind Energy Facility

Rating	Explanation
Outstanding Visual Quality	A rating reserved for landscapes with exceptionally high visual quality. These landscapes are significant nationally or regionally. They usually contain exceptional natural or cultural features that contribute to this rating. They are what we think of as “picture post card” landscapes. People are attracted to these landscapes to view them.
High Visual Quality	Landscapes that have high quality scenic value. This may be due to cultural or natural features contained in the landscape or to the arrangement of spaces contained in the landscape that causes the landscape to be visually interesting or a particularly comfortable place for people. These landscapes have high levels of vividness, unity, and intactness.
Moderately High Visual Quality	Landscapes that have above average scenic value but are not of high scenic value. The scenic value of these landscapes may be due to man-made or natural features contained within the landscape, to the arrangement of spaces, in the landscape or to the two-dimensional attributes of the landscape. Levels of vividness, unity, and intactness are moderate to high.
Moderate Visual Quality	Landscapes, that are common or typical landscapes that have, average scenic value. They usually lack significant man-made or natural features. Their scenic value is primarily a result of the arrangement of spaces contained in the landscape and the two-dimensional visual attributes of the landscape. Levels of vividness, unity, and intactness are average.
Moderately Low Visual Quality	Landscapes that have below average scenic value but not low scenic value. They may contain visually discordant man-made alterations, but these features do not dominate the landscape. They often lack spaces that people will perceive as inviting and provide little interest in terms of two-dimensional visual attributes of the landscape.
Low Visual Quality	Landscapes that have below average scenic value. They may contain visually discordant man-made alterations, and often provide little interest in terms of two-dimensional visual attributes of the landscape. Levels of vividness, unity, and intactness are below average.

Note: Rating scale based on Buhyoff et al., 1994; U.S. Department of Transportation Federal Highway Administration, 1988, and United States Department of Agriculture Forest Service, 1995.

In terms of the relationship of the rating levels in this scale to ratings under the BLM's Scenic Quality/Visual Integrity system, views with an Outstanding Visual Quality rating are equivalent to Class A (Unique) Landscapes, views with ratings of High and Moderately High Visual Quality are equivalent to Class B (Above Average) Landscapes, views with ratings of Moderate, Moderately Low, and Low Visual Quality are equivalent to Class C (Common) Landscapes.

For each KOP, an evaluation was also made of the sensitivity of the view, applying the principles identified in BLM's *VRM Manual 8410-1 – Visual Resource Inventory* (BLM, 2007). Factors considered included the number of users, the type of user, whether the area has received any special landscape protection designations, and level of expressed public interest in the area's appearance.

KOP 1

KOP 1 is a viewpoint located on US 30/287 at the edge of the bluff along the north side of Rock Creek, which is also the southern edge of the built-up area of the incorporated community of Rock River (Appendix D, Figure D-1a). This viewpoint was selected to represent views from Rock River, a community with a population of 235, and from US 30/287, which has an average daily traffic level of 915 vehicles. This viewpoint lies 2.4 miles from the site of the closest proposed turbine.

Appendix D, Figure D-1a shows the existing view toward the Facility site from KOP 1. The plateau, which rises above the rolling plains and the deeply incised valley created by Rock Creek, serves as a landmark in the local environment. The plateau, the rows of trees on the tops of the ridges in front of it, and the Rock Creek valley combine to provide the view with a moderately high level of vividness. In the view from this location, the two existing meteorological towers located on the plateau are not readily detectable, although the communications tower, while not visually prominent, can be made out as a feature that rises above the plateau top. Because of the faint visibility of the communications tower and because of the presence of the road, the level of visual intactness is moderately high. Because the elements of this view combine to create a coherent whole, the level of visual unity is high. Overall, the visual quality of this view is moderately high, and would be a Class B (Above Average) landscape under the BLM classification system.

Because of the visibility of this view to the residents of Rock River and to the occupants of the approximately 450 vehicles that use the southbound lanes of US 30/287 on a daily basis, the sensitivity of this view is high.

KOP 2

KOP 2 is a viewpoint located on US 30/287 approximately 7.6 miles southeast of Rock River, and approximately 2 miles from the closest proposed turbine (Appendix D, Figure D-2a). The highway has an average daily traffic level of 915 vehicles.

Appendix D, Figure D-2a shows the existing view toward the Facility site from KOP 2. From this viewpoint, the plateau is not as dramatic and distinctive a landscape feature as it is in the view from KOP 1. From this vantage point, the plateau appears as a more subtle rise in the landscape, and the ridgelines fringed with trees are seen as separate landscape elements that do not combine to create a composition with the plateau. As a consequence, the level of vividness of this view is moderate at most. In the view from this location, the two meteorological towers on the plateau are not readily detectable, but the communications tower is seen as a feature that rises above the plateau top at what appears from this viewpoint to be the plateau's high point. Because of the faint visibility of the communications tower and because of the presence of the road in the view, the level of visual intactness is moderately high. Because the elements of this view do not combine to create a completely coherent whole, the level of visual unity is at most moderately high. Overall, the visual quality of this view is moderate, and would be a Class C (Common) landscape under the BLM classification system.

This view is visible to the occupants of the approximately 915 vehicles per day that use both the east- and westbound lanes of US 30/287 on a daily basis. Although US Highway 30 has some historic importance because it is the route of the Lincoln Highway, one of the first cross-country highways for motor vehicles, no special recognition or protections have been established for the views from the highway in this area. Because the views from this highway have no special status and because roadway viewers are considered to have moderate levels of sensitivity, the sensitivity of the views that KOP 2 represents is moderate.

KOP 3

KOP 3 is a viewpoint located at Exit 279 on I-80 approximately 50 miles northwest of Laramie and approximately 13 miles southwest of the closest proposed turbine (Appendix D, Figure D-3a). The highway has an average daily traffic level of 10,788 vehicles.

Appendix D, Figure D-3a shows the existing view toward the Facility site from KOP 3. From this viewpoint, the plateau is visible, but is not a dramatic and distinctive landscape feature due to its distance from the KOP. From this vantage point, the plateau appears as a subtle rise in the landscape, and the Rocky Mountain Power High Plains and McFadden Ridge windfarm is seen to the southwest of the plateau. As a consequence, the level of vividness of this view is moderate at most. In the view from this location, the two meteorological towers and communications tower on the plateau are not detectable. Because of the visibility of the existing wind project, the level of visual intactness is moderately high. Because the elements of this view do not combine to create a completely coherent whole, the level of visual unity is at most moderately high. Overall, the visual quality of this view is moderate, and would be a Class C (Common) landscape under the BLM classification system.

This view is visible to the occupants of the approximately 10,788 vehicles per day that use both the east- and westbound lanes of I-80 on a daily basis. No special recognition or protections have been established for the views from the interstate in this area. Because the views from this highway have no special status and because roadway viewers are considered to have moderate levels of sensitivity, the sensitivity of the views that KOP 3 represents is moderate.

3.2 Cultural Resources

Cultural resources include historic and prehistoric sites of interest and may include structures, archaeological sites, or religious sites of importance to Native American cultures. The Proposed Action area is known to contain prehistoric sites of unknown age and cultural affiliation. Several surveys have been conducted in relation to the Proposed Action and to the transmission line routes for Alternatives 1 and 2 (described in Sections 2.8.2 and 2.8.3, respectively).

As a result of Native American consultations and archaeological investigations undertaken for the proposed Facility, including the transmission line interconnect (and discussed below), these prehistoric sites have been found to be inter-related and an area associated with a traditional cultural landscape or district. Historic sites, primarily associated with transportation, also occur in the Proposed Action area.

Intensive pedestrian surveys (Class III cultural resource inventories) of 1,828.41 acres within the Proposed Action area were conducted in 2006,[1] 2009,[2] and 2010 (Cultural Resources Analysts, 2009; Cultural Resource Analysts, Inc.; 2011 *pending*). The survey area in 2006 included an inventory of 273.59 block acres and 523.29 linear acres. In 2009, the survey area included an inventory of 256.17 block acres and 612.36 linear acres, and in 2010 the survey area included an inventory of 96 block acres and 67 linear acres. In total, 1,828.41 acres have been inventoried for the Proposed Action.

The 2006 and 2009 inventories covered approximately 15.9 miles of new access roads, 8.7 miles of improved access roads, a switchyard, substation, O&M building, a permanent meteorological tower location, 25 turbine locations, and a laydown/staging area, and the southern transmission line route. All proposed new and improved roads, including turnout locations were covered by a 200-foot-wide inventory corridor, with a 500-foot-wide inventory corridor for the southern transmission line route.

The 2010 inventory was carried out for infrastructure changes associated with the avoidance of NRHP-eligible historic properties. These changes included additional inventory along the southern transmission line corridor to allow access across an active irrigation canal; inventory for the Alternative 2 western transmission line corridor; inventory of the western the switchyard corridor, and switchyard location, and additional inventory to cover three proposed turbine location moves.

The 2011 inventory[3] conducted for the Alternative 1 western transmission line route will include approximately 2 miles of 500-foot-wide inventory corridor and the potential survey of avoidance routes if NRHP-eligible historic properties are encountered. (This route is the one recommended by the Native American tribes to avoid impacts from the Proposed Action.)

The following reports are relevant to the proposed Facility (and will be updated to include the findings of the 2011 surveys for Alternative 1): *Class III Cultural Resources Inventory of Shell Wind Energy's Sand Hills Wind Energy Facility, Albany County, Wyoming* (Cultural Resource Analysts, 2009); and the *Addendum Class III Cultural Resources Inventory of Shell Wind Energy's Sand Hills Wind Energy Facility* (Cultural Resource Analysts, 2011 pending). The first document presents the findings of the cultural resource inventories undertaken in 2006 and 2009. The second document will present the findings of the cultural resource

[1] The 2006 surveys were conducted for the Proposed Action.

[2] A cultural resources survey was also conducted in 2009 for Alternative 2, Southern Transmission Line Access Route (see Section 2.8.3 for a description of that alternative).

[3] A survey is scheduled for spring 2011 for Alternative 1, Western Realignment of Transmission Line Access Route (see Section 2.8.2 for a description of that alternative).

inventories undertaken in 2010 and additional surveys scheduled for 2011 (the 2011 survey will pertain only to Alternative 1, and not to the Proposed Action).

The appropriate literature reviews have been completed for the 2006, 2009, and 2010 surveys and will be implemented for the spring 2011 survey. The 2006 survey covered the original configuration of the Proposed Action. The 2009 survey covered turbine and road relocations of the Proposed Action as well as the Alternative 2 southern transmission line. The pedestrian survey carried out in 2010 was completed for Alternative 2, and an additional pedestrian survey is planned for Alternative 1 pending appropriate weather conditions in spring 2011. The alternative route configurations were considered on the basis of recommendations made by tribal representatives during field visits. Consultation with the Wyoming State Historic Preservation Office (SHPO) regarding Determinations of Eligibility and Finding of Effect for cultural resources located within the Proposed Action area is currently being conducted and would be completed prior to construction.

3.2.1 Historic Properties

The National Park Service (NPS) defines archaeological and historic resources as "the physical evidences of past human activity, including evidences of the effects of that activity on the environment. What makes a archaeological resource significant are their identity, age, location, and context in conjunction with their capacity to reveal information through the investigatory research designs, methods, and techniques used by archeologists"(NPS, 2002a). A cultural resource considered eligible for listing on the National Register of Historic Places (NRHP) is referred to as a historic property.

The 2006, 2009, and 2010 Class III cultural resource inventories for the Proposed Action reevaluated 16 previously identified sites, recorded 39 newly identified sites, 13 isolated resources, and 5 historic non-sites. The 52 newly recorded and reevaluated sites include 26 that have been recommended as eligible for inclusion in the NRHP.

Of previously identified and newly identified sites located within the survey area, 40 are prehistoric, 12 are historic, and 3 are multi-component sites containing evidence of both prehistoric and historic activities. Isolated resources/finds are not considered "sites" and by definition are not eligible for inclusion to the NRHP. Historic sites recorded in the Proposed Action area are primarily related to transportation. This includes railroad settlements, a gas station, and portions of the historic Lincoln Highway and the 1868–1900 alignment of the Union Pacific Railroad. Other historic sites in the survey area include trash scatters, a collapsed fence, cairns associated with historic artifacts, a hearth, and two historic irrigation ditches.

Many of the newly identified prehistoric sites and the prehistoric components of multi-component sites are located along the rim of the plateau and along the western ridge extending from the plateau. There is an increased density of these sites on the plateau at the western edge of the original turbine string road route. The prehistoric sites are predominantly stone circle habitation sites and cairn alignment sites. Similar sites are also located along the east-west oriented ridge extending from the western side of the plateau. Other prehistoric site types include an open camp/lithic scatter, a lithic scatter, and 11 single stone cairns. Many of the prehistoric sites contain more than one type of feature. These sites, through consultation with local Native American tribes, have been found to be associated with one another and are considered to be part of a traditional cultural landscape or district. Many of these sites also include archaeologically identifiable similarities that support their identification as a traditional cultural landscape or district.

As discussed at the beginning of this section, cultural resources surveys were conducted in 2006 for the original configuration of the Proposed Action, and the BLM initiated Native American consultation in November 2008 to discuss tribal concerns. As a result of the findings from that consultation and from the cultural resource surveys , SWE revised the initial turbine layout of the Facility design to move several turbines farther away from the plateau, thus avoiding impacts to cultural resources and sites deemed through tribal consultation as having religious significance to the tribes (see Section 2.10 for a discussion of this alternative turbine access road that was initially considered but eliminated based on the results of the 2008 tribal consultation). Cultural resource surveys were conducted in 2009 for the revised turbine layout. In 2010, the BLM again initiated Native American consultation, and additional cultural resource surveys occurred for Alternative 2. The surveys identified additional NRHP eligible historic properties and Tribal consultation identified additional sites which were possible sacred or respected places. As a result an additional Class III cultural resource inventory has been planned for 2011.

When the 2011 surveys for Alternative 1 are completed and any newly discovered cultural resources are documented, these data will amended to the existing documentation discussed above, including an overall site form listing all prehistoric sites located within, and associated with the traditional cultural landscape/district. The site form will describe the traditional cultural landscape/district and the common uniting attributes of the archaeological sites within it.

3.3 Transportation

3.3.1 Roads and Highways

3.3.1.1 Existing Roadway Operations

The segment of United States Highway 30/287 (US 30/287) adjacent to the Facility access point is a four-lane, divided highway and is classified as a Minor Arterial by the Wyoming Department of Transportation (WYDOT). State Highway 13 (SH 13), is a two-lane, undivided Major Collector that intersects US 30/287 in the town of Rock River and runs southwest/northeast to I-80 approximately 5 miles west of the site. These two roadways would be used during the construction and operation of the Proposed Action for workforce and deliveries.

Traffic counts are recorded at a number of locations throughout the state and those that fall within the study area are shown on Table 3-9. As Table 3-9 shows, the two potentially affected highways experience relatively low volumes on a daily basis. The highest traffic volumes are on I-80 as it traverses Albany County. The highest proportion of trucks (measuring over 50 percent in places) is also recorded on I-80. Other highways with sizeable proportions of truck traffic include US 287 in Albany County.

TABLE 3-9
Average Annual Daily Traffic and Percent Truck Traffic, by Day and Highway
Sand Hills Wind Energy Facility

Station No.	Location	Highway	County	Average Annual Daily Traffic							Percent Truck Traffic
				Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
60S	Tie Siding South	US 287	Albany	3,521	2,908	2,553	2,707	2,905	3,767	3,760	15–20%
106	Laramie West	I-80	Albany	11,761	9,122	9,466	11,144	10,758	11,359	11,908	50–55%
107	Medicine Bow East	US 30	Albany	759	585	523	542	583	843	752	10%
145E	Bosler Junction	US 34	Albany	622	442	387	395	443	661	609	5–10%
145N	Bosler Junction	US 30	Albany	957	845	795	826	848	1,139	979	10%
145S	Bosler Junction	US 30	Albany	1,403	1,136	1,054	1,076	1,143	1,596	1,425	10%

Source: WYDOT, 2007.

The operating conditions, or levels of service (LOS), provided by US 30/287 and SH 13 to these morning and evening peak-hour volumes were assessed using *Highway Capacity Manual* methodologies for multi-lane and two-lane highways. LOS is a term used to qualitatively describe operating conditions in a traffic stream and motorists' perceptions of those conditions. Six LOS classifications are given a letter designation from A to F with A representing the best operating conditions and F the worst. For multi-lane highways like US 30/287, the LOS is defined in terms of density (passenger cars per mile per lane) and average travel speed. For two-lane highways like SH 13, LOS is defined in terms of percent of time spent following another vehicle and average travel speed.

As Table 3-10 shows, both of these highway segments provide very desirable levels of service during the morning and evening peak hours. It is assumed that the local and unimproved roads experience significantly lower volumes and, therefore, operate at acceptable levels of service.

TABLE 3-10
Existing Highway Peak-Hour Levels of Service (Year 2006)
Sand Hills Wind Energy Facility

Highway	AM Peak Hour	PM Peak Hour
US 30/287	A	A
SH 13	A	A

Source: CH2M HILL. 2006b. Preliminary Transportation Summary, Sand Hills Wind Energy Project.

3.3.1.2 Existing Intersection Operations

Access to the site is proposed at one location off of US 30/287. This location is at an existing intersection with the highway. A permit allowing direct access to the state highway is required from WYDOT to ensure that any modifications to this intersection conform to the standards and specifications set by WYDOT. This intersection and the intersection between US 30/287 and SH 13 could be affected by the Proposed Action.

Because the unimproved road at the access point is within the site boundary, it is assumed that it currently experiences little to no traffic volume and would experience project-related volume (background volume) in the future. At this access point, it is assumed that there is traffic on the road to the east and the intersection operation is analyzed as such using two vehicles per hour for the volumes turning to/from this road and US 30/287. Without existing count data, it is assumed that the SH 13 volume splits evenly to the north and south on US 30/287 at that intersection.

As Table 3-11 shows, both of the intersections provide "A" levels of service during the morning and evening peak hours.

TABLE 3-11
Existing Intersection Peak-Hour Levels of Service (Year 2006)
Sand Hills Wind Energy Facility

Intersection	AM Peak Hour	PM Peak Hour
Access Point 1	A	A
US 30/287 and SH 13	A	A

Source: CH2M HILL. 2006b. Preliminary Transportation Summary, Sand Hills Wind Energy Project.

3.3.1.3 Future Roadway Operations

The future operating conditions of the highways were analyzed with the same methodologies as the existing conditions. The future volumes and truck percentages shown in Table 3-12 are forecasts from the WYDOT. These volumes for the year 2035 represent a modest growth rate of approximately 1.6 percent per annum. The year 2035 is used as the horizon year for the traffic analysis because it coincides with WYDOT's current planning horizon. The existing peak-hour percentages were used to calculate the future peak-hour volumes.

TABLE 3-12
Projected Highway Volumes
Sand Hills Wind Energy Facility

Highway	Average Daily Volume	AM/PM Peak-Hour Volume	Percent Trucks
US 30/287	1,260	75/100	17
SH 13	400	25/30	13

Source: WYDOT, 2009a.

As Table 3-13 shows, both of these highway segments would provide "A" levels of service during the morning and evening peak hours in 2035.

TABLE 3-13
Projected Highway Peak-Hour Levels of Service (Year 2035)
Sand Hills Wind Energy Facility

Highway	AM Peak Hour	PM Peak Hour
US 30/287	A	A
SH 13	A	A

Source: CH2M HILL. 2006b. Preliminary Transportation Summary, Sand Hills Wind Energy Project.

One of the adjacent roadways, US 30/287, is programmed for improvements in the 2009 WYDOT State Transportation Improvement Program. The planned improvements shown in Table 3-14 refer to increasing shoulder width, which theoretically increases roadway capacity.

TABLE 3-14
Planned Improvements to Transportation Infrastructure by WYDOT
Sand Hills Wind Energy Facility

Site	Facility	County	Description	Length of Construction	Construction Year
Medicine Bow to Bosler Junction (Medicine Bow East)	US 30/287	Carbon and Albany	Widen and overlay	11.52 miles	2010
Medicine Bow to Bosler Junction (Rock River Section)	US 30/287	Albany	Widen and overlay; isolated reconstruction	8.78 miles	2014

Source: WYDOT, 2009b.

3.3.1.4 Future Intersection Operations

The future intersection operations were analyzed with the same methodologies as the existing conditions. The same lane configurations were used because there are no known proposed improvements at this time. The assumed amount of two vehicles per peak hour for the turn movements to/from the access point road to the east and US 30/287 was increased to three to represent future growth.

As Table 3-15 shows, both of the intersections provide very desirable levels of service during the morning and evening peak hours.

TABLE 3-15
Projected Intersection Peak-Hour Levels of Service (Year 2035)
Sand Hills Wind Energy Facility

Intersection	AM Peak Hour	PM Peak Hour
Access Point 1	A	A
US 30/287 and SH 13	A	A

Source: CH2M HILL. 2006b. Preliminary Transportation Summary, Sand Hills Wind Energy Project.

3.4 Socioeconomic Conditions and Public Services

This section describes the existing socioeconomic setting in the Proposed Action area. The information provided focuses on the population, employment, housing, and income within the area potentially affected by the Proposed Action. Both the study area and the Laramie metropolitan area are located in Albany County, Wyoming. The Laramie metropolitan area includes the incorporated municipalities of Laramie and Rock River, as well as seventeen other communities that are located in Albany County.

This section also provides information on the current level of public services including law enforcement, fire protection, emergency medical, water and sewer, and solid waste.

3.4.1 Social and Economic Factors

Tables 3-16 through 3-22 summarize the various characteristics of population, employment, income, and housing in the Laramie metropolitan area, Albany County, and the State of Wyoming. The town of Rock River is part of the Laramie metropolitan area.

TABLE 3-16
Population by County and Community, 2000–2007
Sand Hills Wind Energy Facility

Place	Census 2000	July 1, 2001	July 1, 2002	July 1, 2003	July 1, 2004	July 1, 2005	July 1, 2006	July 1, 2007
Wyoming	**493,782**	**493,032**	**497,204**	**499,368**	**503,258**	**506,541**	**512,757**	**522,830**
Albany County	**32,014**	**32,215**	**32,275**	**32,469**	**32,725**	**32,556**	**32,497**	**32,227**
Laramie City	27,204	27,280	27,298	27,398	27,577	27,459	27,477	27,241
Rock River Town	235	239	236	235	234	226	218	213
Balance of Albany County	4,575	4,696	4,741	4,836	4,914	4,871	4,802	4,773

Source: Wyoming Department of Administration and Information, Economic Analysis Division (EAD). 2007.

TABLE 3-17
Employment (population 16 years of age and over)
Sand Hills Wind Energy Facility

Location	1990	2000	Percent Change
Laramie Metro Area	12,856	14,616	12
Albany County	14,927	17,168	13
State of Wyoming	207,868	241,055	14

Source: U.S. Census Bureau, 1999; Wyoming Housing Database Partnership. 2007.

TABLE 3-18
Employment (by industry)
Sand Hills Wind Energy Facility

	Laramie Metro		Albany County		State of Wyoming	
Industry	**1990**	**2000**	**1990**	**2000**	**1990**	**2000**
Agriculture, Forestry, Mining	353	299	615	598	28,497	25,732
Construction	518	773	625	961	14,700	20,881
Manufacturing	698	567	827	713	12,834	11,749
Wholesale Trade	143	206	193	254	5,065	5,499
Retail Trade	2,651	1,503	2,998	1,706	38,351	28,457
Transportation, Utilities	612	445	766	559	17,338	15,847
Information	NA	678	NA	746	NA	5,351
Finance, Insurance, Real Estate	359	603	416	683	9,112	11,402
Professional, Administrative	1,068	982	1,188	1,150	13,283	14,312
Education, Health	4,961	5,565	5,533	6,361	38,037	51,737
Entertainment, Arts, Recreation	208	1,713	227	1,899	3,050	23,173
Other Services	850	678	1,008	824	14,835	11,785
Public Administration	435	577	531	714	12,766	15,130

Source: U.S. Census Bureau, 1999; Wyoming Housing Database Partnership. 2007.

TABLE 3-19
Unemployment – Percentage of Total Labor Force (persons 16 years and over)
Sand Hills Wind Energy Facility

	Laramie Metro	Albany County	State of Wyoming
Percent Unemployed	3.0	3.7	3.5

Source: U.S. Census Bureau, 1999

TABLE 3-20
Income
Sand Hills Wind Energy Facility

	Laramie Metro		Albany County			
Income	1990	2000	Percent Change	1990	2000	Percent Change
Less than $5,000	1,051		-29	1,097		-29
$5,000-$9,000	1,646	2,092		1,824	2,269	
$10,000-$14,999	1,499	1,274	-18	1,679	1,413	-19
$15,000-$24,999	1,933	1,970	2	2,299	2,293	-3
$25,000-$34,999	1,363	1,487	8	1,667	1,707	2
$35,000-$49,999	1,474	1,570	6	1,665	1,928	14
$50,000-$74,999	970	1,725	44	1,158	2,100	45
$75,000-$99,999	284	708	71	378	867	56
$100,000-$149,999	136	383	64	165	474	65
$150,000 or more	65	155	58	78	238	67

Source: U.S. Census Bureau, 1999; Wyoming Housing Database Partnership. 2007.

TABLE 3-21
Housing Stock, Occupancy, and Tenure (2000)
Sand Hills Wind Energy Facility

	Occupied			Vacant						
	Percent of Total	Owner	Renter	Percent of Total	Rent	Sale Only	Rented or Sold, Not Occupied	Seasonal, Recreational, Occasional Use	Migrant Workers	Other
Wyoming	86.5%	70.0%	30.0%	13.5%	20.6%	10.9%	6.2%	44.3%	1.2%	16.8%
Albany County	87.2%	51.3%	48.7%	12.8%	20.8%	6.8%	4.0%	63.1%	0.0%	5.4%
Laramie	94.8%	47.5%	52.5%	5.2%	55.9%	14.5%	8.5%	9.7%	0.0%	11.3%
Rock River	79.8%	75.8%	24.2%	20.2%	12.0%	56.0%	0.0%	8.0%	0.0%	24.0%

Source: U.S. Census Bureau, 1999

TABLE 3-22
Housing Stock by Type of Structure (2000)
Sand Hills Wind Energy Facility

	Single-Family Detached	Single-Family Attached	2 Units	3 or 4 Units	5 to 9 Units	10 to 19 Units	20 to 49 Units	50 or More Units	Mobile Home	Boat, RV, Van, etc.
Wyoming	64.9%	2.5%	4.6%	3.0%	3.0%	1.9%	2.2%	1.0%	15.9%	0.4%
Albany County	50.7%	6.7%	7.9%	7.6%	7.6%	3.4%	2.9%	1.5%	13.2%	0.1%
Laramie	46.3%	8.3%	10.0%	9.5%	9.5%	4.2%	3.6%	1.9%	8.7%	0.0%
Rock River	68.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	27.4%	0.0%

Source: U.S. Census Bureau, 1999

The 2000 census data (Table 3-16) document only 55 vacant seasonal/occasional rental units. This number, however, does not include motels or campgrounds. The average occupancy (2003–2005) for Laramie motels and hotels was 61.04 percent and the average room rate for the same period was $46.62. Peak occupancy appears to occur from June through August, which coincides with the summer travel season. According to the records, the highest occupancy month occurred in July 2003 at 83 percent. For 2004 and 2005, occupancy dropped to 60 and 70 percentiles for the peak summer months. The occupancy rate actually decreased from 2000 to 2005 by 6.30 percent. Occupancy data for hotels and motels in the Laramie area are generated annually by the Rocky Mountain Lodging Report. The data provided include only those establishments that subscribe to the Rocky Mountain Reporting Service; therefore, the information is not completely reliable. However, the number of motel/hotel rooms (10,000 to 13,000) reported is substantial for a city the size of Laramie and is thus expected to be fairly representative of the total. A KOA Kampground is located in the Laramie area offering camping sites and cabins. Occupancy average at the KOA Kampground was 91 percent for 2000–2005.

3.4.2 Public Services

3.4.2.1 Law Enforcement

The Albany County Sheriff is responsible for law enforcement in unincorporated areas of the county including the Proposed Action area. Table 3-23 summarizes the law enforcement personnel in Albany County. In addition, the Wyoming Highway Patrol maintains a number of offices throughout the study area. As of 2007, Albany County had 85 sworn officers. As can be seen from the information presented in Table 3.15-8, the majority of the law enforcement officers are located in the larger community of Laramie. In 2007, the number of officers per 1,000 residents varied from a low of 1.9 for the City of Laramie to 3.7 for the Albany County Sherriff.

TABLE 3-23
Law Enforcement Personnel (2007)
Sand Hills Wind Energy Facility

County/Agency	Employees: Officers	Employees: Civilian	Employees: Total	Officers per 1,000 Population	Index Crimes per Officer
Albany County	85	47	132	2.8	12.4
Albany County Sheriff	18	6	24	3.7	4.3
Laramie	49	30	79	1.9	17.3
University of Wyoming	18	11	29	NA	7.3

NA: Not Applicable
Source: State of Wyoming Office of Attorney General, 2007.

3.4.2.2 Fire and Medical Emergency

The Laramie Fire Department responds to all medical emergencies within the Laramie city limits, as well as fire suppression calls within Rural Fire District #1, which encompasses the Proposed Action area. The Laramie Fire Department is a fully paid department and provides 24-hour emergency response services 365 days of the year, including holidays. Table 3-24 lists the fire departments in Albany County and selected characteristics of each department.

TABLE 3-24
Fire Departments in Albany County
Sand Hills Wind Energy Facility

	Community	County	No. Stations	No. Firefighters: Full-Time Paid	No. Firefighters: Volunteer	EMS Service	Basic EMTs	Advanced EMTs
Albany County Total			**10**	**39**	**121**			
Albany County Volunteer Fire Department	Laramie	Albany	1	0	30	No	0	0
Big Laramie Valley Volunteer Fire Department	Laramie	Albany	2	0	30	No	0	0
Centennial Valley Volunteer Fire Department	Centennial	Albany	2	0	12	No	6	0
Laramie Fire Department	Laramie	Albany	2	39	0	Yes	39	27
Little Laramie Fire Department	Laramie	Albany	1	0	20	No	0	0
Rock River Volunteer Fire Department	Rock River	Albany	1	0	14	No	2	0
Vedauwoo Volunteer Fire Department	Laramie	Albany	1	0	15	No	5	0

EMT: Emergency Medical Technician
Sources: Department of Fire Prevention and Electrical Safety, 2009.

The Wyoming Emergency Response Act (35-9-151) established seven regional emergency response teams under the Director of the Wyoming Office of Homeland Security. Members of these teams are specially trained and available to respond to hazardous materials incidents and weapons of mass destruction. Region 3 is composed of Albany and Carbon counties, and responsibility for this region rests with the Laramie Fire Department.

Ivinson Memorial Hospital is a 99 bed hospital serving the medical needs of the county and surrounding communities. A total of 54 full-time-equivalent physicians, 571 registered nurses, 12 dentists, and 29 pharmacists meet the needs of the community (Wyoming Healthcare Commission, 2006).

Water/Wastewater

The City of Laramie utility division provides up to 14.5 million gallons per day of drinking water. The Big Laramie River is the largest single source of water, and the City has purchased additional priority rights to accommodate future demand. Currently, the City treats about 4.5 million gallons of wastewater per day. Additional services provided by the treatment plant include treatment and disposal of septic tank wastes. Additional wastewater treatment facilities (WWTF) in Albany County include the Rock River Wastewater Lagoon and Wade's Mobile Manor WWTF.

3.4.2.3 Solid Waste

Municipal solid waste (MSW) is defined as waste generated in households, commercial establishments, institutions, and businesses. MSW includes used paper, discarded cans and bottles, food scraps, yard trimmings, and other items. Industrial process wastes, agricultural wastes, mining waste, and sewage sludge are not MSW.

Albany County has one open landfill in Laramie and a transfer station in Rock River. Of the solid waste disposed of, 70 percent was MSW, 25 percent was construction/demolition debris, 4 percent was yard waste, and 1 percent was other (including dead animals). The Laramie landfill estimated that about 3 to 5 percent of the waste received is recycled. This includes 8,500 to 9,000 tires and 1,000 tons of white goods and steel.

3.4.3 Environmental Justice

Executive Order 128998 requires federal agencies to address disproportionately high and adverse human health and environmental effects of their actions, programs, and policies on minority and low-income populations. The BLM's PEIS (BLM, 2005a) follows the Council on Environmental Quality guidelines in assessing environmental justice issues. The three primary steps in this assessment are to determine (1) the geographic distribution of low-income and minority populations; (2) whether any impacts would be high and adverse; and (3) whether these impacts would disproportionately affect the low-income and minority populations.

3.4.3.1 Poverty

The population for whom poverty status was determined in the 2000 census comprises about 97 percent for the state. Of this subset of the population, the proportions living below the poverty level (as defined in 1999) were 11.4 percent for the state, and 21.0 percent for Albany County.

Income data for the Laramie metropolitan area and Albany County are summarized in Table 3.15-10. According to national 2000 poverty statistics, 22.6 percent of the total Laramie, Wyoming, population and 21 percent of Albany County individuals fall below the poverty level. The poverty guidelines for the 48 contiguous United States and the District of Columbia are shown in Table 3-25.

TABLE 3-25
Poverty Guidelines, Contiguous United States
Sand Hills Wind Energy Facility

Size of Family Unit	Poverty Guideline
1	$8,350
2	$11,250
3	$14,150
4	$17,050
5	$19,950
6	$22,850
7	$25,750
8	$28,650

Source: Wyoming Department of Employment, Research and Planning, 2000.

Table 3-26 compares the poverty rates for Laramie, Wyoming, and Albany County, to the State of Wyoming and the country at large.

TABLE 3-26
Poverty Rates for Laramie, Albany County, Wyoming, and United States
Sand Hills Wind Energy Facility

Laramie	Albany County	State of Wyoming	United States
22.6%	21%	11.4%	12.4%

Source: U.S. Census Bureau, 1999.

The substantial difference between the State of Wyoming, versus the City of Laramie and Albany County is possibly the result of what is referred to as a “Group Quarters” issue. The literature suggests that the census is supposed to count people where they permanently reside, as opposed to where they are going to school, but in the case of the University of Wyoming, located in Laramie, the students were counted in their group quarters (dormitories and off-campus housing). Thus, students who typically do not work or who hold low-paying jobs were counted as residents of Laramie, which skewed the resulting “Areas of Substantial Unemployment,” and affected the poverty rates (U.S. Department of Labor, 2009).

3.4.3.2 Minorities

Racial information for the Laramie metropolitan area and Albany County is provided in Table 3-27. Census data indicate that 9 percent of Laramie’s population is minority, and

8 percent of Albany County is minority. All races, except White, identified below are considered minority populations.

TABLE 3-27
Minority Population – 2000 Census
Sand Hills Wind Energy Facility

	Laramie Metro		Albany County	
Race	**Number**	**Percent**	**Number**	**Percent**
Total Population	27,213	100	32,014	100
White	24,868	91	29,299	92
Black	271	1	284	1
Indian	204	1	291	1
Asian	534	2	554	2
Native Hawaiian/ Other Pacific Islander	0	0	0	0
Some Other Race	858	3	930	3
Two or more races	478	2	656	2

Source: U.S. Census Bureau, 1999.

As can be seen from the information presented in Table 3-28, the minority population share of total population varies across communities with 14 percent in Laramie and 9.4 percent in Rock River.

TABLE 3-28
Population Composition by Race and Ethnicity by Community (2000)
Sand Hills Wind Energy Facility

	White Alone	Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Two or More races	Hispanic	Minority Population*
Albany County								
Laramie	90.8%	1.5%	1.7%	2.2%	0.1%	3.6%	8.6%	14.0%
Rock River	96.2%	0.0%	3.4%	0.4%	0.0%	0.0%	5.5%	9.4%

*Population other than non-Hispanic white
Source: U.S. Census Bureau, 1999.

3.4.4 Taxes

Assessed Property Values. The assessed value of real property is the major source of *ad valorem* taxes (property taxes). Properties are assessed at both the state and local (county) level: the state assesses the value of utility and mineral properties, while the counties assess residential, agricultural, commercial, and industrial land and improvements.

The total assessed value of real property in 2008 for Albany County was $330,654,074 as displayed in Table 3-29.

TABLE 3-29
Assessed Valuation by Type of Property by County (2008)
Sand Hills Wind Energy Facility

	Locally Assessed Valuation				State Assessed Valuation		
County	**Agricultural Land**	**Commercial Land, Improvements and Personal Property**	**Residential Land, Improvements and Personal Property**	**Industrial Property**	**Non Minerals (Utilities, Railroads, and Airlines)**	**Minerals**	**Total**
Albany	$6,606,794	$67,907,378	$206,015,043	$7,207,710	$37,970,700	$4,946,449	$330,654,074
State	$189,329,238	$1,034,539,039	$4,272,222,102	$1,639,188,562	$917,847,973	$13,845,204,284	$21,898,331,198

Source: Wyoming Department of Revenue, 2008.

Of the six types of property assessments described in Table 3-29 for the study area, the greatest contribution is associated with mineral properties, which accounted for 51 percent of total assessed value. However, in Albany County, mineral property assessed value contributes less than 2 percent of total assessed value of property. For Albany County, the large share (62 percent) of total assessed value is contributed by residential land, followed by commercial land (21 percent) with each of the remaining property categories contributing 11 percent or less.

The *ad valorem* taxes levied by Albany County in 2008 are shown in Table 3-30. By far the greatest share is assigned to education: 66 percent ($14,548,779). The amount of *ad valorem* taxes levied in 2008 increased from the 2007 level by 8 percent in Albany County.

TABLE 3-30
Ad Valorem Taxes Levied (2008)
Sand Hills Wind Energy Facility

	Albany County	
Category	**Mills**	**Amount**
County Tax Levies	12.000	$3,967,849
Fair Operations	0.467	$154,416
Other General Fund	9.901	$3,273,806
Library Operation	1.632	$539,627
Museum Operation	—	—
Recreation System	—	—
Municipal Tax Levies		$1,635,665
Special District Tax Levies		$1,993,636
All Education Tax Levies		$14,548,779
Grand Total All Taxes Levied	66.976	$22,145,929
Percent Change Over 2007		8.174%

Source: Wyoming Department of Revenue, 2008.

Ad valorem taxes (calculated by applying county- and use-specific mill rates to the assessed value) support a number of county and municipal operations including airports, fire protection, hospitals, libraries, museums, public health, recreational systems, special districts, and education. Table 3-31 displays the major beneficiaries of property taxes in the state.

TABLE 3-31
Beneficiaries of Property Tax Collections in Wyoming (2008)
Sand Hills Wind Energy Facility

Beneficiary	Percent of Total
Schools	54.14%
Counties	18.28%
Foundation Program (for schools)	18.66%
Special Districts	7.40%
Municipalities	1.52%

Source: Wyoming Department of Revenue, 2008.

Sales, Use, and Lodging Taxes. Sales and use taxes comprise the large majority of excise tax revenues collected by the state. Of all excise taxes collected, 53 percent are distributed to the state general fund with the remaining 47 percent distributed to local governments. Local governments can also impose a lodging tax. Each of these tax rates for Albany County are shown in Table 3-32.

TABLE 3-32
State and County Sales, Use, and Lodging Tax Rates
Sand Hills Wind Energy Facility

County	State Tax Rate	General Purpose Option	Specific Purpose Option	Total Sales and Use Tax Rate	Lodging Tax Rate	Total Tax Rate
Albany	4%	1%	1%	6%	4%	10%

Source: Wyoming Department of Revenue, 2008.

Sales Tax. The state-imposed tax rate is 4 percent, and the collections are distributed 69 percent to the state and 31 percent to the respective county. Albany County imposes a 1 percent optional sales tax, of which the revenues (less administrative costs of about 1 percent) are returned by the state to the county. Total sales and use tax collections for the years 2002 through 2008 for Albany County are presented in Table 3-33. Collections in Albany County exhibited a steady rise until 2006, after which they leveled off. Collections rose by 17 percent over the period in Albany County, while the increase at the state level was almost 65 percent.

Use Tax. A state use tax is imposed on purchases made outside a taxing jurisdiction for first time use, storage, or other consumption within that jurisdiction, thus preventing sales tax avoidance. Use tax is a complement to sales tax. Effective January 1, 1981, the adoption of an optional sales tax required a change in the use tax rate of equal amount. The state-imposed tax rate is 4 percent. State use tax collections are shared between state government and the county of origin on the same distribution basis as sales tax. Use tax collections by year are shown previously in Table 3-33.

TABLE 3-33
Sales, Use, and Lodging Tax Collections (Fiscal Years 2002–2007)
Sand Hills Wind Energy Facility

	2002	2003	2004	2005	2006	2007	2008
Sales Tax							
Albany County	$23,521,324	$23,532,103	$25,342,693	$25,892,238	$27,553,099	$26,268,065	$27,520,683
State of Wyoming	$515,799,683	$503,970,199	$551,668,565	$603,951,798	$719,115,277	$799,254,374	$849,216,844
Use Tax							
Albany County	$1,695,842	$1,616,236	$2,055,773	$1,770,844	$2,931,597	$5,896,312	$3,019,097
State of Wyoming	$62,491,361	$54,866,020	$58,387,269	$64,326,659	$82,158,509	$113,045,113	$124,173,968
Lodging Tax							
Albany County	$29,041	$31,590	$44,100	$61,014	$64,837	$62,661	$66,378
Laramie	$282,262	$282,914	$356,934	$349,187	$414,426	$524,036	$567,553
Rock River	$739	$588	$314	$490	$416	$223	$711
Total	$312,042	$315,092	$401,348	$410,691	$479,679	$586,921	$634,642
State of Wyoming	$3,939,521	$4,108,475	$4,738,192	$4,960,822	$5,859,863	$6,843,052	$7,825,924

Source: Wyoming Department of Administration and Information, 2008.

Lodging Tax. Cities, towns, and counties may impose an excise tax of up to 4 percent on all sleeping accommodations for guests staying less than 30 days. All tax collections, less state administrative costs, are distributed to the taxing jurisdiction. At least 90 percent of the tax distributions must be used to promote travel and tourism. The tax rates for Albany County are shown previously in Table 3-32, and tax collections are shown in Table 3-33.

3.5 Health and Safety

The Facility would be located primarily on rural, agricultural land consisting of BLM and private property. The closest residence is more than 1,000 feet from a proposed turbine location.

The current principal use of the Proposed Action area is cattle grazing. Activities associated with animal grazing could have the potential for releasing small amounts of hazardous materials[4] or wastes or petroleum products into the soil or groundwater. In the area, such materials are generally limited to fuels and lubricants. However, vehicle/equipment storage

[4] Hazardous material means: (1) Any substance or material defined as hazardous, a pollutant, or a contaminant under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at 42 USC. 9601(14) and (33); (2) Any regulated substance contained in or released from underground storage tanks, as defined by the Resource Conservation and Recovery Act (RCRA) at 42 USC. 6991; (3) Oil, as defined by the Clean Water Act at 33 USC. 1321(a) and the Oil Pollution Act at 33 USC. 2701(23); or (4) Other substances applicable Federal, state, tribal, or local law define and regulate as ‘‘hazardous’’ (43 CFR Sec. 2801.5(b).

and maintenance are largely restricted to the immediate vicinity of permanent structures or roads and do not occur in the Proposed Action area. Small amounts of herbicides and/or pesticides may occasionally be applied to control noxious weeds or for other range management purposes. There are no particular hazardous material or petroleum concerns for the Proposed Action area.

According to FEMA flood insurance rate maps (see Section 3.5.1), a 100-year floodplain exists along the Rock Creek, Threemile Creek, Coalbank Creek, Meiser Creek, Dutton Creek, Cooper Creek, and Cooper Lake floodplains, indicating that there is a potential for flooding in these areas during a 100-year flood (FEMA, 1986). No significant geologic or seismic hazards are known to exist in the Proposed Action area.

Weather-related, transportation-related, and equipment-related safety risks in the Proposed Action area are similar to those associated with ranching activities in surrounding areas. Safety risks to small aircraft, including those used to conduct wildlife surveys, are likewise similar to those associated with similar activities conducted elsewhere in the region.

CHAPTER 4

Environmental Consequences

4.1 Introduction

This section presents the environmental consequences of implementing the Proposed Action and alternatives.

In instances where potential impacts could occur, this EA summarizes and relies on information contained in several key documents that identify BMPs and other measures that would be implemented to avoid and minimize potential impacts. The following documents guide the development of wind energy projects for the BLM and Western and prescribe measures with which such developments must comply:

- *Final Programmatic EIS on Wind Energy Development on BLM-Administered Land in the Western United States* (BLM, 2005a) (BLM PEIS)
- *Record of Decision and Approved Rawlins Resource Management Plan for Public Lands Administered by the Bureau of Land Management Rawlins Field Office, Rawlins, Wyoming* (BLM, 2008a) (Rawlins RMP)
- *BLM 9113 Manual* (BLM, 1985) and the *Surface Operating Standards for Oil and Gas Exploration and Development* (U.S. Department of the Interior and U.S. Department of Agriculture. 2007) (the Gold Book).
- Western Area Power Administration *Standard Construction Project Practices and Mitigation* (2009)
- WYDOT Wyoming County Road Standards (2008)

In accordance with BLM IM 2009-043, the Sand Hills EA is tiered to the analysis in the BLM PEIS (BLM, 2005a). The ROD for *Implementation of a Wind Energy Development Program and Associated Land Use Plan Amendments* (BLM, 2005b) establishes policies and BMPs for wind energy development activities on BLM land and establishes minimum requirements for mitigation measures that have been incorporated to avoid and minimize impacts. BLM's land use plans establish goals and objectives for management of the BLM-administered lands. As noted in Chapter 1 of this EA, the relevant land use plan is the BLM's Rawlins RMP (BLM, 2008a). Additionally, the BLM's guidance manuals include measures relevant to construction and maintenance (*BLM 9113 Manual* and the Gold Book).

Western also prescribes construction BMPs relevant to SWE's interconnect to Western's existing Miracle Mile-Snowy Range 1 115-kV transmission line. SWE would adhere to Western's *Standard Construction Project Practices and Mitigation* and the Wyoming County Road Standards in developing the Facility.

In accordance with these guiding documents, Appendix H contains the following sets of measures applicable to the Facility:

- Appendix H-1, BLM Wind Energy Development Program Best Management Practices
- Appendix H-2, Sand Hills Wind Energy Facility Site-Specific Environmental Protection Measures
- Appendix H-3, Western Area Power Administration Standard Construction Project Practices and Mitigation

Where applicable throughout this EA impact analysis, the text references the relevant appendix containing applicable measures for avoiding or reducing potential impacts.

4.2 Proposed Action

4.2.1 Land Use

4.2.1.1 Construction

Land Ownership

The Proposed Action would not affect land ownership in the area, with the exception of approximately 5 acres at the site of the interconnection substation that would be transferred to Western's ownership. The majority of the Facility footprint would occur on privately owned land, which would be leased from the landowner. Development would also occur on lands administered by the BLM, and no change in BLM ownership of these lands is anticipated.

Livestock Grazing

The affected area of the site includes portions of three BLM grazing allotments. During construction, livestock use would be limited in pastures with major construction activities, and some areas would be unavailable for livestock grazing. Facility construction would alter livestock distribution, which could lead to localized impacts to vegetation and soils. Livestock would be disturbed by construction traffic, equipment activity, and noise. If construction occurs outside the grazing schedule (May through September), livestock displacement would not occur.

Soils would be affected directly by overland travel, construction, increased livestock activity, and removal of native vegetation. Such areas could also be susceptible to noxious weeds. These impacts would have the potential to alter rangeland health.

Disturbance associated with construction of the wind turbines and associated facilities would occur on the plateau within the Upper Pine Ridge allotment and the northwestern portion of the Lookout Ranch allotment. The transmission line, transmission line road, and the switchyard road would each traverse both the Lookout Ranch allotment and the Cooper Lake allotment (Homers Pasture and Farm Pasture). The switchyard at Western's Miracle Mile-Snowy Range 1 transmission line would be constructed within the Cooper Lake allotment (Farm Pasture).

Surface disturbance would occur within the allotments as a result of construction activities, including roads, turbine sites and associated facilities. Forage would be temporarily or permanently eliminated from these areas. The potential disturbance area represents less than 0.4 percent of the total acreage within the three allotments. At 4 acres per AUM, 112 acres of disturbance would result in a potential temporary loss of a total of about 28 AUMs on these allotments during the construction period. However, it is not expected that a reduction in livestock AUMs permitted would be necessary for any of the allotments.

Of the 112 acres affected by construction activities, approximately 44 acres would be disturbed temporarily, and this acreage would subsequently be reclaimed and revegetated after construction. In consultation with the BLM, revegetation of disturbed areas would be designed using native plant species to maintain rangeland health.

Wind-borne sediment has the potential to settle on vegetation in the vicinity of construction activities and affect the productivity or palatability of rangeland forage. The potential for fugitive dust would be minimized by dust suppression measures implemented throughout the construction period (see Appendix H).

Fences would be repaired following road construction, and cattle guards or gates would be installed, as appropriate, to provide continuing access during construction and/or operation. The transmission line would span allotment and pasture fences and, therefore, no impacts to these features would occur from construction of the transmission line interconnect. Other range improvements (e.g., reservoirs, water wells, and corrals) would be avoided during construction. Livestock water sources would not be used for construction activities.

Construction would result in disruption of the current use of rangeland and cattle grazing. The disruption would be temporary and minor and, therefore, grazing allotments would continue to meet BLM standards (*Standards for Healthy Rangelands and Guidelines for Grazing Management,* BLM, 2008b). Implementation of the environmental protection measures for livestock grazing, soils, and vegetation in Appendix H-2 would maintain conformance with the BLM's *Standards for Healthy Rangelands and Guidelines for Grazing Management*. Other environmental protection measures, such as BMPs for the Proposed Action, are provided in Appendixes H-1 and H-2.

4.2.1.2 Operation

Land Ownership

Operation would not result in a change in land ownership in the area.

Livestock Grazing

Approximately 66 acres in the area would be permanently occupied by Facility features and would remain unavailable for grazing throughout the operation period. This constitutes a conversion of existing agricultural land use to commercial utility use. At 4 acres per AUM, 66 acres of disturbance would result in a potential loss of about 17AUMs on the three allotments throughout the operation period. It is not expected that a reduction in livestock AUMs permitted would be necessary for any of the allotments. Livestock grazing would continue to be a permitted land use as part of the BLM's multiple-use designation for the area, the BLM grazing leases would not be modified, and the existing grazing allotments would continue to be used during operation of the Facility.

No additional ground disturbance would occur during the operation phase. It is expected that livestock would become accustomed to routine activity (mostly from intermittent vehicular travel for facility maintenance) during the operation phase. Cattle use and ranching have not been affected in other nearby wind project areas.

Existing grazing allotments would remain in compliance with the *Standards for Healthy Rangelands and Guidelines for Grazing Management* (BLM, 2008b) during the operation period.

Other Land Uses

Operation would not result in impacts to adjacent land uses, including residential uses, agriculture, transportation, electrical transmission, or wind generation.

4.2.1.3 Decommissioning

Decommissioning would result in impacts similar to those described for construction, and the same environmental protection measures, as presented in Appendix H, would be implemented. Decommissioning and final site restoration and revegetation would restore all affected areas to preconstruction grazing uses. Decommissioning would not result in impacts to adjacent land uses, including residential uses, agriculture, transportation, electrical transmission, or wind generation. Appendix B, Reclamation Plan, contains additional details on reclamation and decommissioning.

4.2.2 Soils

4.2.2.1 Construction

Soils disturbed during construction would be susceptible to water and wind erosion resulting from removal of vegetation. Exposed soil would be most evident during and immediately following construction and would decrease over time as a result of soil stabilization and reclamation.

During construction, activities that contribute to soil erosion would include ground disturbance and heavy equipment traffic. Ground disturbance would occur during construction of access roads, wind turbine tower pads, laydown and staging areas, the electrical substation, and the O&M facility and during installation of underground cables and other onsite features. Heavy vehicles also have the potential to disturb or destroy stable soil conditions and promote soil erosion by both wind and water. Grading, excavation, and other construction activities alter surface runoff patterns by diverting natural drainage into new areas and locally increasing runoff volumes.

Soils in the areas to be disturbed by construction activities have surface runoff potential ranging from slow to rapid and water erosion potential ranging from moderate to high (NRCS, 2009). The water erosion potential of the soils occupying the top of the plateau, where the turbines, substation, and the main access road would be constructed, is moderate, attributable in part to the relatively flat topography (1 to 20 percent slope). The water erosion potential of the various soils on the side slopes of the plateau is high, attributable in part to slopes ranging up to 45 degrees, and the water erosion potential of the soils on the relatively level areas (slopes from 0 to 15 degrees) below the plateau ranges from medium to high. These plateau side slopes and the level area below them would support the construction of the transmission line, the transmission line road, and the road to the switchyard. Physical soil characteristics that contribute to the water erosion potential of these soils are discussed in Section 3.3.

Wind erosion would also affect soils in the area. Wind erosion potential is related to various physical characteristics of the soils (NRCS, 2009). The NRCS classifies soils into Wind Erodibility Groups that indicate their susceptibility to wind erosion "in cultivated areas" (and, presumably, in areas similarly disturbed by construction activities). Susceptibility to wind erosion for nearly all soil types potentially affected by construction is rated high (NRCS Wind Erodibility Groups 3 or 4 on a scale of 1 [highest] to 8 [lowest]), with a few minor soil types somewhat less susceptible to wind erosion (NRCS Wind Erodibility Group 5) (NRCS, 2009). The wind erosion potential is most severe for the soils occupying the top of the plateau (NRCS Wind Erodibility Group 3). The wind erosion potential of the soils of the plateau side slopes and the level areas below them is also high (ranging from NRCS Wind Erodibility Group 3 to Group 5), but, on average, these soils are much less susceptible to wind erosion than the soils on top of the plateau.

Wind turbine sites, the Sand Hills substation/O&M facility, and the main access road are located on the top of the plateau, which hosts the soils most susceptible to wind erosion but with only moderate water erosion potential. The transmission line, the transmission line road, and the road to the switchyard) are located on the plateau side slopes and the fairly level areas below, and soils in these areas have lower wind erosion potential but water erosion potential ranging from medium to high.

Soils would be susceptible to wind and water erosion throughout the construction period (approximately 6 months) and thereafter until the disturbed areas are stabilized and reclaimed (approximately 1 year). Loss of soil from wind and water erosion would be permanent.

Of the 112 acres affected by construction, approximately 44 acres (36 acres on the plateau plus approximately 8 acres on the plateau side slopes and below) would be disturbed temporarily during construction. These areas would be reclaimed and revegetated following construction, thereby reducing future erosion in these areas to levels approximating those experienced under existing conditions. Soil excavated for constructing wind turbine tower pads would be stockpiled, topsoiled, and seeded to reduce erosion and provide soil for final reclamation of each turbine work area. Loss of soil to wind erosion would be minimized during construction by the application of water or a dust suppressant approved by the BLM to construction sites and roads.

The plateau side slopes and would be permanently occupied by Facility features, primarily roads, which would be designed and constructed to minimize surface runoff and soil erosion and would have a gravel surface to reduce rutting and to minimize wind erosion and fugitive dust. The wind turbine pads and the substation/O&M facility area would be leveled and graveled surfaces. Both features would minimize the potential for water and wind erosion during operation.

According to the NRCS, wind erosion from construction could disturb up to 86 tons of soil per acre per year under cultivated conditions (NRCS, 2009). For these soils, however, the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period is no more than 5 tons per acre per year

(NRCS, 2009). Although ground disturbance from construction disturbance would not be the same as disturbance from cultivation, these numbers indicate the potential for erosion to occur and the importance of minimizing soil loss during construction.

Implementation of environmental protection measures, including minimizing disturbed areas to the extent practicable, using existing roads to minimize the need for clearing and grading, constructing infrastructure on nearly level to gentle slopes to reduce runoff velocity and erosion potential, and revegetating disturbed areas, would reduce soil erosion from Facility construction. These measures are described in Appendixes H-1, H-2, and H-3.

Potential impacts of surface water runoff are described in Section 4.2.4. Impacts of construction-related fugitive dust (blowing soil) are described in Section 4.2.10.

4.2.2.2 Operation

Environmental impacts to soils during Facility operation would be associated with limited soil erosion induced by vehicle traffic on unpaved roads. Some continued soil erosion from these sources is expected but would be minor.

Implementation of the environmental protection measures described in Appendixes H-1 and H-2 would reduce potential soil loss from operation and maintenance to negligible levels.

4.2.2.3 Decommissioning

Potential impacts to soils from decommissioning would be similar to those described for construction. Soil erosion and some compaction are the primary impacts that would be expected from removal of roads, turbines, and other structures. Increased erosion from decommissioning would continue until all disturbed soils are revegetated. Environmental protection measures would be the same as those described for construction and would reduce impacts to soils from decommissioning to minor levels. Appendix B, Reclamation Plan, contains additional details on reclamation and decommissioning.

4.2.3 Geology/Minerals

4.2.3.1 Construction

Slope Failures and Seismic Hazards

The preliminary geotechnical investigation conducted in 2006 indicated no substantive potential for geological hazards, including ground rupture, earthquake-induced landslides, slope instability, lateral spreading, liquefaction, or settlement or subsidence in the area. The Facility would comply with standard design measures for protection from the occurrence of seismic hazards and slope failure. Therefore, construction activities would not result in adverse impacts to site geology relative to slope failure or geologic hazards. Also see Appendix A, Geotechnical Investigations.

Paleontological Resources

No paleontological resources were determined to exist on the site. The standard paleontological stipulation (Appendixes H-1 and H-2) would apply unless sensitive formations are identified. If potential resources are uncovered during site development, construction activity would halt until a qualified paleontologist analyzed the resource for potential significance. Therefore, construction would not result in adverse impacts to paleontological resources.

Mineral Resources

No known economic mineral resources exist in the area other than mineral materials such as sand and gravel, and no active commercial rock quarries, gravel mines, active oil, gas, or coal leases, or other important mineral resources are located at the site. Therefore, construction would not result in impacts to mineral resources.

The BLM requires that wind energy projects be developed in a manner that would not prevent mineral extraction (Appendix H-1). The Facility would not affect potential mineral resource exploration or development or oil and gas exploration or extraction in the area.

Construction would not result in adverse impacts to site geology.

4.2.3.2 Operation

No new earth-moving activities would occur during operation and maintenance. Therefore, no impacts would occur to site geology relative to slope failure or geologic hazards, paleontological resources, or mineral resources as a result of Facility operation. Also, operation would not affect potential mineral resource exploration or development or oil and gas exploration or extraction at the site.

4.2.3.3 Decommissioning

Activities associated with decommissioning would be similar to those associated with construction. However, all earth-moving activities would occur in areas that would have been previously disturbed for construction, and, therefore, no new impacts to paleontological resources would result from decommissioning. Decommissioning activities would not result in adverse impacts to site geology relative to slope failure, geologic hazards, or mineral resources. Appendix B, Reclamation Plan, contains additional details on reclamation and decommissioning.

4.2.4 Water Resources

4.2.4.1 Surface Water

Construction

Both wind turbines and transmission line tower structures would be located to avoid or minimize impacts to active channels for all surface water drainages. Stream and wash crossings for all new and improved access roads would be constructed in compliance with the CWA and in accordance with a Stormwater Pollution Prevention Plan (SWPPP), a component of the requisite Wyoming Pollution Discharge Elimination System (WPDES) permit issued by the WDEQ Water Quality Division. Implementation of standard construction BMPs, as required in the SWPPP, as well as implementation of the requisite Spill Prevention Control and Countermeasures (SPCC) plan, would minimize the potential for accidental release of hazardous materials to surface water resources. The SWPPP requires that site-specific erosion control measures be implemented and monitored for effectiveness during and, for a period, after construction. Additionally, numerous BMPs would be implemented to minimize disturbance, stabilize soils, protect slopes, and control stormwater flows into and through the area (Appendixes H-1, H-2, and H-3). Potential impacts associated with erosion and sediment runoff would be minimal because of the implementation of the SWPPP and environmental protection measures to reduce construction-related erosion.

Water erosion is a potential hazard for soils in the area during construction based on the removal of topsoil and vegetation. Impacts on these soils from water erosion would be temporary. Increased erosion and sediment in streams and drainages could increase quantities of sediments, salts, and other ions to the water, which reduces water quality and can adversely affect aquatic life. Particularly in the road construction phase, surface runoff and erosion would be high, with potential for creating deep roadside ditches and channels. Road erosion would be closely monitored during construction to prevent excessive sedimentation/incision of roadside ditches, and sediment delivery to streams and drainages. Environmental protection measures would be closely monitored for effectiveness and would be maintained regularly to ensure effectiveness.

Concrete materials for construction would be sourced commercially from Laramie. However, if required, a temporary batch plant would be placed within the laydown/staging area. The concrete batch plans would occupy an area of approximately 2 acres. A SWPPP for the batch plant and the concrete washout area would be developed after road design is complete.

Executive Order 11988 requires agencies to reduce the risk of flood loss; minimize the impact of floods on human safety, health and welfare; and restore and preserve the natural and beneficial values served by floodplains.

During construction, vegetation removal would be minimized, to the extent practicable, in accordance with the BMPs in Appendix H. With the proposed revegetation effort following construction, and pole spacing designed to avoid floodplain areas, adverse impacts would not occur nor result in impairment to the function and value of the floodplains.

Operation

Outdoor maintenance activities, such as vehicle and equipment washing, that would potentially create surface water discharges would be conducted in designated areas designed to treat this discharge in conformance with applicable WDEQ requirements. Potentially hazardous materials would be stored indoors at the O&M building in a manner that would comply with all applicable local, state, and federal regulations.

Increased runoff resulting in a modified hydrologic regime could occur due to the reduced permeability of roads. Road erosion and culverts would be closely monitored throughout the operation to prevent excessive sedimentation/incision of roadside ditches, and sediment delivery to streams and drainages. Road areas, culverts, and environmental protection measures would be closely monitored for effectiveness and would be maintained regularly to ensure effectiveness. With the proposed revegetation effort following construction and the operational monitoring program of roads and culverts, adverse impacts would not occur nor result in impairment to the function and value of the surface waters.

Decommissioning

Decommissioning activities would have similar surface-disturbing impacts as described for construction. Implementation of BMPs similar to those described for protecting surface waters during construction would minimize potential impacts to surface waters during decommissioning. Potential impacts associated with erosion and sediment runoff during decommissioning would be minimal because of the environmental protection measures for erosion discussed in Sections 4.2.2 and 4.2.4. Appendix B, Reclamation Plan, contains additional details on reclamation and decommissioning.

4.2.4.2 Groundwater

Construction

The potential for accidental release of hazardous materials used in the construction of the proposed facilities would potentially result in adverse impacts to groundwater resources. Implementation of standard construction BMPs, as required in the SWPPP, as well as implementation of the requisite SPCC plan, would minimize the potential for accidental release of hazardous materials to groundwater resources. No impacts to groundwater resources are anticipated from use of hazardous materials during construction.

Wind turbine foundations are anticipated to be less than 10 feet deep. Based on groundwater depths at the site, minimal potential exists for encountering groundwater during foundation installation. If groundwater were encountered, excavations would be dewatered in accordance with the WPDES General Permit or under the General Permit for Temporary Discharges (if required as a result of the duration of dewatering). Construction dewatering BMPs, including containment basins and removal of residual wastes, would be implemented.

Water would be purchased from an existing private water source permitted for commercial uses and would be used for dust suppression and at the portable concrete batch plant during construction. Water supplied from nearby private groundwater wells that operate under existing permitted water rights and the amounts withdrawn would not result in impacts to regional groundwater availability.

The majority of the site, with the exception of a limited area to the north, is located within a zone for which groundwater has been determined to not be hydrologically connected to the North Platte River. The WDEQ-State Engineers Office would regulate surface and groundwater use/supply to ensure compliance with applicable regulations and the Platte River Implementation Agreement. Based on a determination by the Wyoming State Engineers Office, the facility would conform as an existing water-related activity covered by Wyoming’s Depletion Plan and the Platte River Recovery Implementation Program.

Operation

No wells would be drilled or springs developed for operation. Water use during operation would be minimal and dust suppression activities would not occur due to low vehicle traffic. No impacts to groundwater are anticipated from routine operation and maintenance activities.

Decommissioning

No wells would be drilled or springs developed for decommissioning. Water use during decommissioning would be minimal and dust suppression activities would be minimal if required. No impacts to groundwater are anticipated from decommissioning activities. Appendix B, Reclamation Plan, contains additional details on reclamation and decommissioning. Also see Appendix A, Geotechnical Investigations.

4.2.4.3 Wetlands and Jurisdictional Waters

Construction

The proposed Facility would be constructed in compliance with the CWA Section 404, Executive Order 11990 Protection of Wetlands, and the Clean Water Act Section 402 by preparing a SWPPP and implementing the protective BMPs in that document. During final design, the final location of appurtenant linear features would be adjusted to maximize avoidance of impacts. The basis of this final location determination would be informed by pre-construction studies and surveys for geotechnical, soils, wildlife, and plant species. This siting approach plus implementing BMPs during construction would minimize potential impacts to wetlands and water bodies. The Facility would be constructed in compliance with the requirements of the CWA and the appropriate Nationwide Permit.

Operation

No impacts to wetlands or water bodies are anticipated from routine project operation and maintenance activities.

Decommissioning

Decommissioning activities would have surface-disturbing impacts similar to those described for construction. Implementation of BMPs similar to those described for protecting wetlands and water bodies during construction would minimize potential impacts to wetlands and water bodies during decommissioning. No impacts to wetlands or water bodies are anticipated from routine decommissioning activities.

4.2.5 Vegetation

4.2.5.1 Construction

Impacts to vegetation would occur from clearing and grading activities for access roads, wind turbine pads and crane pads, the electrical collection system, the Sand Hills substation, the O&M facilities, and the interconnecting transmission line, Western's interconnection switchyard, and switching substation. Impacts to vegetation would be permanent along roadways and at Facility features, and temporary in areas planned for reclamation and revegetation. Direct removal of vegetation for construction of the proposed transmission line would be related to the construction of the permanent access road.

To minimize long-term impacts to vegetation(sagebrush, sagebrush steppe, and grassland communities), temporarily disturbed areas on BLM-administered lands, affected areas would be reseeded using one or more reclamation seed mixtures, using native species, as determined in consultation with the BLM. Reseeding on private lands would be done in accordance with landowner requirements. BLM-approved seed mixtures and BLM-recommended timing and methods of reseeding would be used to improve the success of reseeding (Appendix H-2). Seed mixtures would be designed to reclaim disturbed areas successfully. Areas that are temporarily disturbed would have persistent vegetation impacts, such as reduced cover and increased presence of annuals for several years until vegetation can be re-established.

To protect the identified mountain plover-occupied habitat, seed mixes and application rates for reclamation will be designed to use as specified in the Facility's Reclamation Plan.

Application of the environmental protection measures described in Appendix H-2, including minimizing disturbed areas to the greatest extent practicable and revegetating disturbed areas, would minimize the duration and extent of impacts to vegetation.

4.2.5.2 Operation

After areas temporarily disturbed by construction activities have been successfully reclaimed through the implementation of appropriate soil stabilization and revegetation measures, further impacts to vegetation related to the operation and maintenance would be unlikely because new ground-disturbing activities are not anticipated. Approximately 15.8 acres of currently vegetated BLM-administered land would be permanently disturbed and occupied by Facility features throughout the operation period and would, thus, be unavailable for other uses, including wildlife habitat.

4.2.5.3 Decommissioning

Decommissioning activities would be similar to those described for construction, but potential impacts to vegetation would be less than during construction and would be temporary. Surface-disturbing activities would likely be related to removal of wind turbine towers, transmission line towers, and appurtenant structures. All disturbance associated with decommissioning, would be temporary and reclaimed in accordance with BMPs utilized for construction.

Final site reclamation and revegetation activities would restore vegetation. Reclamation of disturbed areas on BLM-administered lands would be designed in consultation with the BLM. Reclamation of private lands would be accomplished in accordance with landowner requirements. No long-term decommissioning impacts are anticipated. Appendix B, Reclamation Plan, contains additional details on reclamation and decommissioning.

4.2.6 Noxious Weeds and Invasive Species

4.2.6.1 Construction

Noxious or invasive weeds are not common in the Proposed Action area; however, areas where weed species occur would be treated to reduce potential spreading to the Proposed Action area. Implementation of the reclamation, revegetation, and environmental protection measures described in Appendixes H-1 and H-2, including preparing a Noxious Weed Plan, avoiding or treating existing noxious weed infestations prior to disturbance, cleaning construction equipment prior to its entering the Proposed Action area, using certified weed-free seed and mulching materials, and mapping and treating areas that become infested during construction, would minimize the potential for establishment of noxious weeds or other invasive species. With implementation of these measures, no long-term impacts associated with noxious weeds are anticipated. The Weed Management Plan is included as Appendix G.

4.2.6.2 Operation

The potential exists for noxious weeds or other invasive species to become established on site during the operation period, particularly along permanent access roads within the Proposed Action area.

Noxious weed monitoring and control would continue on site during the operation phase. Access roads would be monitored regularly for invasive species, and weed control measures would be initiated upon evidence of the introduction of invasive species. Noxious weeds are not anticipated to become established as a result of routine operations activities, and no impacts are expected. If noxious weeds become established, control efforts would be initiated (see Appendix G.)

4.2.6.3 Decommissioning

Activities related to decommissioning t would be similar to those involved in construction, but potential new ground-disturbance would be less than during construction. Most earth-moving activity would likely be related to removal of wind turbine towers, transmission line towers, and appurtenant structures. This disturbance would create additional opportunities for the introduction of noxious weeds and invasive species and require weed monitoring and subsequent control.

Final site reclamation and revegetation activities would restore vegetation to all areas occupied by Facility features during the operation phase and to any areas newly disturbed by decommissioning activities. The need for continued monitoring and treatment of noxious weeds and invasive species would be determined in consultation with the BLM for BLM-administered lands and in accordance with landowner requirements for private lands. Appendix B, Reclamation Plan, contains additional details on reclamation and decommissioning.

4.2.7 Wildlife Habitats and Species

The principal impacts to wildlife associated with construction and operation of the facilities would occur from habitat loss, displacement from disturbance and disruption to wildlife behavior, and potential injury and mortality of wildlife associated with collisions with turbines and other facilities. As discussed in Chapter 1 and Section 4.1, various relevant documents provide guidance on assessing potential impacts of wind energy development, including the BLM's PEIS (BLM, 2005a) and the Rawlins Resource Management Plan (BLM, 2008a). These documents describe potential wildlife impacts and BMPs for wind energy development. Also, *Impacts of Wind Energy Facilities on Wildlife and Wildlife Habitat* (Arnett et al., 2007) and *Environmental Impacts of Wind-Energy Projects* (Committee on Environmental Impacts of Wind Energy Projects, 2007) also provide an overview of potential direct and indirect impacts to wildlife from wind energy facilities. In addition, the wildlife surveys conducted for this EA and the findings of those surveys are provided in Appendix C, Biological Resources Reports. Specific wildlife protocols are provided in Appendix I, Wildlife Monitoring Plan.

4.2.7.1 Construction

Construction activities would affect wildlife through habitat reduction, alteration, or fragmentation; introduction of invasive vegetation; injury or mortality of wildlife; decrease in water quality from erosion and runoff; fugitive dust; noise; exposure to contaminants; and interference with behavioral activities. Construction location and timing would also affect migratory and other behavioral activities of some wildlife species (BLM, 2005a). Restricted areas would occur on BLM land and be appropriately marked to ensure that prohibited activities do not take place in those areas (see Appendix I).

Existing habitat within the construction footprints of turbines and support facilities, new access roads, and new utility corridors would be disturbed and some habitat fragmentation would occur. Approximately 112 acres of wildlife habitat would be affected during construction, although approximately 58 acres of this would be revegetated. This represents a small percentage of the available habitat in the vicinity of the site.

Direct impacts from mortality or injury to smaller, less-mobile species (for example, reptiles, small mammals, and ground-nesting birds) would occur during construction if those species are present. These impacts are expected to occur during the construction period of approximately 6 months. More mobile species (for example, coyotes, fox, pronghorn, and mule deer) would likely be temporarily displaced from occupied habitats. Noise and human presence during construction activities are likely to temporarily displace wildlife species that are present within or near construction areas. The duration and distance an animal is displaced are generally dependent on the individual species. Construction activities would affect local wildlife by disturbing normal behavioral activities such as foraging, mating, and nesting. Wildlife could avoid foraging, mating or nesting, or vacate active nest sites in construction areas, and some wildlife could permanently abandon construction-area habitats and adjacent habitats. This could result in reduced wildlife use and productivity. Construction timing stipulations to avoid or minimize these impacts are provided in Appendix I.

Erosion and sedimentation, contaminant exposure, fugitive dust, and introduction of noxious weeds from construction activities would have minimal impacts on wildlife. Impacts to amphibians and riparian-associated wildlife would be minimized through siting and implementation of BMPs; therefore, erosion and sedimentation would be controlled and minimized, and potential impacts to wildlife associated with changes in water quality would be minor (see Section 4.2.2, Soils, and Section 4.2.4, Water Resources). Fugitive dust would be minimized through the application of dust control measures, and associated impacts to wildlife would be minimal and occur during the approximately 6-month-long construction period. Potential impacts to wildlife from contaminants within the Proposed Action area would be short-term, localized, and minimized by implementation of environmental protection measures (see Section 4.2.4, Water Resources). Introduction of invasive vegetation (see Section 4.2.6, Noxious Weeds and Invasive Species) has the potential to reduce forage and habitat quality. These potential impacts would be minimized through noxious weed control to manage weeds on BLM-administered lands. As discussed in Appendix G, upon completion of the weed inventory survey required by the plan, SWE would provide its specialist or weed management contractor's updated plan to the BLM, State Land Office representative, and private landowner(s), respectively, addressing specific treatment methods. Their comments would be incorporated into the treatment method(s) for approval on their property. This coordination would continue throughout the life of the Facility and as the Weed Management Plan is updated, as needed. The Weed Management Plan would be updated as necessary and re-submitted with Pesticide Use Proposals (PUPs) for approval every 3 years upon completion of construction activities. The Weed Management Plan covers the lands administered by the BLM within the Facility boundary. The objective is to treat noxious and invasive infestations of weeds that occur within the Facility area and that have the potential to spread outside that area. SWE would be required to demonstrate compliance with Albany County, the State of Wyoming, and private landowner regulations controlling and eradicating noxious and invasive weed species on private lands. Compliance is required within the disturbed areas of the Facility boundary, both during and for a minimum of 5 years after the life of the operation on BLM lands. For analysis purposes, it is assumed that weed control measures on private lands would be similar to that occurring on public lands.

Impacts associated with habitat loss and disturbance to wildlife during construction would be avoided where practicable. The implementation of environmental protection measures during construction, spatial and temporal construction stipulations, dust suppression, contaminant control, weed suppression, and revegetation of disturbed areas with native seed mixtures would reduce and minimize potential impacts to wildlife habitats and species where implemented. Protection measures are provided in Appendixes H-1, H-2, and H-3, Unless otherwise specified, these measures would be applied on BLM-administered lands.

4.2.7.2 Operation

During the operations phase, wildlife could be affected by disturbance from O&M activities. Avian and bat collision with facility structures would result in unavoidable mortality, based on baseline studies, even with application of relevant measures (Appendix C).

Indirect impacts on wildlife habitat would include changes in functionality and increased fragmentation; these impacts would be species specific (Section 4.2.7). Habitat fragmentation and isolation are difficult to quantify and would vary by species, but could result from Facility development.

The primary noise-generating activities associated with normal operation include turbine noise, transmission line noise, and minor and intermittent maintenance equipment noise. Studies have shown that densities of bird populations in the vicinity of wind energy projects would be reduced near turbines, transmission lines, and other facility equipment if continuous noise levels are in the range of 40 decibels (dB) or higher (BLM, 2005a). Birds hear best between about 1 and 5 kHz (Dooling, 2002). Birds cannot hear the noise from wind turbine blades as well as humans, and most likely a human with normal hearing can hear a wind turbine twice as far away as can the average bird (Dooling, 2002). Turbine blade defects that produce whistles may be more audible to birds and at the same time make no measureable contribution to overall noise level (Dooling, 2002).

Human activity, including vehicle use and site maintenance activities, could disturb or displace wildlife in the Proposed Action area. Some species could be temporarily or permanently displaced from the site, and some species would be attracted to the Facility in response to human activities during operation (such as ravens, magpies, and gulls). Some wildlife species could become habituated to the routine O&M activities and associated noise.

Impacts to wildlife from exposure to contaminants during operations would be minimal and would only occur if leaks or accidental spills occurred. Wildlife could be affected by exposure to contaminants during operation; however, limited quantities of hazardous materials would be present at the Facility, exposures are not expected under standard facility operation, and spill plans would be in place to minimize the extent of spills.

Facility operation has the potential to affect migratory behavior of terrestrial big game if structures interfere with migratory movement patterns. Studies of pronghorn at the Foote

Creek Rim wind project in Wyoming, however, indicate no substantial change in pronghorn abundance in the wind energy facility area. Pronghorn were not displaced, and pronghorn use of the area did not decline from operation of that facility (Johnson et al., 2000). No fences that would interfere with movement of big game would be installed. Fences would be installed only around the electrical substation to protect public health and safety and to protect the substation itself.

Collisions with Facility Structures

The majority of impacts on wildlife from Facility operation would result from collision with structures and potential electrocution from contact with the transmission line.

Impacts to wildlife from colliding with Facility components would include bat and bird collision with turbines, transmission lines, and other facility structures. USFWS *Interim Guidance on Avoiding and Minimizing Wildlife Impacts from Wind Turbines* (USFWS, 2003) recommends siting wind projects in areas that would decrease impacts to wildlife. The site is not within known bird concentration areas, and 3 months of avian use surveys did not indicate the area is a migration corridor or concentration area for either bats or birds. Additional survey data could determine if bird use varies seasonally or spatially across the project site.

Bats

Wind energy developments can result in impacts to resident and migratory bats, depending on site location and the species that are present. Four types of impacts could occur: (1) direct mortality due to collisions with turbines; (2) direct mortality resulting from rapid decompression of lungs due to changes in atmospheric pressure caused by the rotating turbine blades; (3) displacement of bats from preferred feeding, and mating areas; (4) alteration of migratory pathways.

It is estimated that the majority of bat fatalities at wind energy facilities involve solitary, migratory, foliage- and tree-roosting species such as silver-haired, hoary, and red bats. Hoary bats account for nearly half of all bat fatalities at wind energy facilities (Arnett et al., 2007; Kunz et al., 2007; Erickson et al., 2002; Johnson, 2004; Johnson, 2005). The majority of bat fatalities peak in late summer and fall, coinciding with migration (Arnett et al., 2007). Approximately 90 percent of fatalities occur from mid-July through late September, with over 50 percent occurring in August (Erickson et al., 2002; Johnson, 2004; Johnson, 2005). Mortality during the breeding season is low. One study showed that, although relatively large breeding populations of bats were present near an operating wind facility in Minnesota, bat collision mortality was low to nonexistent (Johnson et al., 2004). Mortality during spring migration is also very low (Johnson, 2005). Studies indicate that bat mortality rates were the highest in forested environments, moderate in open areas close to forests, and lowest in open areas (Johnson, 2005).

Overall use of the site by bats from July 31, 2009 to October 15, 2009, was similar to other existing wind energy facilities in the western United States (Johnson et al., 2009a). Based on these studies and bat surveys at the site, the most likely species to travel within turbine rotor heights include big brown bats and hoary bats, which would be most susceptible during fall migration. Other species detected in the area with known turbine collision mortality include Townsend's big eared bat, eastern red bat, and *Myotis* species. Bat species use and comprehensive species presence, however, is unknown.

Most passes (64.6% of all bat passes) were by low-frequency bats, suggesting higher relative abundance of species such as hoary, silver-haired, and big brown bat, although the fringed bat (BLM sensitive species) also emits calls in the low-frequency range. About 22 percent of the passes were by high-frequency bats, which in the area would likely primarily comprise long-legged bat (*Myotis volans*) and/or western small-footed bat (*Myotis ciliolabrum*). The remaining 13.4 percent comprised mid-frequency species, which in the area would be limited to eastern red bat, long-eared myotis (BLM sensitive specie), and little brown bat. Many of the low-frequency species likely to be present in the area (hoary, silver-haired, and big brown bat) tend to forage at higher altitudes than most high-frequency species due to their wing morphology and echolocation call structure (Norberg and Rayner, 1987).

Some level of bat mortality would likely occur as a result of Facility operation; however, bat mortality is expected to occur at a level that would not affect migratory bats at the population level.

Bat fatality monitoring would be conducted on private and BLM land during the operation phase to determine impacts on bats. If bat mortality levels are determined to be high, additional mitigation measures would be developed.

Birds

Wind energy developments could affect migratory game birds and waterbirds depending on site location and species that are present. As with other bird species, three types of impacts are anticipated: (1) direct mortality due to collisions with turbines, power lines, and meteorological towers; (2) displacement of migratory birds from preferred feeding, resting, or nesting areas; and (3) alteration of migratory pathways. Appendixes H and I provide relevant programmatic and site-specific BMPs and other protection measures to avoid and minimize potential impacts on birds. Therefore, some level of avian mortality would likely occur from Facility construction; however, mortality is expected to occur at a level that would not affect resident or migratory birds at the population level. In addition to the measures in Appendixes H and I, other relevant general background materials on wind energy development are being considered by the WGFD (WGFD, 2009).

At most locations, wind energy facilities have been associated with avian fatalities caused by collisions with turbines and other wind facility structures (Erickson et al., 2000; Erickson et al., 2001; Johnson et al., 2002). In general, it is estimated wind turbines kill 33,000 birds annually (Erickson et al., 2001; USFWS, 2002). Data suggest an average of 2.19 avian fatalities per turbine per year in the United States for all species combined and 0.033 raptor fatalities per turbine per year (Erickson et al., 2001). Studies show that avian mortality rates from wind energy facilities vary greatly by region and species, with higher concentrated impacts in northern California and Appalachia (GAO, 2005). Excluding California, an average of 1.83 avian fatalities per turbine per year and 0.006 raptor fatalities per turbine per year may be expected (Erickson et al., 2001). Studies conducted to date indicate that, in the United States, passerines and raptors appear to be the most susceptible to turbine collisions (AWEA, 1995). A regression analysis of raptor use and raptor collision mortality for 13 new-generation wind energy facilities, where similar methods were used to obtain raptor use estimates and operational fatality information is available, showed a significant (R^2 = 69.9%) correlation between raptor use and raptor collision mortality. Using this regression to predict raptor collision mortality, the Sand Hills Wind Resource Area yields an estimated fatality rate of 0.10 fatalities/megawatt/year, or ten raptors per year for each 100 megawatts of wind-energy development. Based on species composition of the most common raptor fatalities at other western wind energy facilities and species composition of raptors observed at the Sand Hills Wind Resource Area during the surveys, the majority of the fatalities of diurnal raptors would likely consist of ferruginous hawks (*Buteo regalis*), golden eagles (*Aquila chrysaetos*), and red-tailed hawks (*Buteo jamaicensis*).

Passerines comprise a large proportion of the fatalities at wind facilities and involve both residents and migratory species (Erickson et al., 2002). Expected passerine mortality may be approximately 1.2 to 1.8 birds per turbine per year. This level of mortality, however, might not have population-level consequences for individual species because of the expected low fatality rates for most species and the large population sizes of common species (for example, horned lark and western meadowlark). It has been suggested that resident birds may have a higher probability of colliding with turbines than migrants because residents tend to fly lower and spend more time in the area (BLM, 2005a). Although population effects may be possible for some species, no studies have thus far documented such effects (BLM, 2005a). An APP would be developed in coordination with USFWS to reduce impacts on migratory birds on both private and public lands.

Avian surveys at the site found that the greatest mean use of the area was by vultures and raptors. One hundred percent of the passerines and small birds were observed flying below the zone of risk. Frequency of occurrence and species composition measures indicated that avian species diversity in the site was low. When combined with raptor use estimates from the spring and fall of 2006, overall raptor use of the area was estimated at 0.66 raptors/plot/20-minute survey. Raptor use of the study area was low to moderate relative to raptor use at 36 other wind-energy facilities that implemented similar protocols to the present study and had data for three or four seasons; however, mean use is based on smaller sampling intervals at the Facility site than most projects to which it is compared, based on the short duration of the 2006 and 2009 studies. Mean raptor use in the Sand Hills study area during this period ranked thirteenth compared to the other facilities (Johnson et al., 2009a). Bird use and species diversity at the site was low relative to operational facilities, and most birds flew below the proposed turbine risk impact zones; however, based on the available data collected for this site, the potential impacts regarding spring and fall migration are undetermined.

Some bird mortality would likely occur as a result of operation. Baseline data suggest that passerines are at minimal risk, whereas raptors and vultures are at the greatest risk for wind turbine or transmission line collisions. To protect avian species from collision with transmission lines, as well as larger species from potential electrocutions, the Avian Power Line Interaction Committee (APLIC) has established guidelines to reduce these risks (APLIC, 2006). Incorporating appropriate design standards, such as flight diverters, perch prevention design and structures, 60 inches of horizontal separation and a vertical separation of 40 inches between phase conductors and/or grounded hardware will reduce these risks. However, the avian use surveys do not account for flight behavior, nocturnal migrants, or the varying ability among species to detect turbines; therefore, the actual risk of collision with wind turbines may be lower or higher than indicated by these studies (Johnson et al., 2000). It is unknown at this time if operation would have effects on local or migratory bird population numbers. An APP would be developed in coordination with the USFWS to reduce impacts on migratory birds.

Golden Eagle

USFWS has determined that the Proposed Action has the potential to result in impacts on golden eagles or their habitat based on WEST's studies, and considers an APP to be an option to avoid and minimize impacts on golden eagles. Therefore, an APP is required under BLM IM 2010-156 as a condition of the ROW grant. SWE is coordinating with USFWS and the BLM to prepare an APP that would enable the Facility to be constructed in a manner that avoids, minimizes, or effectively mitigates impacts, and addresses siting, operations, and monitoring considerations necessary to ensure no net loss to the regional eagle population. In accordance with the BLM IM, a letter of concurrence from USFWS that addresses the adequacy of the APP would be incorporated into the project record. Operational risk to golden eagles would be addressed in the APP currently in preparation for the Facility. Potential impacts on individual eagles or the regional population associated with operation of the Facility, as well as potential impacts on nesting territories and nonbreeding habitats would be presented in the APP and avoided, minimized, or mitigated as determined appropriate by USFWS and the BLM. Additionally, fatality monitoring would be conducted during the operation phase to evaluate potential impacts on golden eagles and to adapt operational management and mitigation in accordance with these findings.

4.2.7.3 Decommissioning

Impacts on wildlife from decommissioning would be similar to impacts associated with construction, but of reduced magnitude. Noise and visual disturbance to wildlife may temporarily increase during decommissioning and site restoration relative to conditions during operation. New habitat loss would be negligible, and wildlife injury and mortality would be minimal and less than that expected during construction. Disturbance to wildlife habitats and wildlife during decommissioning is expected to be localized and short-term. Removal of facilities components to a depth of 3 feet below ground level would eliminate the impacts associated with wildlife collisions with wind energy facility structures. Wildlife and wildlife habitat in the area could return to pre-construction conditions following site restoration (BLM, 2005a). Wildlife habitat would be restored and rehabilitated after decommissioning.

Impacts to wildlife would be avoided during decommissioning where practicable, and the implementation of environmental protection measures, including wildlife monitoring, dust suppression, contaminant control, weed suppression, and revegetation of impact areas with native seed mixtures, would minimize potential disturbance or impacts to wildlife habitats and species. Protection measures are provided in Appendixes H-1 and H-2, which unless otherwise specified would be applied on BLM-administered lands or indirectly applied as part of the APP.

4.2.8 Threatened, Endangered, and Sensitive Plant and Animal Species

4.2.8.1 Federally Listed Species

Construction, operation, and decommissioning activities would have no effect on federally listed species potentially occurring in the Facility area because of the rarity or unlikelihood of their occurrence in the area. Impacts on the candidate greater sage-grouse is discussed in BLM-sensitive species (Section 4.2.9). In accordance with a formal consultation conducted pursuant to Section 7(a)(2) of the Endangered Species Act (ESA), USFWS issued a biological opinion from its Ecological Services Field Office (USFWS, 2009) for the five federally listed species occurring in downstream reaches of the North Platte River. USFWS found that water depletions during construction may affect, and are likely to adversely affect the endangered whooping crane, interior least tern, pallid sturgeon, the threatened northern Great Plains population of the piping plover, and the western prairie fringed orchid in the central and lower Platte river, and designated whooping crane critical habitat. As an existing water-related activity, USFWS determined that the flow-related adverse effects of the Facility are consistent with those evaluated in the Tier 1 Programattic Biological Opinion for the species, and USFWS had issued its biological opinion that the Facility is not likely to jeopardize the continued existence of these five federally listed species and/or their critical habitats in downstream reaches in other states.

4.2.8.2 Mountain Plover

On June 29, 2010, USFWS reinstated a proposal to list the mountain plover (*Charadrius montanus*) as a threatened species under the ESA. The BLM has determined that Formal Conferencing pursuant to Section 7(a)(4) of the ESA is necessary to address potential impacts to the species. SWE has elected to participate in the conference process by including the private lands and applying the recommendations to minimize or avoid adverse effects to the proposed species. Through the issuance of a Conference Opinion, USFWS will advise the BLM to consider implementing the avoidance and mitigation measures to ensure no impact to mountain plover. If the Conference Opinion is adopted as a biological opinion following the listing or designation of the mountain plover, the measures in the Conference Opinion, with their implementing terms and conditions, would be non-discretionary. The proposed rule to list the Mountain Plover was withdrawn on May 11, 2011.

Construction

Mountain plover exist at the site, and a substantial portion of the area contains shortgrass prairie, which is considered suitable habitat for the species. Potential impacts on mountain plover include collision with construction vehicles and turbines, habitat fragmentation, and disturbance (noise and human presence). In accordance with the Rawlins RMP, surface-disturbing activities in identified occupied mountain plover habitat would be prohibited on BLM-administered lands from April 10 to July 10. Additional protective measures that would be applied on federal lands are presented in Appendix 16 of the Rawlins RMP, and a monitoring program developed in accordance with BLM guidelines would be implemented to minimize risk of potential impacts to the species during construction.

Operations

A post-construction monitoring program, developed in accordance with BLM guidelines, would be implemented to detect any potential impacts on mountain plover during operation. Nesting density surveys would be conducted during the operation phase to evaluate potential impacts on mountain plover. If monitoring indicates a substantial impact on mountain plover, additional mitigation measures would be developed. Additionally, the Conference Opinion to be issued by USFWS may provide additional avoidance and mitigation measures to ensure no impacts occur to mountain plover during opereration.

4.2.9 BLM Sensitive Species

Activities related to Facility construction, operation, and decommissioning could result in impacts on BLM sensitive species. Potential impacts on BLM species and protection measures to be implemented on BLM-administered lands are noted below for each species. Additional measures are presented in Appendix H that, unless otherwise specified, would be applied on BLM-administered lands.

4.2.9.1 Construction

Swift Fox

Swift fox occur on the site and surveys completed in 2009 identified one potential swift fox den (Johnson et al., 2009a). A substantial portion of the area contains shortgrass prairie, which is considered suitable habitat for the species. The greatest potential for impacts to swift fox is vehicle strikes Swift fox are active mostly at night. Because the majority of work and traffic associated with construction would be during daylight hours, impacts are anticipated to be minimal. Therefore, impacts to swift fox during construction are expected to be minimal.

Wyoming Pocket Gopher

Potential Wyoming pocket gopher burrows are present on the site (Johnson et al., 2009a). All potential burrows on BLM-administered land would be avoided by 75 meters, or preconstruction surveys would be completed to verify the species is present on site. If it is determined that Wyoming pocket gophers are on site, burrows would be avoided by 75 meters on BLM administered lands to ensure no direct adverse impact to the species during construction on BLM-administered lands; however, direct impacts on the species and its habitat may result in loss of individuals and suitable habitat on private lands.

Bats

Potential impacts on BLM sensitive species are similar to those described in Section 4.2.7, Bats. A component of the APP to be developed by the applicant, USFWS, and the BLM, will address bats and provide impact avoidance and minimization measures to reduce potential impacts on bats.

Migratory Birds

Construction-related impacts on BLM sensitive migratory bird species are evaluated in Section 4.2.7, Birds. An APP would be developed in coordination with USFWS to reduce impacts on BLM Sensitive migratory birds.

Greater Sage-grouse

Approximately 40 percent of the habitat mapped in the immediate vicinity of the proposed Facility may provide suitable habitat for greater sage-grouse; however, the nearest occupied lek is located approximately 4.2 miles south of the Facility, and approximately 1.9 miles from the proposed south alternative transmission line. Additionally, no sign (droppings, pellets, feathers) was detected during pellet count surveys completed in spring and fall 2007 within or immediately to the west of the Facility site, and no greater sag-grouse were recorded during the avian point count surveys completed in summer and fall months during 2006 and 2009.

The timing and location of construction activities would be limited on BLM-administered lands within 2 miles from the perimeter of the lek from March 1 through July 15 to minimize potential disturbance to greater sage-grouse during construction. However, direct impacts to the species and its habitat may result in loss of individuals and suitable habitat on private lands. Indirect impacts may occur to leks at greater distances from the Facility area, winter concentration areas and greater sage-grouse core areas located to the east of the FAcility area. Potential impacts will be evaluated through the implementation of the Wildlife Monitoring Plan (Appendix I).

Raptor Nests

Raptor nests are present in and near the area. The timing and location of construction activities would be controlled on BLM-administered lands, as per the timing and distance stipulations presented in the Rawlins RMP (Table 2-10 of the RMP contains seasonal restrictions for raptors) to minimize potential for impacts to occur to nesting raptors during construction. Therefore, some level of raptor nest disturbance and potential displacement or mortality would likely occur as a result of Facility construction. Localized impacts on nesting raptors may cause a decrease in raptor productivity. Appendix I includes a monitoring program for raptors that, unless otherwise specified, would be applied on BLM-administered lands.

Burrowing Owl

No prairie dog colonies are present within 0.25 mile of the area proposed for construction activity. If nest burrows are detected, the timing and location of construction activities would be controlled on BLM-administered lands, as per the timing and distance stipulations presented in the Rawlins RMP, to minimize of the potential for impacts to occur to nesting burrowing owls during construction. Additionally, a monitoring program developed in accordance with BLM guidelines would be implemented to minimize risk of impacts to the species during construction. See Table 2-10 of the RMP for seasonal restrictions for burrowing owl.

Beaver Rim Phlox

Potential habitat for Beaver Rim phlox is present in areas proposed for construction activity. If preconstruction surveys detect this species, avoidance of impacts to plants would be required on BLM-administered lands to minimize impact to the species; however, construction-related disturbance in potential habitat on private land may lead to localized loss of the species.

Nelson’s Milkvetch

Potential habitat for Nelson’s milkvetch was confirmed absent by WEST (Johnson et al., 2009a); therefore, this species will no longer be discussed.

4.2.9.2 Operation

Swift Fox

The primary risk of impacts to swift fox during operation would be via direct mortality associated with vehicular collision. The majority of work and traffic associated with operation would be during daylight hours, resulting in minimal risk to swift foxes. Monitoring would be conducted for swift fox in accordance with the protocols in

Appendix I. Therefore, potential impacts on swift fox during operation are expected to be minimal.

Wyoming Pocket Gopher

The potential for impacts to occur to Wyoming pocket gophers during operation would be minimized by siting Facility features on BLM–administered lands at distances greater than 75 meters from potential burrows. Survey protocols for pocket gopher are outlined in Appendix I.

Bats

Potential impacts on BLM sensitive species during operations would be similar to those described in Section 4.2.7, Bats. Although baseline studies (Johnson et al., 2009b) indicate that bats are present in the area, the presence of BLM sensitive bat species is currently unknown. Bat fatality monitoring would be conducted during the operation phase to determine impacts to bats. If bat mortality levels are determined to be high, measures additional to those documented in Appendixes H and I would be developed.

Migratory Birds

Operations-related impacts on BLM sensitive migratory bird species are evaluated in Sections 4.2.7, Birds. An APP would be developed in coordination with USFWS to reduce impacts on BLM Sensitive migratory birds.

Greater Sage-grouse

Proposed Facility features are located outside the setback requirements for project features on BLM-administered lands, in accordance with the No Surface Occupancy distance stipulations presented in the Rawlins RMP.

BLM Sensitive Raptors

Impacts on BLM sensitive raptors would be similar to those described in Section 4.2.7. The potential for impacts to occur to nesting raptors and potential fledglings in and near the Proposed Action area would be minimized by implementing the setback requirements for Facility features on BLM-administered lands, as per the No Surface Occupancy distance stipulations presented in the Rawlins RMP (see Table 2-1 of the Rawlins RMP). Additionally, post-construction nest monitoring and fatality monitoring programs developed in accordance with BLM guidelines would be implemented to minimize risk of impacts to the species during operation.

Beaver Rim Phlox

No impacts on Beaver Rim phlox are anticipated during operation because preconstruction surveys, conducted in accordance with the survey protocols outlined in Appendix I, would be conducted prior to construction. Impacts associated with changes in snow deposition, moisture and temperature regimes, or other microclimate changes occurring in response to Facility features could affect localized plant populations or pollinators. No ground disturbance would occur during operation and, therefore, no direct impacts are expected to occur.

4.2.9.3 Decommissioning

Potential impacts on BLM sensitive species from decommissioning would be similar to risks during construction. Section 4.2.7, Wildlife Habitat and Species, describes impacts on wildlife from decommissioning.

4.2.10 Air Quality and Noise

4.2.10.1 Construction

Air Quality

Potential impacts on air quality from construction were determined by reviewing expected air emission sources. Sources of air emissions, pollutants emitted, and factors contributing to the magnitude of construction-related emissions are provided in Table 4-1.

TABLE 4-1
Construction Emissions Profile
Sand Hills Wind Energy Facility

Activity	Pollutants	Factors
Vehicular Traffic	CO, NO_x, VOCs, particulates, SO_2, air toxics	Vehicle-miles traveled (VMT)
Vehicle Fugitive Dust from Paved and Unpaved Roads	Particulates	VMT, road conditions (for example, silt loading, silt content, moisture content and vehicle weight)
Construction Fugitive Dust from Earth-moving Activities	Particulates	Acres disturbed
Construction Equipment Exhaust	CO, NO_x, VOCs, particulates, SO_2, air toxics	Volume of fuel used
Concrete Batch Plant	Particulates	Volume of cement used
Emergency Generators	CO, NO_x, VOCs, particulates, SO_2, air toxics	Volume of fuel used or hours of operation

Construction of access roads and preparation of turbine sites and transmission line structure sites would involve the use of earth-moving equipment, including loaders, various-sized bulldozers, shovels, and backhoes over an approximately 6-month period. Delivery of turbine components and transmission line components, as well as electrical cable and other ancillary equipment and supplies, would involve the use of delivery trucks, semi-tractors, and assembly cranes, over the same time frame. Emissions from these activities include fugitive dust and tailpipe emissions (CO, NO_x, VOCs, particulates, SO_2, and air toxics). Similar air quality impacts would also be related to site reclamation activities of temporary disturbance areas following construction.

Up to approximately 112 acres of soil could be disturbed during construction, including 58 acres of temporary disturbance areas that would be reclaimed following construction and areas that would be permanently occupied by Facility infrastructure. Most soils in the Proposed Action area have a high hazard for blowing soils and, based on NRCS rates of soil loss from wind erosion for these soils (NRCS, 2009), could generate up to approximately

3,800 tons of fugitive dust per year (see Section 4.2.2). Fugitive dust from construction activities and from travel on Facility roads, however, would be controlled by the application of water. Water from existing permitted nearby groundwater wells would be used for dust suppression.

Activities associated with foundation installation include grading, excavating, and concrete batch plant installation and operation. Emissions from these activities include fugitive dust, tailpipe emissions, concrete batch plant emissions (particulates), and onsite diesel generator emissions.

An approximately 250-kW, stand-alone, diesel generator would supply power to the concrete batch plant that, if required at the site, could operate for approximately 3 to 4 months of the 6-month construction period. If constructed, the concrete batch plant would require an air permit from the State of Wyoming, which would provide enforceable air pollution mitigation measures to minimize air emission impacts from operation of the batch plant.

Additionally, a rock crusher would be operated to provide appropriately sized aggregate for construction of roads and other infrastructure. The rock crusher would have an average capacity of approximately 20,000 tons per day and would operate for approximately 3 to 4 months of the 6-month construction period. The rock crusher's dust-suppression features, including screens and water spray, would operate at all emission points during operation of the crusher, including start-up and shut-down periods. The rock-crushing area would be sprayed by a water truck to suppress dust. These measures would minimize fugitive dust emissions related to operation of the rock crusher.

Tailpipe emissions, the relatively small emission levels from the batch plant and rock crusher, and fugitive dust emissions would not result in a violation of ambient air quality standards or degradation of regional air quality. The extent and duration of air quality impacts from construction activities would be temporary and would cease within a few months.

Implementation of environmental protection measures during construction, including dust suppression, posting and enforcing speed limits, and covering or watering batch plant storage piles, would reduce potential impacts on air quality due to fugitive dust to minor levels. Environmental protection measures are provided in Appendixes H-1, H-2, and H-3.

Noise

Potential noise impacts were determined by reviewing expected noise levels resulting from construction, including noise levels within the Proposed Action area and within a surrounding 1-mile buffer area. Estimated noise levels were evaluated to determine potential effects on the closest receptors.

Average noise levels for typical construction equipment are summarized in Table 4-2.

TABLE 4-2
Average Noise Levels from Common Construction at a Reference Distance of 50 feet (dBA)
Sand Hills Wind Energy Facility

Construction Equipment	Typical Average Noise Level at 50 feet (dBA)
Air compressor	81
Backhoe	85
Concrete mixer	85
Concrete pump	82
Crane, mobile	83
Dozer	80
Generator	78
Grader	85
Loader	79
Paver	89
Pile driver	101
Pneumatic tool	85
Pump	76
Rock drill	98
Saw	78
Scraper	88
Shovel	82
Truck	91

Source: EPA, 1971

Total composite noise levels at reference distances of 50 and 1,500 feet, based on equipment operating for each construction phase and the typical usage factor for each piece of equipment, are presented in Table 4-3. The calculated level at 1,500 feet is conservative because the only attenuating mechanism considered was geometric spreading, which results in an attenuation rate of 6 dBA per doubling of distance. Attenuation related to wind direction, the presence of structures, trees or vegetation, ground effects, and terrain was not considered.

TABLE 4-3
Composite Construction Site Noise Levels
Sand Hills Wind Energy Facility

Construction Phase	Composite Equipment Noise Level at 50 feet (dBA)	Composite Equipment Noise Level at 1,500 feet (dBA)
Clearing	88	58
Excavation	90	60
Foundation	89	59
Erection	84	54
Finishing	89	59

Source: EPA, 1971

Construction would occur only during the day and would be within acceptable Occupational Safety and Health Administration (OSHA) standards.

Neither Albany County nor federal noise regulations exist. EPA has provided guidelines for acceptable noise levels (EPA, 1974). Recommended levels are 55 dBA to protect the public from the effect of broadband environmental noise in typically quiet outdoor and residential areas, and 70 dBA or less over a 40-year period for protection against hearing loss in the general population.

The closest human receptors are approximately 1 mile from the construction areas. Based on the EPA-recommended levels, construction noise would be reduced to acceptable levels within about 1,500 and 3,000 feet of the source of construction noise (see Table 4-3). Thus, based on the limited duration of construction activity and on noise attenuation related to the distance to the nearest receptors, construction-related noise levels would have no adverse effects on humans.

During construction, noise could temporarily disturb local wildlife, including avian foraging, breeding, and nesting. Because of the limited duration of construction, noise from construction activities would not be expected to affect more than one breeding cycle of birds or other wildlife. This temporary disturbance would not result in adverse effects to the survival and reproductive success of wildlife in the area.

4.2.10.2 Operation

Air Quality

An operating wind energy facility would not be classified as a major source under the EPA Prevention of Significant Deterioration program.

Typical air quality impacts resulting from O&M activities for wind energy projects are discussed in Section 5.4 of the BLM's PEIS (BLM, 2005a). During the operation phase, vehicle and equipment use would be minimal, and generation of fugitive dust by occasional O&M activities would also be minimal. O&M activities would result in negligible air quality impacts.

Noise

The wind turbines would be the predominant noise source during operation. Background noise, wind speed, and other meteorological conditions may influence the intrusiveness of turbine noise.

Wind turbines most commonly produce some broadband noise as their revolving rotor blades encounter turbulence in the passing air. Broadband noise is usually described as a "swishing" or "whooshing" sound. Wind projects are located where the wind speed is higher than average, and the background noise of the wind tends to mask sound produced by operating wind turbines—especially because the turbines only run when the wind is blowing.

Average noise levels for a range of activities are presented in Table 4-4.

TABLE 4-4
Comparison of Average Noise Levels
Sand Hills Wind Energy Facility

Source	**Average dBA**
Rural night-time background	30
Quiet bedroom	35
Busy road at 5 km	35–45
Car at 65 km/h at 100 m	55
Conversation	60
Busy general office	65
Truck at 50 km/h at 100 m	65
City traffic	90
Pneumatic drill at 7 m	95

Source: British Wind Energy Association, 1994.

The proposed Facility is located in a remote, rural setting characterized by rural noise levels estimated at 30 dBA (nighttime) to 45 dBA (daytime) (British Wind Energy Association, 1994). Typical sound levels for turbines similar to those proposed for the Facility vary from 100 to 108 dBA at the rotor hub, which results in a sound pressure level of about 55 to 65 dBA at 130 feet (similar to a normal conversation).

At noise attenuation rate of 6 dBA per doubling of distance considering geometric spreading only, turbine noise levels would be reduced to acceptable levels (approximately 55 dBA) within about 130 to 500 feet of the noise source. Thus, neither the nearest noise receptors at approximately 1,000 feet from the nearest turbine nor residents of the town of Rock River at approximately 2 miles away would experience operations-related noise above EPA-recommended levels.

This theoretical calculation is conservative in that it only takes into consideration geometric of noise. It is expected that, depending on other undetermined factors that affect noise attenuation (such as the presence of structures, trees or vegetation, ground effects, terrain, and wind levels and direction), noise could be reduced and/or intermittent at sites in the vicinity of the site. Wind direction and wind speeds during turbine operation (windy conditions), in particular, could significantly ameliorate noise levels experienced by potentially affected areas in the vicinity. Therefore, depending on the influence of these factors, noise impacts related to Facility operation are estimated to be minor or negligible.

4.2.10.3 Decommissioning

Decommissioning activities are anticipated to be similar to construction activities, except that rock crushing and concrete production would not be necessary as part of the decommissioning effort. Ground-disturbance during decommissioning may include reestablishing access roads to haul out facility components, and additional air quality impacts could be driven by final site reclamation activities following decommissioning. Emissions from these activities would include fugitive dust and tailpipe emissions. Air quality impacts related to decommissioning are expected to be similar in nature to construction activities, but of a lesser magnitude, and would not cause a violation of ambient air quality standards or degradation of regional air quality. The extent and duration of air quality impacts from decommissioning activities would be temporary.

Implementation of environmental protection measures during decommissioning, including dust suppression, would reduce potential impacts on air quality due to fugitive dust to minor levels.

4.2.11 Visual Resources

An analysis of the potential visual impacts was conducted using the BLM VRM system. This analysis focused on the three representative KOPs discussed in Section 3.11, Visual Resources. BLM-managed lands are assigned one of four VRM classes based on BLM's evaluation of the form, line, color, and texture of the existing landform/water, vegetation, and structures. The VRM class assigned to the area is compared with the proposed development to determine what, if any, mitigation is required to meet the VRM class objectives (BLM, 2005a).

The area is in VRM Class III. The objective for VRM Class III is to "partially retain the existing character of the landscape." BLM policies permit "moderate changes to the existing landscape, although management activities associated with these changes should not dominate the view of the casual observer" (BLM, 1986).

The Proposed Action would conform to all federal, state, and local land use plans regarding visual resources.

4.2.11.1 Construction

Construction activities (see Chapter 2), would occur over a 6-month period. During that time, large earth-moving equipment, trucks, cranes, and other heavy equipment would be highly evident features in views from nearby areas toward the site. Occasionally, small, localized clouds of dust created by road-building and other grading activities could be visible at the site. Active dust suppression methods would be used to minimize the frequency and extent of such dust events. Construction-related grading activities could expose areas of soil and gravel that would contrast with the colors of the surrounding undisturbed landscape, and could be visible offsite.

In views from the closest segments of US 30/287, the visual changes from construction activities would be moderately to highly visible and would have a moderate level of visual impact. In views from the closest segments of I-80, the visual changes from construction activities would be barely visible, if it all, and would have a negligible level of visual impact. Because the construction activities would have a generally low level of impact and would occur over a limited period of 6 months, visual impacts during construction would be minor.

The transmission line construction period is expected to last 6 months, and visible changes would be of short duration. Transmission line construction activities would not be seen by a substantial number of viewers. Given these circumstances, visual impacts related to transmission line construction are considered to be minor.

Implementation of environmental protection measures during construction, including minimizing areas of surface disturbance, controlling erosion, using dust suppression techniques, and restoring temporarily exposed soils would minimize short-term construction impacts to visual resources.

Construction impacts on views from the three KOPs are discussed in the following paragraphs.

KOP 1 – US 30/287 at the southern edge of Rock River

Construction, including both the turbines and related installation of transmission lines and access roads, would cause a short-term visual change from this location. Construction of new access roads, widening of existing roads, and preparation of turbine sites would result in temporary generation of fugitive dust that could be visible from KOP 1 under certain conditions.

Large equipment delivery trucks and construction equipment would be present during construction, and movement of such vehicles could be visible, particularly as they travel from US 30/287 into the area. Wind turbine towers would become increasingly evident as they are erected throughout the construction period. The wind turbines would range in distance from 2.4 to 5.5 miles from KOP 1. As evidenced by the simulated view (Appendix D, Figure D-1b), it is unlikely that the approximately 110-foot-high transmission line towers would be visible at from KOP 1.

KOP 2 – US 30/287, 7.6 miles southeast of Rock River

Construction activities, including the turbines, transmission lines, and access roads, would be visible in this view and would result in short-term changes to the background of the existing environment of KOP 2. Construction of new access roads, widening of existing roads, and preparation of WTG sites would result in temporary generation of fugitive dust that could be visible from KOP 2.

Construction equipment would be present during the construction phase, and movement of such vehicles could be visible along the Facility access road. It is unlikely that the approximately 110-foot-high transmission line towers would be visible at from KOP 2.

KOP 3 – I-80, Exit 279

Construction activities, including the turbines, transmission lines, access roads, would be minimally visible in this view. Because KOP 3 is over 13 miles away from the site, most of the short-term construction activity, including construction of new access roads, widening of existing roads, and preparation of the WTG sites, would not be detectable to highway users. However, the WTGs would become increasingly evident as they are erected. It is unlikely that the proposed transmission line would be visible from this location.

4.2.11.2 Operation

The major features of the Proposed Action are described in detail in Chapter 2. The Facility's most visible features would be the wind turbines.

To respond to the FAA's aircraft safety lighting requirements, the Facility would be marked according to FAA guidelines for lighting wind turbines. For any structure with a height greater than 200 feet, the FAA requires adherence to the *Obstruction Marking and Lighting* (AC 70/7460-1K) guidelines. Daytime lighting of wind turbines is not required if the turbine color is either a bright white or light off-white color. Under these guidelines, wind turbines must be lighted at night with either red (preferred) or white lights and synchronized flashes. Though not every turbine needs to be lighted, peripheral turbines must be lighted, and no more than a 0.5-mile gap may exist between lights. These lights are designed to concentrate the beam in the horizontal plane, thus minimizing light diffusion down toward the ground and up toward the sky. The exact number of turbines that would require lighting would be specified by the FAA after it has reviewed final project plans. Aside from any required aircraft warning lights, the turbines would not be illuminated at night. The FAA is now in the process of reviewing its safety lighting standards for wind energy facilities and may reduce the amount of lighting required.

Based on topographic variations, the visual changes would be high in views from the segments of US 30/287 within approximately 4 miles of the site; the turbines would be highly visible and would tend to dominate the view. Impacts to viewers along US 30/287 would be of short duration when passing the Facility at designated highway speeds. Farther from the site, the visual dominance of the turbines would decline. In views from segments of I-80, the visual changes would be moderate based on the distance of the Facility from the highway. Rock River, which has the greatest concentration of viewers near the site, would be 2.4 miles away from the closest turbines, and at that distance, studies of the relationship between distance and wind turbine visual effects indicate that the turbines would have at most a moderate effect on the view. Overall, even though the turbines would be visible, the impact of the change to views in the surrounding area would be minor because few residential viewers with close views of the Facility are present and because the landscape region affected has been substantially modified prior to this proposed development by other infrastructure (for example, highways, transmission lines, and agricultural production areas) and has not been designated in either local or BLM plans as having landscape resources that are so distinctive as to require preservation.

Visible changes related to the addition of the transmission line to the landscape would be relatively minor and would not represent the insertion of an entirely new facility into an undeveloped landscape. With a few exceptions, the transmission line would not be seen close-up by substantial numbers of viewers. Given these circumstances, the visual impacts related to the presence of the transmission line would be minor.

The Proposed Action would not result in change to the form, line, color, or texture of the land, vegetation, and structures in the foreground or middle ground of any of the three representative KOPs. Moderate change would occur to these attributes in the background of KOP 1 and KOP 2, and minor change would occur to these attributes in the backgrounds of KOP 3. Environmental protection measures are provided in Appendixes H-1 and H-2.

Activities and changes to the existing environment associated with the Proposed Action are consistent with VRM Class III assigned to the BLM-managed lands in the area. The wind farm would support Albany County's goal of developing renewable energy sources for economic development purposes. Facility construction would result in no adverse effect on visual resources.

Operation-related impacts on views from the three KOPs are discussed below.

KOP 1 – US 30/287 at the southern edge of Rock River

Appendix D, Figures D-1a and D-1b compare existing conditions with a simulation of the view of the site from US 30/287 at the southern edge of Rock River as it would appear during the operational period. A total of 17 turbines are prominently visible on the top of the mesa, at distances ranging from 2.4 miles to 5.5 miles. In this view, the Facility's O&M building, substation, and transmission line are not visible because they are located to the right and behind the ridge, and are set back from the mesa's edge. The presence of the turbines makes a substantial change in the character of this view, changing it from a view of open rangeland to a view in which an infrastructure project is prominently visible, adding vertical lines, smooth surfaces, light colors, and motion. The turbines would be particularly visible because they would be seen against the backdrop of the sky. Although the turbines would be highly visible and create a substantial change in the character of this view, they would not result in a substantial diminishment of the view's visual quality. The turbines would reduce the intactness of the view by adding elements that are out of character with the prevailing landscape pattern. The introduction of smooth, vertical elements into a landscape predominantly occupied by horizontal topographic features would increase the vividness, or distinctiveness, at this location. The level of visual unity would not be substantially affected because the turbines would be arrayed in an evenly dispersed and not overly dense-appearing pattern.

KOP 2 – US 30/287, 7.6 miles southeast of Rock River

Appendix D, Figures D-2a and D-2b compare existing conditions to a simulation of the view of the F site from US 30/287, 7.6 miles southeast of Rock River as it would appear during the operational period. From this viewpoint, the turbines would be visible, at distances ranging from 2 to 5 miles. In this view, the O&M building, substation, and transmission line would be over 7 miles away, on the other side of the mesa, and would not be visible. The presence of the turbines would make a change in the character of this view, changing it from view of open rangeland to a view in which an infrastructure project is prominently visible, adding vertical lines, smooth surfaces, light colors, and motion. The turbines would be seen against the backdrop of the sky, but would not be as prominent in the view as they would be in KOP 1 because the viewing angle is lower and because, in this view, the mesa on which they are located is not as visually important as the focal point of the view. As is the case in KOP 1, the turbines would be highly visible and create a change in the character of the view, but they would not substantially diminish the view's visual quality. The turbines would reduce the intactness of the view by adding elements that are out of character with the prevailing landscape pattern. This effect would be counterbalanced by the fact that as tall, distinctive elements on top of the mesa, the turbines increase the view's vividness. The level of visual unity is not substantially affected because the turbines are arrayed in an evenly dispersed and not overly dense-appearing pattern.

KOP 3 – I-80, Exit 279

Appendix D, Figures D-3a and D-3b compares existing conditions to a simulation of the view of the site from westbound Exit 279 off I-80 as it would appear during the operational period. From this viewpoint, all of the turbines would be visible from a distance of approximately 13 miles. However, the O&M building, substation, and transmission line would not be perceptible from this distance. An existing industrial wind energy generation facility is visible from this location, but the introduction of additional turbines at a distance of 13 miles would not serve to dominate the landscape. The presence of the turbines would not change the character of the view because the landscape has already been altered by the existing industrial facility. Because the turbines would be sited on top of the mesa, the sky would serve as the only backdrop. The turbines would be more visible against the sky on a clear day and less visible on a cloudy day. The levels of visual unity and intactness would not be diminished by the additional turbines because existing turbines already pervade the view, and the additional turbines would contribute to a greater level of patterning across the landscape. The new turbines would not degrade the vividness of this view, and it would remain at a moderate level. The overall visual quality of this view at this location would remain moderate.

4.2.11.3 Decommissioning

As viewed from the three KOPs, the impacts of decommissioning would be similar to those described for construction, including the generation of fugitive dust and the presence of work vehicles and heavy equipment. Measures to reduce airborne dust would minimize potential effects to the visual environment during decommissioning, and measures to restore areas temporarily cleared of vegetation during decommissioning would minimize potentially longer-term effects to the visual environment from fugitive dust. After decommissioning, there would be essentially no lasting visual impact of any consequence.

4.2.12 Cultural Resources

Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended (16 USC 40 et seq.), requires federal agencies to take into account the effects of their actions on properties listed or eligible for listing on the NRHP. The process of evaluating impacts on cultural resources begins with the identification and evaluation of cultural resources for NRHP eligibility, followed by an assessment of effect on those eligible resources, and concludes after a consultation process. If an action (undertaking) could change in any way the characteristics that qualify the resource for inclusion on the NRHP, it is considered to have an adverse effect.

4.2.12.1 Construction

Historic Properties

This analysis discusses impacts relative to the proposed Facility. The area of potential effect includes the individual disturbance areas associated with each of the Facility features planned for construction described in Section 2.2, including the transmission line access road that interconnects the proposed Facility's Sand Hills substation to the switchyard located immediately adjacent to Western's Miracle Mile-Snowy Range 1 transmission line. The transmission line access road starts at the Sand Hills substation and connects with an existing, primitive two-track road before turning west into State Highway 13.

In general, construction impacts pose the greatest risk to cultural resources through ground-disturbing activities such as clearing vegetation, grading, excavating, and trenching. Construction activities may also increase the potential for vandalism of sites, inadvertent vehicular travel through sites, or increased erosion as a result of ground disturbance.

As presently configured, the Proposed Action would result in direct impacts to cultural resource sites identified as sensitive to Native Americans along the western interconnect route and to at least two NHRP-eligible sites. It would also result in adverse impacts to features recorded and included in the Class III cultural resources report.

As discussed in Section 3.12, cultural resources surveys were conducted in 2006 and the BLM also initiated Native American consultation in November 2008 to discuss tribal concerns. The initial Facility layout was reconfigured in 2008 to address concerns identified during the 2008 field visits with the Native American tribes. Specifically, the planned location of several turbines on the turbine string was changed to avoid potentially sacred or respected places identified by tribal representatives.

As a result of the findings of the 2006 survey and the tribal consultation, SWE revised the initial turbine layout of the Facility to move several turbines farther away from the plateau, thus avoiding impacts on cultural resources and sites deemed through tribal consultation as having religious significance to the tribes (see Section 2.9 for a discussion of this alternative turbine access road that was initially considered but eliminated based on the results of the 2008 tribal consultation). Based on that initial redesign of the Proposed Action's turbine locations along the turbine access road with the potential to result in adverse effects to cultural resources, impacts on cultural resources associated with the turbines and the turbine access road are not anticipated to occur.

Although this redesign element avoided impacts along the turbine string road, impacts would still occur under the Proposed Action along the transmission line access road that interconnects the Facility's Sand Hills substation to the switchyard located immediately adjacent to Western's Miracle Mile-Snowy Range 1 transmission line. That road starts at the Sand Hills substation and connects with an existing, primitive two-track road before turning west into State Highway 13. Subsequent to that initial change to the Facility's turbine access road, an additional site visit with tribal representatives was conducted in 2010 along the western transmission line access road. During field visits to this area in 2010 with Native American tribes, the representatives identified areas of the transmission line access road as sacred or respected places, which would result in the occurrence of adverse impacts on cultural resources from implementing the Proposed Action. On the basis of the information developed as part of the BLM's Native American consultation during and following the October 2010 field visit, significant adverse effects would occur from authorizing construction of a portion of the western transmission line interconnect route based on the presence of sensitive cultural resources along that road.

Buried Cultural Resources

Buried cultural resources could occur at the site locations subject to disturbance. Buried cultural resources are generally discovered during construction-related ground-disturbing activities. Because intensive survey efforts have been conducted, it is likely that any buried cultural resources would be similar to those already located and recorded. The following procedures would be followed to minimize potential impacts on cultural resources if unanticipated cultural materials are discovered during construction.

- Construction personnel would be trained on the types of artifacts or other archaeological features that might be encountered at the site, procedures to be followed in the event of an unanticipated discovery, and laws and regulations prohibiting collecting or otherwise disturbing cultural materials.

- Construction personnel discovering cultural resources or suspected cultural resources, including archaeological materials or human remains, would cease work in the immediate area and notify the construction foreman.
- The construction foreman would establish a buffer zone with a radius of at least 100 feet around the discovery site and halt all activities within the buffer zone pending assessment of the site by a qualified cultural resources specialist and consultation with the BLM. Traffic within the buffer zone would be limited to that necessary to remove vehicles and equipment.
- The construction foreman would notify the BLM Rawlins Field Office of the discovery.
- If the cultural resources specialist determines that the discovery is an isolated artifact or feature, construction activities would cease within a sufficient area around the discovery to allow the cultural resources specialist to safely recover and document the find. If a large, complex site or feature is discovered, construction would continue to be excluded within approximately 100 feet of the discovery to allow the cultural resources specialist to safely document the discovery and implement appropriate notification and consultation procedures.
- SWE or its representative would consult with the BLM to determine appropriate treatment, if any. Construction would not resume within the buffer area until authorization to proceed has been received from the BLM.
- Depending on the nature of the discovery, the BLM would consult with the Wyoming SHPO, the Wyoming State Archaeologist, and/or the Albany County coroner as to appropriate treatment of artifacts or remains, as appropriate. The BLM would proceed pursuant to federal regulations (at 36 CFR 800.13) to avoid, minimize, or mitigate effects to cultural resources.

Viewshed

Impacts on cultural resources could also occur where the viewshed is altered and the setting of the site is a component that contributes to the characteristics that make the site eligible for the NRHP. Although there would be no physical impacts to eligible historical-era sites within the site, construction could affect the visual setting of portions of the Lincoln Highway and the 1868–1900 Union Pacific Railroad alignment, both of which follow the northern boundary of the site, and the historic Seminoe-Cheyenne electrical power transmission line southwest of the site. However, the landscape of the area is not pristine and already contains modern features, specifically roads, railroads, and transmission lines occupying the same alignments as these historic features, as well as existing wind energy facilities to the west and southwest.

Although US 30 is noteworthy because it is the route of the Lincoln Highway, no special recognition or protections have been established for the views from the highway in this area. None of the other eligible sites experiences significant heritage tourism. For these reasons, the introduction of a new industrial feature constitutes a low to moderate, incremental change but not a complete revision of the existing landscape. Furthermore, the visual setting is only one of seven aspects of site integrity, and sites are not required to retain integrity in all seven aspects to be eligible for the NRHP. Consequently, visual impacts on cultural resources are considered minor. Visual impacts from viewpoints representing these historic cultural resource sites are also addressed Section 4.2.12.

Native American Religious Concerns

As discussed above, despite the early design change to avoid impacts on cultural resources along the turbine access road, significant adverse effects to cultural resources would occur under the Proposed Action along the transmission line access road based on the presence of sacred or respected places identified during tribal consultation in 2010.

4.2.12.2 Operation

Historic Properties

No impacts to cultural resource sites are anticipated during operation because no new ground-disturbing activities would take place. Along the western transmission line interconnect route, disturbance would have occurred during construction and no additional disturbance would occur during operations.

Native American Religious Concerns

No Native American religious concerns associated with operation activities are anticipated. Along the western transmission line interconnect route, disturbance would have occurred during construction and no additional disturbance would occur during operations.

4.2.12.3 Decommissioning

Historic Properties

Activities associated with decommissioning would be similar to those associated with construction. All earth-moving activities associated with decommissioning would occur in areas that would have been previously disturbed for construction. If decommissioning activities take place outside such areas, impacts to cultural resources would be avoided or mitigated in compliance with Section 106 of the NHPA. Therefore, no new impacts to cultural resources would occur from decommissioning. Along the western transmission line interconnect route, disturbance would have occurred during construction and no additional disturbance would occur during operations.

Native American Religious Concerns

No Native American religious concerns associated with decommissioning are anticipated. Along the western transmission line interconnect route, disturbance would have occurred during construction and no additional disturbance would occur during operations.

4.2.13 Transportation

4.2.13.1 Construction

Delivery of wind turbine and transmission line components, other supplies and materials, and construction equipment would involve highways in the area, including I-80 and US 30/287. Most deliveries would travel from the east or west on I-80 and then north on US 30/287 from Laramie to the Facility access point. Deliveries from the west could also depart I-80 on State Highway 13 to US 30/287 and thence south to the Facility access point.

It is estimated that up to 7,470 truck roundtrips would occur during construction to deliver the turbine components and related equipment to the site. The majority of these truck trips are expected to occur in the first 2 to 3 months of construction during the road construction, turbine site preparation, and operations building work. Subsequently, up to 390 trips would be required for turbine components (including foundation components and cement), and these deliveries are expected to take place over a 3- to 4-month period. Based on these assumptions, construction deliveries to the site would be expected to range from 5 to 118 round trips per day, with most occurring within the first 3 months of construction

I-80 through Wyoming is a major freight route for trucks traveling east-west through the central United States. It currently experiences traffic volumes on the order of 11,000 vehicles per day at Laramie (WYDOT, 2007). Approximately one-half of its volume is semi-trucks, so the road is maintained to accommodate heavy vehicular loads. The addition of up to 118 daily round trips on I-80 for Facility-related deliveries would not appreciably increase traffic volumes on I-80 or adversely affect operating conditions.

Traffic volumes on US 30/287 in the vicinity of the site access point range from approximately 1,250 per day north of Laramie to approximately 900 per day closer to the site (WYDOT, 2007). In addition to construction-related deliveries, US 30/287 would experience an average of approximately 40 round trips per day by other construction, trade, and workforce vehicles. Assuming that most deliveries and other trips come north out of Laramie, the addition of up to 118 round trips per day for construction deliveries and 40 round trips by other vehicles would represent an increase of up to approximately 25 to 34 percent in traffic on US 30/287 south of the access point during the first 2 to 3 months of construction. Although not estimated, some proportion of this traffic could approach the access point on US 30/287 from the north (via State Highway 13 from I-80). This would result in a smaller increase in US 30/287 traffic south of the access point. US 30/287 is currently considered to operate at a high level of service (best operating conditions) (WYDOT, 2007) and would still operate at desirable levels of service with the addition of Facility-related trips during the construction period.

Access to the site from US 30/287 is proposed at one location at an existing intersection with the highway at approximately milepost 307. The unimproved road at the access point is within the proposed site boundary, and it is assumed that it currently experiences little traffic volume. Intersection operation, analyzed as two vehicles per hour turning to/from the proposed access road and US 30/287, indicates that the intersection currently provides a high level of service. Likewise, the intersection of State Highway 13 and US 30/287, which could experience some degree of traffic, is rated as providing a high level of service.

As a Minor Arterial, access is permitted to US 30/287 at 0.5-mile spacing. The access road complies with this regulation and would be improved as part of development to provide adequate site access. A permit allowing direct access to US 30/287 would be obtained from WYDOT to ensure that any modifications to this intersection would conform to WYDOT standards and specifications. The access road intersection would be compliant with WYDOT regulations for access, such as those relating to oversized transporter trucks, auxiliary lanes, and unobstructed sight distances.

The existing access roadway is currently unimproved and would be improved. To allow safe passage of the large transport equipment used during construction, all-weather gravel roads would be constructed with adequate drainage and compaction to support transport vehicles. Facility roads would be designed with road widths and turning radii adequate to accommodate equipment transporting the approximately 150-foot-long wind turbine blades and large construction cranes (see Chapter 2). Road-width and turning-radius specifications are often dictated by the equipment manufacturer.

The access road crosses a branch of the Union Pacific Railroad transcontinental mainline at grade just west of US 30/287. Applicable traffic rules would be observed at the crossing, and no impact to the railroad would occur as a result of construction activities.

Sufficient excess capacity exists on I-80 and US 30/287 that highways and intersections would continue to operate at desirable levels of service during construction. Impacts to transportation in the area would be minor for the first 2 to 3 months of construction and would be negligible thereafter. Transportation impacts of wind energy development projects are discussed in Section 5.6 of the BLM PEIS (BLM, 2005a). Appendix H also contains other relevant BLM and Western environmental protection measures.

4.2.13.2 Operation

Transportation impacts related to operation would be associated primarily with operations workers commuting to the site, and also intermittent deliveries of supplies for operation and maintenance. Further deliveries of large equipment beyond the construction period could occur but would be infrequent.

Up to 10 employees per day would commute to the site on a permanent basis. Employees would typically work 8 hours per day, 5 days per week, with the exception of the windsmiths, who would rotate shifts to cover nights and weekends. It is expected that most of the workforce would commute from Laramie on US 30/287. Sufficient excess capacity exists on US 30/287 that operation and maintenance would not degrade traffic operations.

Area highways and intersections would operate at high levels of service during the operation period. Operation would not result in adverse impacts to transportation in the area.

4.2.13.3 Decommissioning

Impacts on transportation from decommissioning would be similar to those described for construction. Large construction equipment and large transport vehicles would be needed to deconstruct and remove Facility components. It is possible that fewer hauling trips would be necessary because concrete foundations and other underground features could be left in place rather than being removed for disposal elsewhere. The decommissioning period could also be shorter than the construction period.

Area highways and intersections would continue to operate at desirable levels of service during decommissioning. Impacts to transportation from decommissioning would be short-term and minor.

4.2.14 Socioeconomic Conditions and Public Services

4.2.14.1 Social and Economic Factors

Construction

This section assesses economic activity; property, sales, and other taxes; population and housing; community facilities and service; and environmental justice. From a socioeconomic perspective, consequences are attributable primarily to changes in the local economy related to construction and operation. Economic activity from site development would increase in local employment; purchase of materials and services from local sources; and expenditures in the local economy by non-local workers for items, such as accommodations, food, and recreation. Construction-related impacts would be short term, while impacts associated with operation activities would have a longer duration. One of the most identifiable impacts could be to housing resources, especially temporary housing. To the extent that the local labor force cannot provide suitably skilled workers, workers would be sought from outside the Laramie/Albany County area. Because the duration of construction activities is relatively short, it is likely that most non-local workers would reside in hotels, motels, recreational vehicles, or campers within commuting distance of the site. It is assumed that these workers would not be accompanied by family members, and, thus, effects on community facilities and service providers would be minimal.

Economic Activity

Direct Employment and Income. During the course of the 6-month construction period, direct onsite employment would exceed 100 workers for 3 consecutive months. Many of the tasks would require skilled workers with specialized expertise that would not be available locally, therefore, it is expected that the majority of the construction workforce would be drawn from outside the Albany County/Laramie area. However, it is anticipated that efforts to hire locally would be made to the extent possible.

Secondary Employment and Income. Employment in addition to that directly associated with construction activities would occur in the region. This “secondary” employment would be related to additional employment in local businesses providing materials, goods, and services necessary for project implementation; accommodations, meals, and recreation opportunities for temporary residents; and other items for personal consumption by resident workers.

A portion of the cost of construction materials would be sourced within Albany County. Providing these additional materials (for example, concrete and aggregate) could require local suppliers to add jobs during the construction period. Likewise, providing for food, lodging, and other goods and services for temporary and permanent workers during the construction period could also increase employment in local businesses.

Facility development would stimulate procurements and personal consumption expenditures by local and non-local construction workers, which would have a beneficial effect on the local economy. In the short term during construction, the economic stimulus could reduce unemployment, increase income and earnings, and increase revenues accruing to the state and local jurisdictions from sales, use, and other taxes.

Property, Sales, and Other Taxes

Property Taxes. Property taxes are based on 100 percent of the fair market value (FMV) of the property and would, in most cases, be computed by the county assessor. Construction and operation of the Facility would add considerably to the tax base of Albany County, which contains few such capital-intensive developments.

Sales and Other Taxes. Sales tax is normally collected on all retail sales made within the state. Products purchased outside the state for final consumption within the state are subject to use taxes at rates equivalent to the sales tax in the jurisdiction where the product is consumed. Assuming that all materials and services (purchased locally or elsewhere) required for construction of the facility are not exempt, the majority of capital purchases associated with the construction of the proposed Facility would be subject to sales or use taxes, and generate substantial sales tax revenue.

Temporary resident workers would require local services such as accommodations, recreation, and entertainment, and would purchase items such as meals and gasoline locally. Such services and commodities would generate sales tax revenues.

Population and Housing

Impacts to regional population and housing could occur over the short term. Workers would temporarily relocate to the region to fill jobs not held by local workers. Because of the short duration of construction activity, it is unlikely that non-local workers would be accompanied by family members.

Non-local workers would be expected to reside in available housing in the Laramie metropolitan area. The supply of temporary accommodations in the area includes hotel and motel rooms, apartments, single-family rental housing units, rental mobile homes, and RV spaces located in RV parks. A slow rental market caused by a recent economic downturn and a general increase in the rental stock in Albany County is well documented in the Wyoming Rental Vacancy Survey (Wyoming Housing Database Partnership, 2009). The trend toward increasing availability in the rental housing market in the area is evident from the vacancy rates indicating that adequate housing is available to meet the needs of the non-local workers throughout the construction phase.

Community Facilities and Services

In the absence of sizeable increases in the number of residents as a result of construction, impacts to community facilities and services such as law enforcement, fire and medical emergency, water/wastewater, and solid waste are not expected.

Environmental Justice

Environmental justice impacts would not occur because the impacts would not disproportionately affect a minority or low income population compared with the general population. In addition, the measures in Appendix H would reduce impacts overall to all potentially affected populations.

Operation

Impacts associated with operations would be long-term and beneficial but quantitatively small. During the operation phase, approximately 10 full-time jobs would be associated with operation and maintenance. Secondary employment associated with local Facility-related procurements and personal consumption expenditures by direct employees would also increase. Impacts to employment, population, housing, and community facilities and services would be negligible during the operation phase. Impacts on minority and low-income populations would be negligible during the operation phase.

Annual property tax revenues would continue to accrue to Albany County. These tax revenues would likely decline over time as the FMV of the facility declines through depreciation.

Assuming that all materials and services (purchased locally or elsewhere) required for operation of the facility are not exempt from sales tax, it is estimated that sales tax receipts would accrue to the state and county. In addition to the direct purchases associated with operation activities, there would be additional tax receipts generated from purchases made by the new direct and secondary workers and their families. These tax receipts would be minor but beneficial.

Decommissioning

Impacts would be similar to those described for construction, but the magnitude of such impacts would be less than for construction based on reduced activity and workforce requirements relative to the conditions prevailing at the time of decommissioning.

4.2.15 Health and Safety

4.2.15.1 Construction

Potential health and safety impacts during construction include accidents, electrical shock, fire, and hazardous materials.

Accidents

The potential for construction accidents is inherent in projects involving extensive earth-moving activities and the installation/erection of industrial facilities. The erection of the wind turbine towers (in sections) and the subsequent installation of the nacelle and turbine blades pose potential safety concerns based on the size and weight of these components. Their installation requires the use of large construction cranes. Swinging Potential safety concerns during construction will be moderated by using guying systems and/or by conducting such activities during calm wind conditions, including at night.

Safety procedures that are standard for the wind energy industry and consistent with OSHA standards will be implemented. The construction contractor would be responsible for ensuring that appropriate safety procedures are followed. Potential impacts to workers from accidents during construction would be typical of impacts at similar construction projects and are assumed to be negligible. Therefore, no adverse impacts to worker safety due to construction accidents are expected.

Electrical Shock

Utility and turbine workers may be at risk for electrical shock during the construction of wind turbines or utility components. However, with incorporation of avoidance and minimization measures, the risk of electrical shock due to construction would be negligible, and no adverse impacts to construction worker safety due to electrical shock are expected.

Fire

Potential fire hazards, such as vehicle exhaust, sparks from welding and other construction activities, and from construction workers smoking on the construction site, could result in fires during construction. The greatest fire risk would likely be in the creation of rangeland fires, which can quickly propagate in the grassy vegetation of the site under the prevailing windy conditions. The potential for rangeland fires would be highest during the summer and fall.

Risks to human safety from such fires could extend from construction workers to other firefighters, including BLM and local emergency responders, involved in fire suppression. The Laramie Fire Department responds to fire suppression calls within Rural Fire District #1, which includes the site. Avoidance and minimization measures would reduce these potential fire hazards to minor or negligible levels, and no adverse impacts to worker or public safety due to fires during construction are expected.

Hazardous Materials

Hazardous materials associated with construction would consist primarily of fuels (gasoline and diesel) and lubricants used for operation and maintenance of construction vehicles. The potential for accidental spills or leakage would be avoided and/or minimized by standard procedures such as using leak-proof gaskets and proper maintenance of vehicles and equipment to minimize leaks. Small amounts of adhesives, solvents, paints, propane, and coolants would be used in the construction/installation of Facility features. The risk of hazardous materials release is negligible, and no adverse impacts to health and safety due to the use of hazardous materials during construction are expected.

4.2.15.2 Operation

Potential health and safety impacts during operation include wind turbine operation issues, electrical shock, fire, electric and magnetic fields, induced voltage and current phenomena and hazardous materials.

Wind Turbine Operation

The probability of structural failure of a wind turbine is negligible. Failure of a turbine tower at its base or failure of its anchorage to the foundation would create a hemispherical hazard zone with a radius approximately equal to turbine tip height. The modern wind turbines under consideration have an approximate tower height of up to 263 feet and rotor diameter up to 306 feet, depending on the model selected.

The probability of turbine blade throw is likewise negligible. The simplified worst-case loss of a whole blade would occur with the blade rotating at maximum speed, when oriented at 45 degrees from the horizontal axis and rising. This is the classic maximum trajectory case from standard physics texts. Review of these data indicates that, for the maximum turbine envelope, the worst-case blade throw distance is approximately one turbine tip-height. Persons or facilities within the blade throw hazard zone could theoretically be at risk of being struck.

Moderate icing risk is expected in the Sand Hills area. The turbines would be situated in a remote area and have been sited at locations that exceed the reasonable set-back of 328 feet to safeguard against ice throw. The probability of rotor failure is also negligible. The potential for rotor failure would be avoided or minimized by implementation of appropriate Facility design.

In the unlikely event of a turbine tower collapse, blade throw, ice throw, or rotor failure, the potential risk to the public would be limited because the turbines would be constructed on property with controlled access across private land and because of the low human use of the overall area. Additionally, the closest residence is over 1,000 feet from the nearest turbine or publicly traveled road. Therefore, no adverse impact on health and safety from tower integrity, blade throw, ice throw, and rotor failure due to operation would occur.

Electrical Shock

Utility and turbine workers may be at risk for electrical shock during Facility operation. The potential also exists for accidental or intentional entry into the site and subsequent risk to human health. Incorporation of avoidance and minimization measures would reduce the risk of electrical shock to negligible levels.

Fire. Potential fire hazards during operation could include fires associated with the wind turbines, substation, and power lines. These fire risks could be related to lightning strikes. Although lightning strikes are relatively rare in the area in general, the probability of lightning strikes could be slightly higher at the site because the wind turbines would be the highest structures in the surrounding terrain. Fires caused by lightning strikes or other factors could create rangeland fires, as discussed for construction, above.

The Facility has been designed in a manner to reduce the risk of fire and explosion from lightning strikes. Impacts to health and safety from lightening strikes and fires would be negligible. Therefore, no adverse impacts from fire risk and explosion from lightning strikes from operation would occur.

Electric and Magnetic Fields

Research on long-term exposure to electric and magnetic field (EMF) effects has not provided uniform conclusions. In the absence of conclusive or evocative evidence, some states have chosen not to specify maximum acceptable levels of EMF. Instead, a program of prudent avoidance is mandated, whereby EMF exposure to the public would be minimized by encouraging electric utilities to use low-cost techniques to reduce the levels of EMF.

Generally, electromagnetic fields are considered a possible concern when associated with the siting of high voltage (115 kV+) overhead transmission lines in proximity to residences. EMF is generally not a health and safety issue that is related to wind turbines because turbines have low-voltage drop-cables contained within steel towers and have a predominantly underground collection system also at a low voltage (34.5 kV). Therefore, no adverse impact from EMF due to operation activities would occur.

Furthermore, the Facility would be located mostly on private property, public use of the site would be discouraged, the overall area is rural with limited human use, and the closest residence is located more than 1,000 feet from the nearest turbine. Because no residences or occupied buildings occur in the transmission line ROW, no long-term exposures would be expected. Therefore, no adverse impacts from EMF generated by operation are expected.

Induced Voltage and Current Phenomena

Underground 34.5-kV cables generate magnetic fields, not electric fields, and would not cause voltage to appear on fences that parallel the underground circuits. Therefore, grounding fences near the underground lines is unnecessary. No known commercial pipelines or other such facilities cross the areas of disturbance. Privately owned underground irrigation lines cross the site, but these lines are constructed of PVC pipe and do not conduct current.

Any aboveground 34.5-kV single-circuit and double-circuit collection system lines would have low electric fields at ground level (less than 1 kV per meter) and are not expected to cause induced voltage concerns for wire livestock fences with steel fence posts, even where not purposefully bonded to ground rods.

Although not necessary based on the conclusions stated above, the project design incorporates additional measures to protect from induced voltage and current to satisfy landowner concerns. Therefore, no adverse impact from induced voltage and current phenomena due to operation would occur. Operation is expected to result in negligible risk to health and safety from induced voltage and current.

Hazardous Materials

Materials for operations and maintenance would need to be transported to and stored on site. No extremely hazardous materials are anticipated to be produced, used, stored, transported, or disposed of as a result of operation. However, accidental spills or leakage could occur during routine procedures such as gearbox maintenance and truck fueling.

Chemicals would be stored in tanks or drums equipped with secondary containment areas to prevent runoff. Existing roads in the area can safely accommodate fuel trucks. A fuel tanker accident would trigger activation of the SPCC plan. Cleaning chemicals or detergents would generally be biodegradable and would be stored in the O&M facility in sealed containers. Oils needed for normal maintenance would be stored in drums or smaller sealed containers at the O&M facility and transported to the turbine when needed. Routine protocol included as part of the transportation health and safety procedures, such as adequate maintenance of equipment and emergency contact information listed on refueling vehicles would provide protections from hazardous materials releases. Erosion and runoff control measures would also be incorporated into the Facility design.

The risk of hazardous materials releases during operation would be negligible. Avoidance and minimization measures in the Facility design would address and provide appropriate measures to avoid releases of hazardous materials. Therefore, no adverse impact from release of hazardous materials due to operation would occur.

Intentional Destructive Acts

Transmission line projects and other installed infrastructure such as the wind project may be the subject of intentional destructive acts ranging from vandalism and theft to sabotage and acts of terrorism intended to disable a line or facility. The former, more minor, type of act is far more likely for such types of projects in general and particularly for those like the Proposed Action, which are in relatively remote areas and serve relatively small populations. Intentional sabotage or terrorist acts would be expected to target much larger electrical facilities, where a loss of service would have substantial regional impacts. The risks of significant damage from destructive acts are considered very low for the proposed Facility. The potential consequences of these acts to the installed infrastructure and the environmental are also considered low.

Theft is most likely to involve substation and switchyard equipment that contains salvageable metal (for example, copper and aluminum) when metal prices are high. Vandalism, on the other hand, is more likely to take place in relatively remote areas and perhaps more likely to involve acts of opportunity (for example, shooting out transmission line insulators or shooting at the blades on a wind generator) than premeditated acts.

Protections against theft include fencing around substations and the use of locks and alarm systems where expensive equipment is housed. The presence of high voltage would also discourage theft and vandalism. Vigorous prosecution of thieves and monitoring of metal recycling operations might also deter the theft of equipment. Similarly, the prosecution of vandals who have damaged or destroyed project equipment might discourage vandalism if it has become a problem.

The Facility substation would be protected from theft and vandalism by fencing and alarm systems. The presence of high voltage would also serve as a deterrent to casual attacks. The relatively remote location of the proposed project would tend to reduce vandalism on the whole, because of the small number of people who would be expected to encounter the line. However, this same remoteness might encourage a rare act of opportunistic vandalism. Such occurrences would be infrequent and would be vigorously investigated and prosecuted to discourage further acts.

The effects of intentional destructive acts could be wide ranging or more localized, depending on the nature and location of the acts and the size of the project, and would be similar to outages caused by natural phenomena such as storms and ice buildup. While a transmission line is out of service, residences may lose lighting and perhaps heating or air conditioning. Electrical appliances would be nonfunctional until electrical service was restored. In such cases, perishable food could spoil, and residents would be inconvenienced and could experience discomfort during cold or hot weather. However, some residents may already have backup generators and alternate means of cooking and heating. Also, if the residences are supplied with electricity from two or more sources, there may be no noticeable interruption or only minor, temporary interruptions if the alternate sources were not affected.

Effects on commercial and industrial electricity users would similarly include loss of lighting and ventilation but could also include the shutting down of office equipment, computers, cash registers, elevators, heavy machinery, food preparation equipment, and refrigeration. Some commercial operations might be forced to shut down temporarily as a result of a loss of power or concerns about safety. Municipalities could be affected by the shutting down of traffic signals, while city offices might have to close temporarily. Police and fire services could be affected if communication systems shut down. City services, such as sewer and water systems, might be affected by extended outages. Loss of electrical service at hospitals would be of special concern because it could be life threatening. Such effects might be mitigated at hospitals and for other critical uses through the use of temporary backup power (for example, from a diesel- or gas-powered generator).

In addition to the effects from loss of service, destructive acts could cause environmental effects as a result of damage to the facilities. Two such possible effects are fire ignition, if conductors are brought down, and oil spills from equipment (for example, mineral oil in transformers) in the substation, if the equipment is damaged or breached. Fires would be fought in the same manner at those caused by, for example, an electrical storm. Spills would be properly cleaned up in accordance with regulatory requirements including appropriately disposing of contaminated soil and replacing with clean soil.

4.2.15.3 Decommissioning

Risks associated with accidents, electrical shock, fire, and hazardous materials during decommissioning would be similar to those associated with construction. These risks would be negligible, and no adverse effects to health and safety from decommissioning are expected.

4.3 Alternatives

NEPA directs the BLM to develop alternatives to the Proposed Action that would resolve conflicts with available resources within the Proposed Action area (NEPA Section 102(2)(E). For an alternative to be considered reasonable, it should meet the purpose and need (as outlined in Chapter 1). For this Proposed Action, two project alternatives and a No Action alternative were identified. Both action alternatives would meet the project purpose and need, and have been identified to minimize potential environmental effects associated with the Proposed Action.

4.3.1 No Action Alternative

Under the No Action alternative, the ROW application would be denied and the Facility would not be built. Approximately 50 MW of renewable electrical capacity would fail to be generated at the site and would need to be produced at other locations and/or by other renewable or non-renewable energy sources in order to meet energy objectives. Development of a wind energy project on non-federal lands could preclude NEPA environmental disclosure and analysis requirements if federal funding or permitting were not required for the Facility.

Under the No Action alternative, existing land uses in the area would continue consistent with current or planned practices. Potential impacts of wind energy development would not occur at the site. Other locations would be likely to have the same type of resource issues and would likely have similar environmental impacts.

While preliminary wind testing is taking place in surrounding areas, the BLM has not received any other applications requesting full wind energy development at this time. Replacement of 50 MW of electrical generating capacity with energy from non-renewable sources would likely result in less ground disturbance but could result in substantial increases in air pollutant emissions, including greenhouse gases.

Under the No Action Alternative, Western would not execute an interconnection agreement with SWE and the proposed wind project would not be constructed and interconnected with Western’s transmission system. Western’s determination not to approve the interconnection request could make the proposed Facility infeasible. SWE could continue to pursue the project by applying for interconnection with another transmission provider in the vicinity; however, Western cannot speculate on whether access to alternative transmission is a technically and economically feasible option for SWE. The electrical generation capacity of the Facility could change depending on the transmission capacity of the alternative transmission provider and other factors could make SWE’s Facility infeasible. For the purposes of this EA, which discusses the potential impacts of Western’s decision on the interconnection request, the No Action Alternative is considered to result in the proposed

Facility not being constructed, and consequently the environmental impacts associated with the proposed Facility would not occur.

4.3.2 Alternative 1—Western Realignment of Preferred Transmission Line Access Route

The Western Realignment of Preferred Transmission Line Access Route (Alternative 1), as described in Section 2.8.2, presents an alternative western alignment for the transmission line access road. During preliminary cultural resource investigations for the Proposed Action's interconnect, it was determined that there could be the potential for disturbance of sensitive cultural resources along the Proposed Action's proposed route for the western transmission line route. This alternative was developed to avoid any impacts to those cultural resources.

Other than for cultural resources and Native American resources, the impacts of Alternative 1 would be the same as the Proposed Action. Under Alternative 1, the impacts that would occur under the Proposed Action (i.e., direct impacts to cultural resource sites identified as sensitive to Native Americans along the western interconnect route and to at least two NHRP-eligible sites and adverse impacts to features recorded and included in the Class III cultural resources report) would be avoided.

The revised route of a portion of the transmission line access route was selected by the Native American representatives who attended filed visits in 2010. This alternative would avoid the Proposed Action's cultural resources impacts by moving the access road away from identified sensitive cultural resources.

No additional impacts to wetlands or jurisdictional waters would result from Alternative 1. Alternative 1 would be constructed in compliance with the CWA and authorized under the appropriate Nationwide Permit (NWP), if applicable. No additional impact during operations or decommissioning would occur.

Alternative 1 would potentially require the installation of several additional transmission line poles from the minor increase in length over the Proposed Action; however, short- and long-term impacts to vegetation communities and risk of noxious weed and invasive species would be insignificant. Impact minimization measures associated with ground disturbance and control of noxious weeds and invasive species would be similar to those described for construction, operations, and decommissioning of the Facility.

4.3.3 Alternative 2—Southern Transmission Line Access Route

The Southern Transmission Line Access Route, Alternative 2, as described in Section 2.8.3 is located south of the Proposed Action and presents an alternative transmission line access road along existing roadways.

This alternative was identified for consideration based on facilitating site access from the Facility entrance to a switchyard that would interconnect to the substation farther south than the location proposed in the Proposed Action. If selected, additional turnouts to address construction traffic may be incorporated into the road design.

Under this alternative, impacts would be similar to the Proposed Action with the exception of impacts on waters of the United States, including wetlands. The existing canal crossing would be improved, and a raised roadbed with culverts for drainage would be installed in the Dutton Creek area. The southern interconnect route would cross Dutton Creek and result in potential direct impacts on waters of the United States, including wetlands. Under Alternative 2, the FEMA-designated 100-year floodplain associated with Dutton Creek would be disturbed by the improvement of the road to Western's interconnection switchyard and construction of the new road along the transmission line. Impacts would occur to floodway capacity or result in an increased flood potential, and additional permitting conditions would be likely. If this alternative were selected as the preferred alternative, additional environmental review of the Dutton Creek crossing would be conducted in accordance with NEPA. In addition, surveys of surface water features that would be occupied or crossed by Facility components would be conducted after final micrositing is complete to comply with the CWA and the appropriate Section 404 permit.

Construction of a transmission line and access roads across Dutton Creek would require a 401 Water Quality Certification from the WDEQ to obtain a 404 Permit from the USACE. The purpose of § 401 of the CWA is for states to use its process to ensure that no federal license or permit authorizes an activity that would violate the state's water quality standards or become a future source of pollution. A Section 401 Water Quality Certification (WQC) covers construction, operation, maintenance, and decommissioning of a proposed project, and conditions of the WQC become conditions of the federal license or permit. All aspects of the project, including energy production devices and any cables in, on, or under state waters (including wetlands) would be considered in the review if determined to be relevant to this alternative.

Road impacts would be minimized to the maximum extent practical. Impacts to each single and complete crossing are expected to be less than 0.5 acres and, therefore, would be authorized under NWP 12 or 14 and completed in compliance with the CWA and associated regulations.

No impacts to wetlands or water bodies are anticipated from routine operation and maintenance activities associated with Alternative 2. If road or wetland/jurisdictional waters crossings would be reclaimed during decommissioning, similar surface-disturbing impacts as described for Facility construction would occur.

Alternative 2 would require installation of approximately 4.69 miles of road along the alternate southern transmission line route, resulting in permanent disturbance of 14.22 acres for the road. Impacts to vegetation and potentially associated with noxious weeds and invasive species would be minimized as described for construction, operations, and decommissioning of the proposed Facility.

One occupied lek is located approximately 1.9 miles from the proposed switchyard and southern termination of the Alternative 2 transmission line. Habitat at this location is entirely shortgrass prairie, and no suitable habitat for greater sage-grouse would be disturbed along the southern mile of this transmission line alternative. Risk of impact to this lek and potentially nesting or brood rearing hens and their young in and near the Alternative 2 Facility would be minimized by implementing the timing and location of construction activities on BLM-administered lands within 2 miles from the perimeter of the lek from March 15 through July 15. Setback requirements for Facility features on BLM-administered lands, as per the No Surface Occupancy distance stipulations presented in the

Rawlins RMP would be required, and a lek monitoring program, developed in accordance with BLM guidelines, would be implemented to detect any impacts to the species during operation. Potential impacts of decommissioning would be avoided and minimized in a manner similar to those required for construction, and would not be significant. Potential impacts would be evaluated based on the specific monitoring considerations found in WGFD's wildlife protection recommendations for wind energy development (WGFD, 2009). Aquatic monitoring data would be provided by SWE to the WGFD.

4.4 Cumulative Impacts

4.4.1 NEPA Requirements for Cumulative Impacts Assessment

The CEQ regulations implementing NEPA define a "cumulative impact" for purposes of NEPA as follows:

> Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future 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 Section 1508.7).

The CEQ also establishes a need for developing a baseline (or benchmark) against which to compare predictions of the effects of the proposed action and reasonable alternatives.

For the purposes of this EA, cumulative impacts would occur if the incremental impacts of the Proposed Action (or the alternatives), when added to the environmental impacts of past, present and reasonably foreseeable actions (identified below) in the vicinity of the Proposed Action combined to result in an adverse effect to regional resources.

4.4.2 Geographic Scope of Cumulative Analysis

The geographic scope of cumulative impacts analysis is generally based on the natural boundaries of the resources affected. For all the resources analyzed, other potential actions or projects were reviewed on the basis of subwatershed boundaries. This approach provides a broad area for which potential cumulative actions can be analyzed and encompasses the range and distribution of the resources of potential concern.

4.4.3 Timeframe

Potential impacts from the construction of the Proposed Action would be short-term, generally occurring over a 12-month period. Impacts on soils, air quality, vegetation, and noxious weeds may extend several months beyond the initial construction period until revegetation is accomplished. For the purposes of the cumulative impacts analysis, it is assumed that construction of the project would begin in 2012.

Potential impacts associated with operation of the proposed Facility and transmission line would continue into the foreseeable future, approximately 30 years.

4.4.4 Past, Present, or Reasonably Foreseeable Future Actions

The following types of past, present, or reasonably foreseeable future actions were evaluated for consideration of cumulative impacts analysis:

- Oil exploration and extraction
- Natural gas exploration and extraction
- Pipeline construction
- Electric transmission line construction
- Wind power generation projects
- Coal gasification
- Uranium exploration and extraction

Historical land use includes grazing, road development, and private land actions. Current and planned projects include those that have either been permitted or are in the permitting process. These projects are listed in Table 4-5.

TABLE 4-5
Other Actions Considered in Cumulative Analysis
Sand Hills Wind Energy Facility

Project	Owner/Proponent	Location	County
High Plains and McFadden Ridge Wind Energy Projects	PacifiCorp Energy	near McFadden	Albany and Carbon
Foote Creek I, II, III, and IV Wind Energy Projects	PacifiCorp Energy and others	near Arlington, Wyoming	Carbon
Sierra Madre/Chokecherry Wind Farm	Power Company of Wyoming	south of Rawlins, Wyoming	Carbon
Seven-Mile Hill Wind Energy Project	PacifiCorp Energy	west of Medicine Bow	Carbon
Simpson Ridge Wind Energy Project	Horizon Wind Energy		Carbon
Campbell Hill Windpower Project	Duke Energy, dba Three Buttes Windpower	north of Glenrock	Converse
Silver Sage Windpower Project	Duke Energy	near Cheyenne	Laramie
Happy Jack Windpower Project	Duke Energy	west of Cheyenne	Laramie
Glenrock, Rolling Hills, and Rolling Hills II Wind Energy Projects	PacifiCorp Energy	north of Glenrock	Converse
Gateway West Transmission Line Project	Idaho Power and Rocky Mountain Power Company	Dave Johnston Power Plant at Glenrock, Wyoming to the 20 miles southwest of Boise, Idaho	Converse, Albany, Carbon, and Sweetwater and west
Gateway South Transmission Line Project	Rocky Mountain Power Company	Aeolus Substation near Medicine Bow to Mona Utah.	Carbon, Sweetwater and west

TABLE 4-5
Other Actions Considered in Cumulative Analysis
Sand Hills Wind Energy Facility

Project	Owner/Proponent	Location	County
Transwest Express Transmission Line Project	Transwest Express LLC.	South-central Wyoming to Las Vegas, Nevada	Carbon, Sweetwater and southwest
Quealy Dome Gas Field	Legacy Reserves Operating LP	20 miles West of Laramie	Albany
Medicine Bow Fuel & Power Coal-to-Liquids Project	Medicine Bow Fuel & Power	south of Medicine Bow	Carbon

4.4.4.1 Other Wind Projects

Development of other wind projects could occur in the area, but none are far enough along in the planning process to define the location, scale, and impacts of their potential development. Therefore, potential future wind energy projects are not included in the cumulative impact assessment.

4.4.4.2 Other Transmission Line Projects

In addition to the projects listed above, a number of transmission line proposals are under consideration. However, none is actively conducting planning processes, and, if successfully permitted, they would likely be constructed in 2015 or later. Therefore, they are not included in the cumulative impact assessment.

4.4.4.3 Other Oil and Gas Related Projects

In addition to the projects listed above, additional oil and gas related projects are under consideration. Primarily these include pipelines associated with the Medicine Bow Fuel & Power Project as well as other natural gas lines that are located along the existing I-80 corridor.

4.4.5 Cumulative Effects

Construction of the Sand Hills Wind Energy Facility has the potential to contribute to cumulative impacts along with other construction projects that have occurred or may occur within the cumulative impact area. Operation of the Facility also has the potential to contribute to cumulative environmental impacts, because the primary long-term impacts associated with operation of the Facility and the transmission line (avian and bat collisions) are the same type of impacts associated with other reasonably foreseeable projects.

As noted previously, impacts could occur to soils, air quality, vegetation, wildlife, cultural resources, and land use. Soils is combined with vegetation and air quality in the following discussion because the primary impacts of soil disturbance in the area are fugitive dust emissions and loss of soil quality for vegetation.

4.4.5.1 Air Quality

Air quality in the cumulative impact area is generally good, and the area is not in violation of any National Ambient Air Quality Standards. Simultaneous Facility construction activities could adversely affect regional air quality as a result of emissions from construction equipment and vehicular exhaust. These emissions would generally be localized and short in duration. Dust emissions and soil loss from travel on unpaved roads, from earth-moving activities, and from areas where vegetation has been removed could increase. Although these impacts would generally be minor, the ongoing impacts of other energy development projects make the area susceptible to cumulative impacts on a short-term basis. Impacts from construction activities, however, would not be expected to be great because fugitive dust control is implemented as a BMP at most projects and is usually required by county and state permit constructions.

4.4.5.2 Vegetation

Existing and reasonably foreseeable projects that would be expected to produce incremental and cumulative impacts within the cumulative impact analysis area are summarized in Table 4-5. These projects would contribute incremental changes to the current level of effects to vegetation resources in the analysis area from historical and ongoing management activities.

Historical impacts include grazing and soil-disturbing activities such as road development, water development, and building development. These activities and supporting developments are common in this rural landscape. These projects generally consist of large soil disturbance, especially older projects, likely mixed topsoil with subsoils and used weedy non-native species as part of the reclamation effort. These techniques have had long-lasting impacts on changing the vegetation communities to more disturbance-oriented communities. In recent years, improved techniques have been developed and there is a greater understanding of the importance of preservation of topsoil and other suitable soil horizons as well as the use of native species.

Noxious and invasive weed species are present throughout the landscape, with heavier occurrences in areas that have been previously disturbed. Soil-disturbing activities have created opportunities for noxious and invasive species to gain a foothold and spread. Linear projects such as roads, transmission lines, and pipelines provide some of the greatest opportunity for weeds to migrate. With greater understanding of the harm noxious and invasive weed species can have, new techniques to minimize the spread, and careful diligence in controlling those weeds that do appear, the cumulative effect from this Facility will likely be relatively low.

4.4.5.3 Wildlife

Cumulative impacts on wildlife from construction activities and development within the cumulative impact area include habitat disturbance and fragmentation, injury and mortality, and interference with migration or movement. Multiple construction projects have the potential to disrupt wildlife habitat and behavior (nesting, breeding, migration) over a larger area.

Impacts on non-migratory bats, including the BLM sensitive species of bats in the vicinity of the Facility are expected to be low, and no significant cumulative impacts are likely. Impacts on long-distance migratory tree bats are unique, in that the affected populations are likely not local, but breed north of the project area such as in the Pacific Northwest or forested areas of northern Wyoming, Idaho, Montana, and western Canada. Cumulative impacts on bats would primarily be associated with wind energy development and other forms of development that result in habitat loss—such as energy development, logging, and roads—along their entire migration corridor from Canada to Mexico.

As of June 2009 (AWEA, 2009), the 17 western U.S. states had 19,951 MW of installed capacity, which represents 68 percent of all installed wind energy in the United States. There are an additional 800 MW of existing wind energy in western Canada (CWEA, 2009). Using an average of 2.1 bat fatalities/MW/year for existing wind energy facilities in western North America (Johnson and Stephens, 2011) would imply that as many as 43,577 bat fatalities could occur per year in this region. The existing wind energy and the projected increase in wind energy development throughout western North America, as well as other forms of development that result in direct habitat loss, would result in cumulative impacts to migratory tree bat populations, especially hoary and silver-haired bats.

Little information exists on cumulative impacts to birds associated with wind energy development. The potential for population-level impacts caused by avian collision mortality associated with 6,700 MW of existing and proposed wind energy development in the Columbia Plateau Ecoregion of eastern Oregon and Washington was estimated based on results of 12 existing mortality studies in the ecoregion (Johnson and Erickson, 2010). Estimated breeding population sizes were available for most birds in the ecoregion based on Breeding Bird Survey data. Predicted fatality rates for avian groups, as well as species of concern were compared to published annual fatality rates. Because the additional wind-energy-associated mortality was found to comprise only a small fraction of natural fatality rates, population-level impacts would not be expected for the ecoregion as a whole, but local impacts to some species could occur (Johnson and Erickson, 2010). In the only study to quantitatively assess potential population-level impacts, Hunt (2002) conducted a 4-year radio telemetry study of golden eagles at the Altamont Pass Wind Resource Area (APWRA) and found that the resident golden eagle population appeared to be self-sustaining despite high levels of fatalities, but the effect of these fatalities on eagle populations wintering within and adjacent to the APWRA was unknown. All 58 territories occupied by golden eagle pairs in the APWRA in 2000 remained active in 2005 (Hunt and Hunt, 2006). Other activities considered for the cumulative impacts analysis, such as oil and gas development, increased vehicle presence, direct habitat loss, and power lines, are expected to result in some direct impacts on raptors and other birds. Most birds using the area will come into contact with other wind facilities, increased traffic associated with energy development, and other risk factors during migration. Nevertheless, collision mortality of raptors as well as other birds associated with the proposed Facility is not expected to result in cumulative impacts through population reductions.

4.4.5.4 Cultural Resources

As directed by law, cultural resource inventories are conducted for any actions involving federal lands, and adverse effects on NRHP-eligible sites are avoided or mitigated as appropriate. Avoidance through project redesign is the preferred method of mitigation;

however, when avoidance is not feasible data recovery or other forms of mitigation are implemented prior to ground-disturbing activities. Direct impacts on all NRHP-eligible sites located in the project area that cannot be avoided would be mitigated through consultation with the SHPO and interested tribes. In addition, any previously unknown NRHP-eligible sites that may be discovered during construction activities would be mitigated in accordance with the project discovery plan. Therefore, the proposed Facility is not expected to cumulatively contribute to direct effects on NRHP-eligible sites. However, if data recovery is necessary to mitigate unavoidable adverse effects on NRHP-eligible sites, the process would recover a significant amount of data but ultimately the site would be destroyed by the undertaking. Over time, this represents a cumulative loss.

Indirect effects, such as illegal collecting of artifacts, have occurred and most likely would continue to occur in the cumulative impact analysis area through increased access, development, and increased human presence as a result of past, present and reasonably foreseeable future actions.

4.4.5.5 Land Use

Development within the cumulative impact area would make some lands unavailable for grazing. Generally, the Facility site is not incompatible with grazing, and most of the area would remain available for grazing. Projects crossing grazing allotments must be designed to avoid disruption to grazing, including avoiding permanent impacts on water facilities, fences, and other infrastructure. Dust impacts on vegetation, as stated previously, can lower palatability and cause lower weight gain and health issues. Cumulatively, these impacts would increase, but the actual effect to the livestock operation would remain low.

4.5 Residual Impacts

No additional mitigation measures beyond those included in the Proposed Action and alternatives have been identified. Consequently, no residual impacts would occur.

4.6 Unavoidable Adverse Effects

Mitigation measures would be used to avoid or minimize many of the potential adverse effects from the proposed Facility. However, unavoidable adverse effects, residual impacts that would likely remain after mitigation, would include the following:

- Consumption of fossil fuels and water and labor and materials would be expended during construction and to a much lesser extent, during operation (for example, fuel for O&M vehicles, energy to heat O&M building). This would be offset by renewable energy produced through wind rather than consumption of fossil fuel.
- Some damage to, or illegal collection of, paleontological or cultural resources could occur.
- Up to 180 hectares (446 acres) of soil and vegetation disturbance would occur during construction, resulting in some soil loss and some stream sedimentation, until surface disturbed areas are successfully reclaimed. Up to 19 hectares (47 acres) of vegetation would be lost for the life of the Facility.

- Some additional emissions of fugitive dust, sulfur dioxide, nitrogen oxides, carbon monoxide, carbon dioxide and volatile organic compounds would occur, mostly during construction of the Facility.
- Some wildlife mortality could occur.

4.7 Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources have on future generations.

Irreversible effects primarily result from use or destruction of a specific resource (for example, energy and minerals) that cannot be replaced within a reasonable time frame. An irreversible commitment of resources represents a loss of future options. It applies primarily to nonrenewable resources, such as minerals or cultural resources, and to those factors that are renewable only over long time spans, such as soil productivity.

Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (for example, extinction of a threatened or endangered species or the disturbance of a cultural site). Irretrievable commitments represent the loss of production, harvest, or use of renewable resources. These opportunities are foregone for the period of the proposed action, during which other resource utilization cannot be realized. These commitments may be reversible, but the foregone utilization opportunities are irretrievable.

CHAPTER 5

Consultation and Coordination

In developing this EA, BLM consulted with the following parties with interest in the Proposed Action or with information relevant to the analysis of the Proposed Action:

- Native American Tribes, in accordance with the American Indian Religious Freedom Act of 1978 (42 USC 1531) and National Historic Preservation Act (NHPA) (16 USC 1531)
- U.S. Department of Interior, U.S. Fish and Wildlife Service, in accordance with the Endangered Species Act Endangered Species Act of 1973, as amended, for Water Related Activities and Federal Depletions (USFWS, 2007)
- U.S. Department of Defense, in accordance with Wind Energy Protocol (U.S. Bureau of Land Management and U.S. Department of Defense, 2008)
- Wyoming State Historic Preservation Office. Wyoming Antiquities Act of 1935 and the Wyoming Environmental Quality Act of 1973.
- Coordination with the Western Area Power Administration as the NEPA Cooperating Agency for this EA.

CHAPTER 6

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Appendix A
Geotechnical Investigations

APPENDIX A

Geotechnical Investigations

Additional geotechnical site evaluations may be required to establish engineering data suitable for evaluation of potential turbine sites for finalizing the turbine layout and for use in designing turbine foundations. This appendix describes the types of geotechnical investigations that may be used.

Cone Penetration Testing

CPT is an on-site testing method used to determine the geotechnical engineering properties of soils and delineating soil stratigraphy. The test method consists of pushing an instrumented cone, tip first, into the ground at a controlled rate (usually 2 centimeters [cm]/second). The resolution of the CPT in delineating stratigraphic layers is related to the size of the cone tip, with typical cone tips having a diameter of 3.6 cm or 4.4 cm. This method allows for the collection of information on soil resistance based on movement of the cone through the soil and measurement of shear wave generation, velocity wave generation, and pore pressure dissipation testing. Shear wave generation testing will occur at each WTG site. It is anticipated that velocity shear generation testing and pore pressure dissipation testing will occur at approximately 15 percent of the WTG sites.

It is anticipated that CPT will take about two hours at each site. The tests will be performed by the CPT rig during the initial advancement of the CPT rods and cones. CPT requires a track-mounted rig, a CPT support vehicle, and a geotechnical contractor support vehicle (standard pickup truck). The track-mounted CPT rig is typically 25 feet long, 10 feet wide, and 12.5 feet in height. The CPT support vehicle is typically 8.5 feet wide, 22 feet long, and 8 feet in height. The CPT work area will be located beneath the CPT rig. An area approximately 30 feet by 30 feet will be needed to accommodate parking, foot traffic, and the testing activities.

Dilatometer Testing

The DMT is a test to measure the elasticity of the soil. DMT is conducted with a CPT rig that is fitted with a flat-plate dilatometer. A single DMT consists of pushing into the soil, to a desired depth, a flat blade located at the end of a series of drilling rods. A circular steel membrane is located on one side of the blade. At selected intervals (typically 8 inches), the steel membrane is expanded laterally into the soil. The pressures required to expand the membrane provide a direct measurement of the soil stiffness. Once the test depth is reached, the operator records two pressures (A and B pressures). The A pressure is the pressure on the blade before expansion, while the B pressure is the pressure required to produce an expansion of 1 millimeter (mm) of the membrane into the soil. The operator then deflates the membrane and records a third pressure (C pressure). This test requires 1 to 2 minutes. The blade is then advanced to the next test depth. The thrust required to advance the blade is measured using a load cell. A main benefit of the dilatometer is that it directly measures the soil stiffness. This parameter controls foundation design since almost all foundations are designed based on their potential for settlement and not bearing capacity (i.e., failure). DMT testing typically takes two hours and may or may not occur during the same trip as the CPT. DMT testing requires the same support vehicles and disturbance footprint as CPT.

Hollow-stem Auger Drilling

HSA drilling is a conventional drilling method that uses augers to penetrate the soil. As the augers are rotated, soil cuttings are conveyed to the ground surface via auger spirals. A plug prevents the soil from entering the hollow portion of the auger during the drilling. The sample is taken by retracting the plug and lowering the sample tube down the auger. For a hole that is 3.25 inches in diameter, approximately 5.5 cubic feet of spoil is produced per 60 feet of hole depth. This spoil will be backfilled into the hole and any excess will be distributed around the work area. Each HSA drilling will extend to a depth of 50 to 65 feet. HSA drilling will require a 3- to 4-hour trip to each site that is selected for testing. HSA drilling requires a truck-mounted auger, an auger rig support vehicle, and a geotechnical contractor support vehicle (standard pickup truck). The auger rig is typically 25 feet long, 8.5 feet wide, and 12.5 feet in height. The auger rig support truck is typically 25 feet long, 8.5 feet wide, and 9 feet in height. An area approximately 30 feet by 40 feet will be required to accommodate parking, foot traffic, and drilling activities.

Rock Coring

If the HSA drillings hit refusal and are unable to reach desired depths for sampling, then rock-core drilling will be required. Rock coring is performed using standard diamond drill bit equipment. Each rock barrel is fitted with a drill bit that is used for a single run. This ensures that there is minimum disruption if any particular drill bit becomes blocked during coring. Rock coring will generally extend to a depth of 30 feet or until a 10-foot core run is obtained. Samples will be removed from the core barrel and packaged for later inspection. Rock cuttings will be dispersed on the ground surface around the coring location. If rock coring is necessary, it would require a truck-mounted rotary rig, water truck, support trailer, rotary rig support truck, and geotechnical contractor support vehicle (standard pickup truck). The track-mounted rotary rig is typically 19 feet long, 7 feet wide, and 9 feet in height (25 feet high with the mast up). The water truck is typically 33 feet long, 8.5 feet wide, and 12.5 feet in height. The support trailer is typically 38 feet long, 8.5 feet wide, and 12.5 feet in height. The rotary rig support truck is typically 18 feet long, 8.5 feet wide, and 7.5 feet in height. The anticipated parking and foot traffic area for the rock coring will be approximately 40 feet by 40 feet with an additional area of 10 feet by 10 feet for the drill activities.

Test Pit Excavation

Test pit excavations allow visual observation of subsurface conditions and underground rock formations. This testing method also allows for the collection of a bulk soil sample for electrical thermal resistivity measurements. Test pit excavations will be created with a standard backhoe. Excavated soil will be returned to the pit immediately upon completion of the excavation. Excavation, sampling, and backfilling of test pits can be performed in 1 to 2 hours. Equipment that will be used for test pit excavations includes a standard rubber-tired backhoe and a geotechnical contractor support vehicle (standard pickup truck). The test pit work area typically consists of the test pit (5 feet by 5 feet) and adjacent spoil pile. The parking and foot traffic area will be approximately 25 feet by 25 feet.

Appendix B
Reclamation Plan

Reclamation Plan

Shell WindEnergy
Sand Hills Wind Energy Facility

Prepared for

U.S. Bureau of Land Management
Rawlins Field Office

December 2010

Prepared by

Shell WindEnergy, Inc.

Contents

Sand Hills Wind Energy Facility Reclamation Plan

1.0 Introduction

This Reclamation Plan has been developed to describe methods to be used to reclaim and monitor areas that will be disturbed by construction of the Sand Hills Wind Energy Facility (Sand Hills Project) by Shell WindEnergy, Inc (SWE). Reclamation of disturbed areas is necessary to control erosion and sedimentation, thereby protecting soil and water resources, to minimize impacts to adjacent land uses, and to return the disturbed areas to pre-existing vegetative cover and land uses to the extent possible. The Reclamation Plan will be implemented only in areas disturbed by the construction of the Sand Hills Project on all BLM-administered lands. Restoration and reclamation on private lands will be completed in accordance with landowner requirements. For purposes of NEPA analysis, it is assumed that reclamation activities on private lands will be similar in nature to those occurring on BLM-administered lands.

Activities required on BLM lands for construction of the wind energy facility include road and transmission line construction, wind turbine assembly and construction, electrical collection system installation, and construction of an electrical substation. Impacts at each site will involve various combinations of ground leveling, soil and vegetation removal, vegetation trampling, and soil compaction, depending on site conditions and the nature of the construction activity. The extent of alteration of the soils, vegetation, and topography will determine the appropriate reclamation response.

The Reclamation Plan describes construction clearing and grading and topsoil removal and stockpiling as they relate to the ultimate reclamation effort; erosion control measures; revegetation, including topsoil replacement, revegetation seed mixtures, and seeding methods; weed management; and reclamation monitoring and reclamation success criteria.

The Sand Hills Wind Energy Facility Reclamation Plan has been developed to generally follow the reclamation plan template provided by the BLM Rawlins Field Office (RFO) in May 2010. The Reclamation Plan addresses the reclamation goals of the 2008 RFO Resource Management Plan (Appendix 36 – Reclamation Plan) by providing for:

- Minimal disturbance of the existing environment
- Reestablishing slope and surface stability and topographic diversity
- Reconstructing and stabilizing water courses and drainage features
- Maintaining biological, chemical, and physical integrity of the topsoil and subsoil
- Stabilizing soils by establishing a native vegetative groundcover on disturbed sites during the first growing season following disturbance

- Restoring a self-sustaining native plant community or establishing an alternate vegetative regime in consultation with the BLM RFO
- Reestablishing complementary visual composition to ensure the reclaimed landscape features blend into the adjacent area and conform to the land use plan decisions, and to ensure the reclaimed landscape does not result in a long term change to the scenic quality of the area.
- Annual monitoring and control of invasive and noxious weeds beginning the first season of disturbance until success criteria listed in Section 6.2 is met
- Monitoring reclamation sites to evaluate reclamation success and plan for future reclamation efforts with annual reporting until success criteria are met (see Section 6.2).

This Reclamation Plan also addresses the individual reclamation requirements set out in the BLM's Wyoming Reclamation Policy for all surface-disturbing activities, as described in Instruction Memorandum No. WY-2009-022 issued in March 2009, and follows guidance provided in the RFO Reclamation Plan, Appendix 36 of the Rawlins RMP.

This Reclamation Plan has been developed to address reclamation of BLM-administered lands specifically. Development of the Sand Hills Project will involve land disturbance for construction of the project facilities and features on BLM-administered lands within the areas listed in Table 1 and shown in Figure 1.

TABLE 1
Location of Sand Hills Project Facilities on BLM-Administered Lands

BLM Area	Location	Feature on BLM-Administered Land	Approximate Road Length on BLM-Administered Land
1	T20N, R76W, S14	Wind turbine #19, road and collection system	1/8 mile of turbine connector road
2	T20N, R76W, S22 (under the west transmission line alternative only)	Electrical substation, collection system, and above ground transmission line	5/8 mile of new transmission line road 3/8 mile of turbine connector road
3	T20N, R76W, S26	Wind turbine #18, road, and collection system	1/2 mile of turbine connector road
4	T20N, R75W, S30	—	1 mile of new project access road
5	T20N, R75W, S32	—	1 mile of existing project access road to be widened

Where it is necessary in this Reclamation Plan to distinguish among these areas in terms of site characteristics, construction activities, or reclamation procedures, they will be referred to as BLM Area 1, BLM Area 2, etc., respectively.

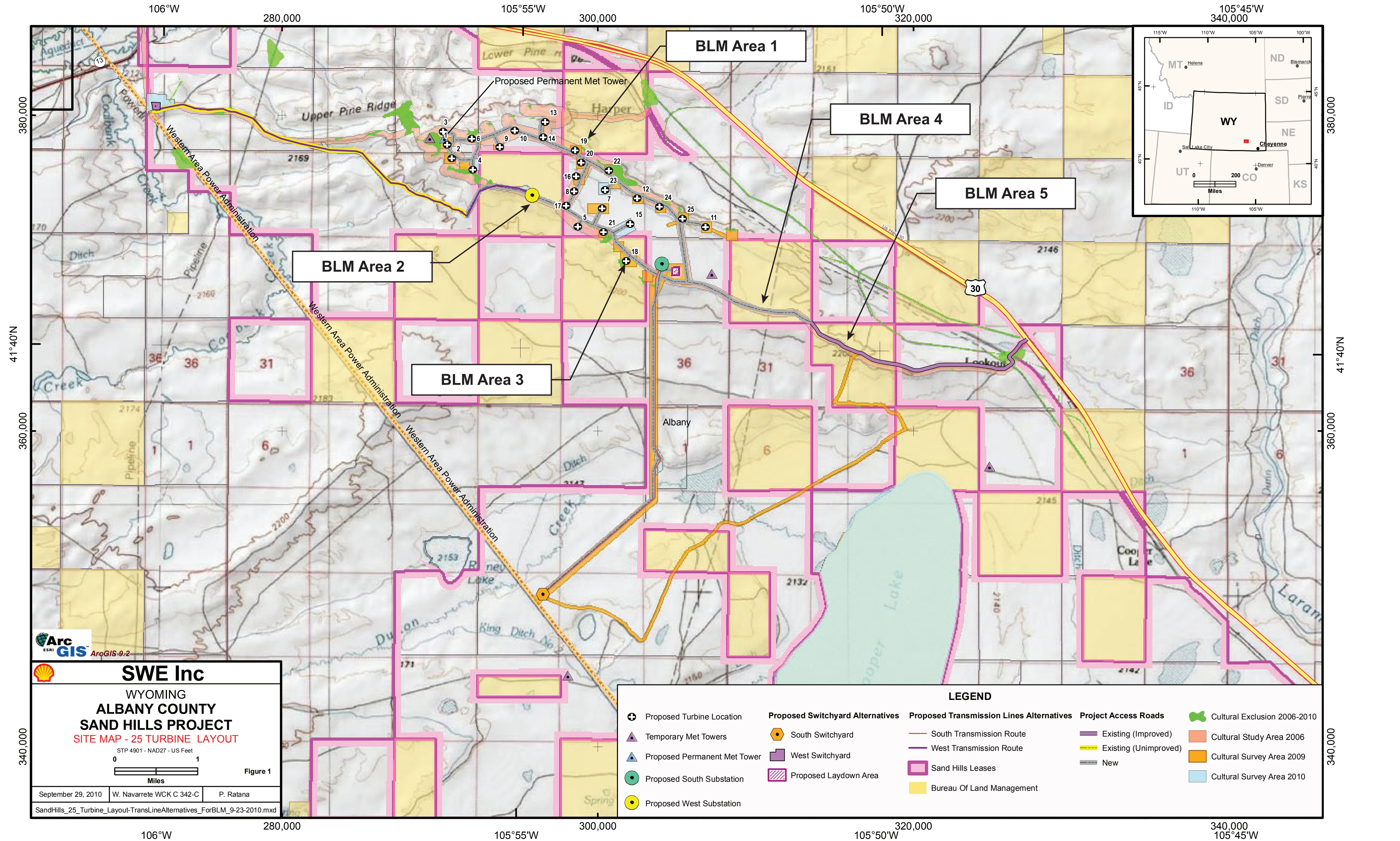

FIGURE 1
Preliminary Facility Layout
Sand Hills Wind Energy Project
Albany County, Wyoming

CH2MHILL

2.0 Pre-disturbance Site Characteristics

2.1 Site Topography

The majority of the Sand Hills Project site is located on top of a relatively flat, elongated northwest- to southeast-trending plateau. All of the wind turbine generator sites, the underground electrical collection system, the temporary laydown area, the O&M building, the west and south alternative electrical substation sites, and most of the project roads are situated on top of the plateau. The west and south alternative transmission line corridors and their associated roads also originate on top of the plateau and then traverse the sideslopes of the plateau and relatively level areas below the plateau. Virtually all of the BLM-administered lands affected by development of the Sand Hills Project are situated on the top of the plateau. The exception is where the west transmission line route begins to descend the plateau sideslope in BLM Area 2 (see Figure 1).

2.2 Soils

Soils on the surface of the plateau are shallow to very deep, well-drained, fine-loamy soils, and they are shallow-acting due to carbonate accumulation. Other physical soil properties include moderate or moderately slow permeability and medium runoff. The water erosion potential of these soils is moderate, due in part to the relatively flat topography (1 to 20 percent slope), and their susceptibility to wind erosion is high. The Ecological Site Description (ESD) for most of the top of the plateau is R034XY322WY—Loamy, as determined by the Natural Resources Conservation Service (NRCS) (http://websoilsurvey.nrcs.usda.gov/app/ WebSoilSurvey.aspx). Virtually all Sand Hills Project facilities and features on BLM-administered lands are situated within this ESD.

Soils on the sideslopes of the plateau are of varying depths and textures, mostly fine- to coarse-loamy and very-fine sandy to fine sandy loams. These soils have moderately slow to moderately rapid permeability, are generally well drained, and have slow to rapid runoff. The water erosion potential of these soils is high, due in part to slopes ranging up to 45 degrees, and their susceptibility to wind erosion is also high. The predominant ESD of the plateau sideslopes is R034XY322WY – Loamy.

All Sand Hills Project facilities and features on BLM-administered lands are situated within ESD R034XY322WY – Loamy. Representative soil features of R034XY322WY – Loamy are listed in Table 2.

TABLE 2
Representative Soil Features of Ecological Site Descriptions of the Sand Hills Project Site

Ecological Site Description	Surface Texture	Subsurface Texture	Depth to Bedrock (inches)	Soil Reaction (pH)	Electrical Conductivity (EC) (mmhos/cm)
R034XY322WY Loamy	Loam, clay loam, fine sandy loam	Loamy	20 – 60	6.6 – 8.4	0 – 8

As indicated by the ESD information in Table 2, the topsoil on BLM-administered lands affected by project construction are suitable for site reclamation and revegetation. However, in conformity with the Wyoming Reclamation Policy and as a condition of the right-of-way (ROW) grant for the Sand Hills Project, these soils will be tested prior to disturbance to determine topsoil suitability for site revegetation and/or to develop possible treatments to help ensure reclamation success.

Soils will be tested for texture, pH, electrical conductivity (EC), and organic matter, and observations of existing erosional conditions will also be recorded. If harsh conditions are demonstrated to exist (pH over 8.5, sandy or clayey textures, EC over 12 mmhos/cm, etc.), an agricultural suitability test should be performed. A minimum of one sample for each ESD occurring on BLM-administered lands on the site will be taken.

Soils will be tested at appropriate depths to characterize the vertical extent of topsoil to be stockpiled for use in reclamation. Soils will generally be tested at a depth of 4 to 6 inches to determine topsoil suitability and ESD. If soils are very shallow, samples would be taken at a shallower depth. If soils are deeper than 20 inches, another test sample will be taken at 10 to 12 inches. Sufficient soil samples will be taken at each proposed disturbance site to adequately represent the areas where topsoil is expected to be stripped and stockpiled for site reclamation. A map or maps indicating soil types and depths at disturbance sites will be developed to guide topsoil salvaging activities, and topsoil stockpiles will be signed.

Soils will be tested again after topsoil placement, but prior to reseeding (see Section 4.4).

Any areas possessing unique landscape characteristics, e.g., highly sensitive and/or erosive soils, extremely sensitive vegetation types, soils with severe physical or chemical limitations, extremely steep slopes, etc., will be identified and mapped during the course of site-specific soil tests and plant community surveys (see Section 2.3) on BLM-administered lands. If such areas are identified, whether they constitute situations having “limited reclamation potential” will be determined in consultation with the RFO, and SWE will work collaboratively with the RFO to develop appropriate site-specific reclamation measures for such areas.

2.3 Vegetation

Vegetation communities characterizing the Sand Hills Project site were evaluated through review of existing data and a site visit completed in 2009 by the BLM and habitat mapping surveys completed by Western Ecosystems Technology, Inc. in 2009. Based on the results of the site visit and habitat mapping surveys, the project site is characterized predominantly as shortgrass prairie grassland interspersed with sagebrush and bare patches of soil and rock. Approximately 20 percent of the area surveyed supports sagebrush at approximately 30 percent cover (sagebrush), 39 percent supports sagebrush at 5 to 20 percent cover (sagebrush steppe), approximately 28 percent is grassland (predominantly shortgrass prairie), and the remaining approximately 12 percent of the surveyed area supports a variety of other plant communities.

The majority of the top of the plateau, including all the BLM-administered lands affected by development of the Sand Hills Project, supports grassland/sagebrush. Threadleaf sedge (*Carex filifolia*) and mutton bluegrass (*Poa fendleriana*) are the dominant grass-like/grass species present, and shrubs include fringed sagebrush (*Artemisia frigida*), Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), gray horsebrush (*Tetradymia canescens*), winterfat (*Krascheninnikovia lanata*), bud sagewort (*Artemisia spinescens*), and mountain mahogany (*Cercocarpus montanus*). The dominant shrubs on the plateau are fringed sagebrush and winterfat.

In conformity with the guidance provided in the RFO Reclamation Plan (Appendix 36 of the Rawlins RMP) and as a condition of the ROW grant for the Sand Hills Project, existing plant communities at the proposed locations of project facilities on BLM-administered lands (listed in Table 1) will be surveyed prior to disturbance. Characterization of the existing vegetation will aid in developing reclamation seed mixtures that will result in self-sustaining plant communities that have suitable composition, function, and structure and are compatible with the local climate and soil types.

Community composition and percent cover by species will be determined for each plant community. Line intercept data will be collected, including measures of ground cover and species composition. Sufficient sampling will be conducted at each proposed disturbance site to adequately represent the area. The survey methodology will use a standardized protocol for estimating cover determined in consultation with the RFO.

Noxious or invasive weeds are not common in the proposed project area, although isolated locations of black henbane (*Hyoscyamus niger*), cheatgrass (*Bromus tectorum*), alyssum (*Alyssum desertorum*), and Canada thistle (*Cirsium arvense*) were observed. Black henbane is a noxious weed, and cheatgrass and alyssum are BLM-listed invasive species. Cheatgrass is a concern because it out-competes native grasses and increases the potential for wildland fire. Canada thistle is on the Wyoming Weed and Pest Control Act State Designated List.

Prior to surface-disturbing activities, surveys of noxious weeds and other invasive species will be conducted in accordance with the Sand Hills Wind Energy Project Weed Management Plan. Treatment of existing weeds infestations will be conducted, as determined in consultation with the RFO or other landowner, to minimize the potential for the spread of noxious weeds during construction.

2.4 Channels and Waterways

The majority of the Sand Hills Project area (the top of the plateau) is drained by a small, unnamed intermittent/ephemeral tributary to the Laramie River. This drainage crosses the northern part of BLM Area 4. The segment of new project access road that crosses the southern part of BLM Area 4 does not cross this drainage. Furthermore, construction of other project features would not affect any channels or waterways on BLM-administered lands.

2.5 Photo Reference Points

Photo reference points will be established at each turbine site and substation site located on BLM-administered land and at representative points along new roads on BLM-administered land in order to document existing conditions. Each photo reference point will be recorded via GPS and plotted on project maps. Pre-disturbance photographs will be taken at each reference point for future use in evaluating reclamation success (see Section 6.1). ESRI Shape files will be provided to the BLM with the appropriate attributes and metadata.

3.0 Surface-disturbing Activities

The Sand Hills Project will involve the construction/installation of the following project facilities:

- Up to 25 wind turbines (up to 2 on BLM-administered land)
- A project substation (1 on BLM-administered land for the west transmission line alternative only)
- A 34.5-kV electrical collection system linking each turbine to the next and to the project substation. The electrical collection lines will be located underground within the turbine connector road width
- An aerial transmission line connecting the project substation and regional transmission system
- A switchyard for interconnection of the project transmission line to the regional transmission system
- Approximately 12.5 miles (west transmission line alternative) or 15.7 miles (south transmission line alternative) of newly constructed access roads and turnaround areas (approximately 2.9 miles on BLM-administered land with the west transmission line alternative or approximately 1.8 miles with the south transmission line alternative)
- Approximately 3 miles of improved existing roads (approximately 1.1 miles on BLM-administered land)
- One permanent meteorological tower
- A construction staging/laydown area and operations and maintenance (O&M) facility within the laydown area.

Construction of these project facilities/features would result in temporary disturbance of approximately 4.85 acres of BLM-administered land for the west transmission line alternative or 4.17 acres for the south transmission line alternative. These disturbance areas would be reclaimed following construction of individual features or construction on individual sites. Construction of project facilities would also result in "permanent" disturbance of an additional approximately 15.78 acres of BLM-administered land for the west transmission line alternative or approximately 8.48 acres of BLM-administered land for the south transmission line alternative. These areas would be occupied by project features, including access/work areas and access roads needed throughout the operations period, and would be reclaimed upon project decommissioning at the end of project operation.

Surface-disturbing activities related to project construction, including clearing and grading and topsoil removal and stockpiling, are described in the following sections.

3.1 Clearing and Grading

Clearing is required to allow for support and operation of construction machinery, placement of excavated materials, and movement of construction traffic along the travel corridors during construction. Successful reclamation of temporarily disturbed areas will be enhanced by (1) careful consideration of the extent to which clearing, grading, and other disturbance of soil and vegetation is necessary to facilitate construction and (2) removing, handling, and stockpiling natural materials, namely topsoil and vegetative debris, in such a way as to protect their integrity and viability.

Clearing, grading, and other disturbance of soil and vegetation will be limited to the minimum area required for construction. Clearing of shrubs and will generally be accomplished using a bulldozer. Grading will require that topsoil be stockpiled on the temporary workspace and that affected areas be reseeded after completion of construction.

In relatively flat areas that do not require grading, clearing may only involve “scalping,” which would involve cutting shrubs near the base and leaving the root structure in the ground to minimize soil disturbance. Brush, other woody materials, and rocks cleared from such sites will be placed to one side inside the temporary workspace for the wind turbine or other facility or at temporary use areas for later use in reclamation. Following construction, the vegetative debris and rocks will be pulled back over the temporary workspace to provide soil cover, create wildlife habitat, and discourage vehicular use of the area.

Construction grading work will be phased to minimize the length of time that any disturbed soil is exposed. In general, the intention is to only expose soils for the minimum amount of time needed in areas that will be actively worked. All disturbed areas will be provided with temporary protection or permanent cover over exposed soil areas if they are not being actively graded. Temporary protection of such areas will be in the form of disc-anchored straw mulch, an erosion control blanket, or a suitable equivalent approved in consultation with the RFO or other landowner.

Silt fencing will be used as perimeter controls down-gradient of exposed soils during construction to capture suspended sediment particles on site to the extent possible. Silt fence will be used around wind turbine sites, access roads, crane paths, laydown areas, and the concrete batch plant. Silt fencing and other erosion control measures such as check dams, synthetic channel linings, or other controls, will be installed immediately following rough grading and will remain in place until sites are fine graded, revegetated, or roads are surfaced. Silt fences and other erosion and sediment controls will be inspected and repaired as needed to maintain proper functioning.

Most roads to be constructed on BLM-administered lands would be constructed at-grade with minimal excavation of existing terrain. In areas where the existing terrain is too steep to accommodate the road design requirements specified in the Sand Hills Wind Energy Project Plan of Development (POD) (for example, where the west transmission line route begins to descend the plateau sideslope in BLM Area 2), additional excavation may be required. Final locations of roads and resulting cut-and-fill volumes will be based on environmental permitting requirements, topography, and sound engineering principles.

Diagrams of a typical cross-section of the 36-foot-wide turbine connector roads and a typical road section with cut-and-fill are provided in POD Figure 6. Cut-and-fill slopes would be at a ratio of 2:1. Equipment clearance would require a minimum inside radius of 82 feet on all turns and would be graded to no more than 6 inches of rise or drop in any 50-foot length. Roadways would be graveled, as required.

During construction, ditches and culverts will be used as necessary to effectively control and disperse runoff in order to minimize erosion. Silt fences will be installed near constructed roads where they intersect existing roads to protect the ditches from sediment laden runoff. Rock riprap will be used at culvert discharge locations within the site to prevent scour erosion from occurring during high flow conditions. Drainage will be provided where roads cross or expose springs, seeps, or wet areas. Runoff collected in roadside ditches will not be discharged into erosion-prone sites.

3.2 Topsoil Removal and Stockpiling

Topsoil materials from each construction site (wind turbine sites, transmission line tower sites, electrical collection line trenches, the substation and O&M facility site, and various access roads, etc.) will be removed in conjunction with clearing and grading and will be conserved in stockpiles within the temporary workspace of each site or pushed to the side of the construction areas for reapplication following construction. At each site, this will include topsoil removed for occupation of the site by permanent project facilities, as well as topsoil removed from areas cleared and/or graded to accommodate construction activities. For linear features, such as the electrical collection line trenches and roadways, topsoil will be stockpiled along the length of such features. Stockpiles will be situated such that the topsoil does not need to be rehandled prior to its use in site reclamation.

In general, the top 4 to 6 inches of topsoil will be stockpiled for use during reclamation. If deeper soils are available, 6 to 12 inches of topsoil will be salvaged and stockpiled accordingly. Topsoil will be removed separately and kept separate from subsoils, which will be handled as described in Section 3.3. There is no intention to stockpile subsoils.

The length of time topsoil is stockpiled will be minimized to the extent practicable based on the various construction activities. Construction areas for wind turbines, transmission line towers, and the substation and O&M facility site will be reclaimed as soon as possible after construction activities have been completed at each site, so stockpiling of topsoil at these sites will be temporary. The electrical collection system trenches, which will be located adjacent to the roadbed, will be refilled with excavated subsoils (bottom of trench) and topsoil (on top) immediately after collection line placement, so stockpiling of topsoil will be a matter of a few days.

Topsoil from the permanent travelway portion of the road will be incorporated into the shoulders, cut-and-fill slopes, and other areas that are not part of the permanent road travelway and will be revegetated for storage until final project decommissioning and reclamation. Road shoulders, cut-and-fill slopes, and other areas that are not part of the permanent road travelway will be revegetated as soon as possible after road construction.

Stored topsoil materials will be protected from erosion, degradation, and contamination. If reclamation cannot take place within 6 months or if there are wind or water erosion issues, stockpiled topsoil will be planted with a suitable seed mixture to (1) maintain the biological, chemical, and physical integrity of the topsoil by preserving the viability of the existing seed bank, other plant propagules, mycorrhizal fungi, and nutrients contained in the topsoil and (2) protect the stockpiles from wind and water erosion. Stockpiles will be signed “topsoil” and will be protected from further disturbance until used. Seeding mixtures and seeding techniques for "temporary" topsoil stockpiles will be developed prior to disturbance in consultation with the RFO or other landowner.

If topsoil is stockpiled for use in final project reclamation following project decommissioning, these stockpiles will be signed "topsoil" and will be protected from further disturbance until used. Such topsoil stockpiles will be planted with a seed mixture suitable for their long-term stabilization and protection from wind and water erosion. Seeding mixtures and seeding techniques for "long-term" topsoil stockpiles will be developed prior to disturbance in consultation with the RFO. Topsoil stockpiles that will be left in place for more than 1 year must not exceed 2 feet in height.

Silt fencing will be installed around all temporary topsoil stockpiles that are within 200 feet of a surface water drainage and/or that could serve as a source of sediment discharge to surface waters. Silt fencing will also be installed around all temporary topsoil stockpiles placed on slopes greater than 5 percent and any that are over 8 feet high with slopes greater than 3:1. The silt fencing will provide adequate protection if placed 3 to 5 feet from the toe of the stockpile. Silt fences and other erosion and sediment controls will be inspected and repaired as needed to maintain working order.

Topsoil stockpiles will be included in the noxious weed management program for the Sand Hills Project, including monitoring and control of noxious weeds and other invasive plant species. Topsoil will not be handled during excessively wet conditions or at times when the ground or topsoil is frozen. Stockpiled topsoil will not be used as fill material.

3.3 Other Soil and Spoil Materials

There is no intention to stockpile excavated materials or subsoils. Excess excavated materials not used as backfill for wind turbine or transmission line tower foundations will be used on site for road or crane pad construction or distributed on previously disturbed sites. Larger excavated rocks will be disposed of offsite or crushed at the batch plant or permitted quarry for use as backfill or road material. Subsoils excavated from electrical collection system trenches will be placed separate from trench topsoils and will be replaced in the bottom of the trenches. Drill holes and test pits used for geotechnical investigations will be backfilled with excavated materials to ensure subsurface integrity, eliminate sources of ground and surface water contamination, and minimize settlement and the amount of soil displaced. Soil excavated from geotechnical test pits will be returned to the pit immediately upon completion of the excavation. Spoil from geotechnical drilling (generally less than 10 cubic feet per test hole) will be backfilled into the hole, and any excess, along with small amounts of drilling water, will be distributed around the work area. Other excess materials (soil, rocks, vegetation), excluding topsoil, developed during the construction of project facilities will be disposed of at a private, off-site facility licensed to accept such material.

Subsoil and spoil materials will not be mixed with topsoil or used in place of topsoil for reclamation.

3.4 Stabilization

Short-term Stabilization

Short-term stabilization refers to protection and treatment of disturbed project sites during construction. The goal of short-term stabilization is to stabilize disturbed areas and provide conditions necessary to achieve long-term.

Short-term stabilization includes appropriate grading and contouring of construction sites to support project facilities, protecting existing surface drainages features, designing new drainage features and/or installing drainage structures to accommodate runoff from the modified topography, implementing erosion control measures to limit the movement of disturbed soils and reduce sedimentation, limiting the time disturbed soils are exposed, and protecting surface soils during the construction process. Short-term stabilization may also include establishing a temporary vegetative or other protective cover on sites expected to experience further disturbance in the near term or where long-term stabilization cannot be accomplished until some later time. Short-term stabilization and protection of project construction sites is addressed in conjunction with associated surface-disturbing activities in Section 3.1 (clearing and grading), Section 3.2 (topsoil removal and storage), Section 3.3 (treatment of other soil and spoils materials), and Section 3.5 (treatment of project waste materials).

Long-term Stabilization

Long term stabilization refers to reclamation of disturbed project sites that will not be occupied by project facilities throughout the operations period and would generally occur once construction has been completed at any particular construction site. The goal of long-term stabilization is to facilitate eventual ecosystem reconstruction to maintain a safe and stable landscape and meet the desired outcomes of the BLM land use plan.

Long-term stabilization includes creating permanent operations work/access areas around permanent project facilities (e.g., establishing gravel pads around wind turbine towers), downsizing facility access and construction sites and project roads (including revegetating road ditches and the parts of roads that are not part of the road driving surface or required for maintenance purposes), reestablishing topography to approximate original land contours, establishing/reestablishing appropriate water course and drainage features, and establishing permanent, self-sustaining vegetative communities that are consistent with the surrounding native vegetation and have equivalent habitat values. Long-term stabilization of disturbed project sites is addressed in Section 4.1 (individual project features), Section 4.2 (reclamation schedule), Section 4.3 (grading), and Section 4.4 (revegetation [topsoil replacement, seedbed preparation, and seeding]).

Long-term stabilization also refers to final reclamation at the time of project decommissioning, including removal of project infrastructure, reclamation of areas that had been occupied by project facilities, and reclamation of any areas newly disturbed in the decommissioning process. Sand Hills Project wind turbines, transmission line towers, collector cables, and the substation and O&M facilities will be removed, and the wind turbine tower and substation foundations will be removed to a depth of 6 inches below grade or to the depth specified in the BLM ROW grant, whichever is greater. All unsalvageable materials will be disposed of at authorized sites in accordance with current laws and regulations. Wind turbine pads, crane pads, and transmission line tower pads will also be removed. At decommissioning, the RFO will determine whether project access roads are to be removed or left in place to accommodate other uses in the area. If the roads are to be removed, the road surface and bed materials will be removed down to the surrounding grade, and roadways will be regraded to original contours to the extent practical.

During decommissioning, the site will be regraded and revegetated to return its drainage characteristics to be similar to those that existed prior to construction. Site reclamation after decommissioning will be based on site-specific requirements and techniques commonly employed at the time the area is reclaimed, including regrading, replacing topsoil, and revegetating all disturbed areas with an approved seed mixture determined in consultation with the RFO or other landowner. Reclamation success would be based on the criteria described in Section 6.2.

Site Stabilization Techniques

In addition to the short-term stabilization measures described for surface-disturbing construction activities in Section 3.1 (clearing and grading), Section 3.2 (topsoil removal and storage), Section 3.3 (treatment of other soil and spoils materials), and Section 3.5 (treatment of project waste materials) and the long-term stabilization measures described for site reclamation in Section 4.1 (individual project features), Section 4.2 (reclamation schedule), Section 4.3 (grading), and Section 4.4 (revegetation [topsoil replacement, seedbed preparation, and seeding]), the following erosion control and site restoration measures will be used to accomplish short-term and/or long-term site stabilization.

Erosion Control. Erosion problems on disturbed areas will be corrected as they develop or during cleanup and subsequent revegetation/soil stabilization at the site. Soil conservation features (such as terraces, rip-rapped channels, grassed waterways, etc.) that may have been damaged by construction activities will be restored as nearly as possible to their pre-construction conditions. In areas where surface disturbance and/or slope leave the soil susceptible to water erosion, reclamation work will include creating waterbars, berms, or rock barriers where needed. In areas susceptible to wind erosion, disturbed soils will be protected with disc-anchored straw mulch, an erosion control blanket, or a suitable equivalent approved in consultation with the RFO or other landowner. Best management practices will be implemented to control erosion and sediment, including the following erosion/sediment control methods.

Channel Stabilization. As discussed in Section 2.4, no channels or waterways on BLM-lands would be crossed or otherwise affected by construction of the Sand Hills Project. Therefore, there will be not need or occasion to implement channel stabilization measures on BLM lands within the Project.

Water Diversion Structures. Water diversion structures (earthen dams) would be constructed as needed to control surface water runoff across and consequent of disturbed areas, trap sediment, and divert water away from incised channels. Waterbars would be constructed to simulate the contour lines of the slope, to drain away from disturbed areas, and to continue across linear disturbances so that water is carried to established vegetation whenever possible.

Nearly all project features to be located on BLM-administered lands at the Sand Hills Project are situated on nearly level topography on the top of the plateau. The exception is the section of the west transmission line road as it begins to descend the plateau sideslope in BLM Area 2.

Waterbars will be constructed on a site-specific basis to the size, spacing, and cross sections specified by the RFO to divert water from all disturbed areas for at least 3 to 5 years.

For projects such as this, typical waterbar spacing to control surface water runoff, based on slope, is given in Table 3.

Slope Protection. Riprap, gabions, or sandbags may be used to secure banks from erosion. Riprap may consist of large rock materials from construction. The only area on BLM-administered lands at the Sand Hills Project that may require slope protection may be the section of the west transmission line road where it begins to descend the plateau sideslope in BLM Area 2. Slope protection will be designed for the particular application required.

Mulching. Site-specific applications of mulch would be made where necessary to control erosion. Mulch would be applied on highly erodible soils and in areas with slopes greater than 15 percent, e.g., possibly where the west transmission line route begins to descend the plateau sideslope in BLM Area 2. Only mulch that has been certified to be weed free would be used. On steep slopes, hydromulching may be appropriate.

TABLE 3
Typical Waterbar Spacing Based on Slope

Slope (percent)	Water Bar Interval (feet)
Less than 1	400
1 to 5	300
5 to 15	200
15 to 25	100

Source: First Wind LLC. 2008. Plan of Development for the Milford Wind Corridor Project. Submitted to U.S. Bureau of Land Management Cedar City and Fillmore (Utah) Field Offices. October 15, 2010.

Site Restoration

Rocks. Rocks will not be permanently windrowed along the edge of disturbed areas. Rocks that were cleared during construction will be randomly placed back on the area to be reclaimed to approximate the density of surface rock on adjacent lands. Rock excavated during construction will either be used as a construction material, placed as riprap at stream or washout crossings, spread over or buried in the disturbed area, or used to construct barricades to discourage vehicular use of reclaimed areas.

Vegetative Debris. After cleanup and seeding is done, all woody and non-woody vegetative debris will be randomly scattered over the area to be reclaimed and then “walked down” with a rubber-tired tractor. Vegetation will not be permanently windrowed along the edge of disturbed areas.

Fencing. Existing improvements, such as fences, gates, and cattle guards, will be maintained and repaired during the construction phase to prevent the passage of livestock. Repair of allotment boundary fences will be coordinated with the adjacent livestock operator. Where construction has damaged or removed a natural barrier used for livestock control, a fence would be constructed in its place to the RFO or other landowner specifications.

Upon completion of construction and reclamation, damaged fences and other range improvements will be repaired or reestablished to the landowner's satisfaction.

Cleanup. During construction and following completion of reclamation, trash, debris, and other solid wastes will be removed from the reclaimed areas, temporary use areas, and ancillary facilities. All such material will be disposed of in an appropriate manner at approved facilities (see Section 3.5). No solid wastes will be buried in or along the temporary workspaces. After final cleanup, the area may be inspected by the RFO or other landowner to verify that pre-construction commitments have been satisfied.

3.5 Waste Management

Project wastes will be managed to protect soils and surface and ground water quality. Sources of contamination will be controlled, and best management practices to protect soils, surface and ground water quality implemented. Wastes generated on site will generally be removed and disposed of at proper facilities meeting federal, state, and county regulations. Only waste materials authorized in consultation with the RFO would be buried on site. Additional information on waste management is provided in the Sand Hills Wind Energy Project POD.

If groundwater is encountered during the installation of wind turbine foundations, excavations would be dewatered in accordance with the Wyoming Pollution Discharge Elimination System General Permit or under the General Permit for Temporary Discharges (if required as a result of the duration of dewatering), and construction dewatering best management practices (BMPs), including containment basins and removal of residual wastes, would be implemented.

Appropriate BMPs (silt fence, check dams, earth berms, etc.) will be installed around the downstream side of temporary concrete batch plants to control sediment and contain any concrete material and wash water. Concrete wash water will be contained within a sump or by earthen berms to prevent washout water from entering surface waters.

Small amounts of hazardous waste generated during project construction would include spent aerosol cans and other construction-related solvents. It is estimated that this waste generation would be on the order of dozens of cans and potentially several gallons of solvent waste. Hazardous wastes generated during construction will be removed and disposed of at an appropriately permitted disposal facility.

Construction equipment will be properly maintained to minimize leaks of motor oils, hydraulic fluids, and fuels. Refueling and maintenance of construction equipment and vehicles that are authorized for highway travel would be generally performed off site. Construction vehicles that are not highway-authorized would be serviced on site using specially designed vehicle maintenance trucks. Enclosed containment would be provided for petroleum wastes, and petroleum-related construction waste would be removed to a disposal facility authorized to accept such materials.

Soils believed to be contaminated by chemicals will be excavated and tested to determine whether they are hazardous wastes or exhibit hazardous characteristics. Soils found to be contaminated with hazardous materials would be disposed of as hazardous wastes. Soils contaminated with gasoline may be aerated to remove the volatile fraction and then may be disposed of as described in Section 3.3.

Non-hazardous and non-petroleum wastes, including but not limited to trash, garbage, refuse, and or human wastes, would be generated during construction. Approved enclosed refuse containers will be used throughout the Sand Hills Project, and accumulated wastes will be periodically removed from the area and recycled or disposed of at approved facilities. Portable toilets will be provided for the construction crew, and sanitary wastes will be periodically removed by a licensed hauler to an existing municipal sewage treatment facility.

Immediately following construction, all remaining waste materials, including construction wastes (lumber, wire, sheetrock, broken brick, shingles, glass, pipes, concrete, metal, plastics, filters, welding rods, equipment, and empty containers), trash and litter, garbage, other solid wastes, and petroleum products and other potentially hazardous materials, would be removed from the area and recycled or disposed of at approved facilities. Construction-related waste would be properly handled in accordance with state and federal regulations and permit requirements.

4.0 Site Preparation and Seeding

The following sections address reclamation of project sites temporarily disturbed in the process of project construction (construction reclamation), as described in Section 3.4, as well as final reclamation of the project site following removal of project facilities as part of project decommissioning.

It is estimated that construction of project facilities/features will result in temporary disturbance of approximately 2 acres of BLM-administered land. These disturbance areas will be reclaimed following project construction. The project will also result in “permanent” disturbance of an additional approximately 9 to 16 acres of BLM-administered land, depending on the transmission line alternative selected. These latter areas will be occupied by project features throughout the operations period, including work areas and access roads needed for project operation. These areas and any additional lands disturbed in the process of removing project features will be reclaimed upon project decommissioning at the end of project operation.

Treatment of temporary and permanent components of disturbance related to the various types of Sand Hills Project facilities/features is discussed in Section 4.1.

Many of the activities involved with project decommissioning are similar to those performed for project construction (see Section 3.4), and the reclamation schedule and reclamation and revegetation activities would likely be similar to those described below for construction reclamation. When the time comes for the Sand Hills Project to be decommissioned, SWE will prepare a decommissioning plan that will provide specific details as to how decommissioning and final site reclamation will be accomplished.

4.1 Individual Project Features

Wind Turbines

An approximately 491 square-foot permanent turbine pad will be constructed at each wind turbine tower to support operations and maintenance activities. These areas will be graveled to minimize water and wind erosion and will be maintained throughout the life of the Project. There are two proposed wind turbine sites on BLM-administered land at the Sand Hills Project (BLM Areas 1 and 3), for a total of approximately 0.02 acre to be maintained for project operation.

Following construction, the remainder of the 39,510 square foot work area around each wind turbine tower will be recontoured to emulate original land contours, and the site will be ripped to reduce construction-related soil compaction and revegetated as described in Section 4.3 using site-specific seed mixtures developed as described in Section 2.3. The temporary disturbance area to be reclaimed at the two wind turbine tower sites occupying BLM-administered land at the Sand Hills Project totals approximately 1.81 acres.

Roads

Approximately 28-foot-wide permanent roads will be constructed to provide access to the Project from State Highway 30/287 to the intersection at the project laydown/staging area. The eastern end of this road would be constructed by widening an existing 12-foot-wide road. The project access road would be graveled and maintained at the 28-foot-wide travel width throughout the life of the Project. There are approximately 2.19 miles of project access road on BLM-administered land at the Sand Hills Project (BLM Areas 4 and 5), for a total of approximately 5.77 acres to be permanently maintained for project operation. All disturbance related to the project access roads is accounted for as permanent, and no reclamation of these areas immediately following project construction is anticipated.

Approximately 28-foot-wide permanent roads will be constructed as turbine connector roads within the Sand Hills Project, and there would be an additional 8 feet of additional temporary ROW associated with these roads. The turbine connector roads would be graveled and maintained at the 28-foot-wide travel width throughout the life of the Project. Following construction, the 8 feet of temporary ROW would be regraded as described in Section 4.2 and revegetated as described in Section 4.3 using site-specific seed mixtures developed as described in Section 2.3. There would be approximately 1.17 miles of turbine connector roads on BLM-administered land under the west transmission line alternative (BLM Areas 1, 2, and 3), for a total of approximately 3.98 acres to be permanently occupied and approximately 1.14 acres to be reclaimed following construction, or approximately 0.79 mile of turbine connector roads on BLM-administered land under the south transmission line alternative (BLM Areas 1 and 3), for a total of approximately 2.69 acres to be permanently occupied and approximately 0.77 acre to be reclaimed following construction.

Under the west transmission line alternative (only), a 12-foot-wide transmission line road would cross BLM-administered land at the Sand Hills Project. The west transmission line road would be graveled and maintained at the 12-foot-wide travel width throughout the life of the Project. There would be approximately 0.69 mile of transmission line road on BLM-administered land under the west transmission line road (BLM Area 2), for a total of approximately 1.01 acres to be maintained for project operation. All disturbance related to the west transmission line alternative road is accounted for as permanent, and no reclamation of these areas immediately following project construction is anticipated.

Electrical Collection System

The electrical collection lines will be located underground and reclaimed as described above. There would be approximately 0.98 miles of electrical collection system on BLM-administered land under the west transmission line alternative, for a total of approximately 1.90 acres to be reclaimed following construction, or there would be approximately 0.82 mile of electrical collection system on BLM-administered land under the south transmission line alternative, for a total of approximately 1.59 acres to be reclaimed following construction.

Electrical Substation

Under the west transmission line alternative (only), an electrical substation would be situated on BLM-administered land at the Sand Hills Project (BLM Area 2). It is estimated that the substation would cover an area up to 5 acres, mostly sitting on gravel, with transformers and control building on concrete foundations. This area would be permanently maintained for project operation. All disturbance related to the electrical substation is accounted for as permanent, and no reclamation of this area immediately following project construction is anticipated.

4.2 Reclamation Schedule

The scheduling of reclamation of construction disturbance will be determined by the project construction schedule and by seasonal climatic conditions. Construction areas for wind turbines, the electrical collection system, transmission line towers, the substation and O&M facility site, and road shoulders, cut-and-fill slopes, and other areas that are not part of the permanent road travelway will be reclaimed as soon as possible after construction activities have been completed at each site. In general, disturbed areas not needed as work areas/road surfaces will be reclaimed/reseeded within 6 months of initial disturbance or during the first available window of opportunity. If weather conditions preclude revegetation activities on some areas during or immediately after the construction period, these areas will be revegetated as soon thereafter as access allows or at the next prescribed seeding season. Seeding will typically be accomplished in the spring or late fall following construction.

4.3 Grading

After construction activities are completed, final grading and installation of erosion control measures will be completed where necessary.

Proper compaction and contouring will be completed prior to topsoil placement. Trenches, depressions, or pits will be wheel-packed to avoid subsidence, and fill will be windrowed over the backfilled trench to compensate for any further settling. Backfill will not be mounded in order to avoid interrupting water distribution.

Grading will be designed to reconstruct the landscape to approximately original contours and to reestablish slope stability, surface stability, and desired topographic diversity. Unless otherwise approved, cut slopes and topographic depressions will be eliminated. These design considerations will ensure that the reclaimed landscape blends with adjacent areas and does not result in a long-term change in the scenic quality of the area.

Stream channels, drainages, drainage basin, and impoundments will be reconstructed and/or stabilized to exhibit drainage patterns, profiles, dimension, and hydrologic characteristics similar to those found in nearby, stable, naturally functioning systems. Grading will be designed to minimize sheet and rill erosion such that there is no evidence of mass wasting, head cutting, large rills or gullies, down cutting in drainages, or overall slope instability on or adjacent to the reclaimed area. Any excess stockpiled soil materials will be incorporated into the disturbed landscape.

Prior to redistribution of topsoil, soil compaction will be reduced to an appropriate depth (generally below the root zone) to accommodate the establishment of desired plant species.

4.4 Revegetation

Vegetation will be reestablished on all areas disturbed by construction, reconstruction, and maintenance activities, except for areas permanently occupied by project facilities, including road travelways. Road ditches and the parts of roads that are not part of the driving surface or required for maintenance purposes will be revegetated. Should ditches need to be regraded or should other areas be disturbed in the course of project operations and maintenance activities, such areas would be promptly reclaimed and revegetated consistent with this Reclamation Plan.

Topsoil Replacement and Seedbed Preparation

Stockpiled topsoil will be distributed over the disturbed area from which it was salvaged. Topsoils will be stockpiled as near as possible to the sites from which they have been removed and will be reapplied to those same sites, as feasible. As indicated in Section 2.2, topsoils in the project area appear to be suitable for site reclamation and revegetation and could be applied without treatment. However, should site-specific soil testing (see Section 2.2) identify any topsoils that require special treatment to optimize the potential for establishment of vegetative cover, these topsoils could be modified during or after their application by the addition of specific soil amendments to adjust soil chemistry or physical properties. Alternatively, these topsoils could be seeded with seed mixtures containing species adapted to their limiting characteristics. In no case will these soils or other soils identified as having “limited reclamation potential” (see Section 2.3) be applied in areas where “suitable” topsoils have been removed, nor will they be mixed with suitable topsoils for use in reclamation.

Spoil material will not be mixed with topsoil or used in place of topsoil for reclamation. Topsoil from undisturbed areas will not be used to cover adjacent disturbances. Topsoil will not be handled during excessively wet conditions or at times when the ground or topsoil is frozen.

Following final grading, topsoil will be applied to areas to be revegetated in order to provide suitable physical, chemical, and biological conditions to support the long-term establishment and viability of the desired plant community. A minimum of 4 inches of topsoil materials will be applied, and it will be redistributed in a manner similar to the original vertical profile, as feasible. Replaced topsoil will be left in a roughened condition to prevent erosion. Additional erosion control and soil stabilization may be required on steeper slopes, in areas of erodible soils, and in areas adjacent to or within drainage basins.

Topsoil will be scarified, tilled, or harrowed to depth of 3 to 4 inches to create a suitable seedbed for germination and establishment of the revegetation seed mixture. Furrows will be placed on contour to prevailing wind or surface water drainage. Where these methods are not practical (e.g. steep slopes, rocky areas, etc.), the site will be dozer-tracked perpendicular to the slope or otherwise left with adequate roughness following topsoil placement to provide microsites for seed germination, capture and retain available precipitation, and reduce soil movement.

Fertilizer will only be used if recommended by the RFO or other landowner. Fertilizer may be used in certain circumstances, for example on steep slopes where rapid growth is important to slope stabilization or to adjust the carbon-nitrogen ratio where mulch is placed on the right-of-way.

Seeding

Disturbed areas on BLM-administered lands will be seeded with reclamation seed mixtures developed in consultation with the RFO. The objectives of the design of the reclamation seed mixture will be to develop a desired self-perpetuating native plant community by (1) establishing species composition, diversity, structure, and total ground cover appropriate for the desired plant community and/or (2) enhancing critical resource values (e.g. wildlife, range, recreation, etc.), where appropriate, by augmenting plant community composition, diversity, and/or structure. Genetically appropriate and locally adapted native plant materials will be selected based on the site characteristics and ecological setting.

One or more reclamation seed mixtures will be developed based on the results of the site-specific plant community surveys of BLM-administered lands to be conducted prior to site disturbance (see Section 2.3). These seed mixtures will ideally comprise native species currently occurring at the site or occurring on adjacent, undisturbed sites. In conformity with the Wyoming Reclamation Policy and consistent with the guidance provided in the RFO Reclamation Plan (Appendix 36 of the Rawlins RMP), non-native species will be included only as an approved short-term and non-persistent alternative to native plant materials. Only non-native species that will not hybridize, displace, or offer long-term competition to endemic plants and that will aid in the reestablishment of native plant communities will be used.

Some standard seed mixtures containing only native species are available for the RFO, which, based on the apparent suitability of topsoils on BLM-administered lands for site reclamation and revegetation (see Section 2.2), may prove to be suitable for revegetation at the Sand Hills Project. Furthermore, based on the apparent presence of only a single ESD on BLM-administered lands within the Project (see Section 2.2), a single seed mixture may be adequate for all revegetation on BLM-administered lands at the Project.

Seeding will be done following construction in areas to be reclaimed or at the next prescribed seeding season (see Section 4.1). Seeding will be coordinated with other reclamation activities to occur as soon after seedbed preparation as possible. Seed will be purchased from a certified seed source in accordance with pure-live-seed (PLS) specifications for seed mixtures. Certified, weed-free seed will be used, and, in all cases, seed will be free of primary noxious weeds. Seeds will be used within 12 months of testing to ensure seed viability. Seed labels from each bag will be available for inspection while seeding is in progress.

Depending on site-specific conditions, either drill or broadcast methods will be used to apply seed. Drilling may be employed on level to gently sloping ground where soil texture allows drilling operations. Seeding depth will be consistent with the germination requirements of the specific seed mixture. A rangeland drill or similar device that contains disks and separate seed boxes or comparable equipment designed for fluffy seed will be used.

Broadcast seeding will be employed on steep and/or rocky areas or other areas where drill seeding is not practical or desirable and where vegetation crushing has been the primary disturbance and root structures remain. Seed will be broadcast using manually operated cyclone-type bucket spreaders, mechanical seed spreaders, blowers, hydroseeders, or rubber-tired all-terrain vehicles equipped with mechanical broadcast spreaders. Seed will be mixed frequently in the spreader hopper to discourage separation of the component seed types. Where broadcast seeding is employed, seeded areas will be raked or harrowed to cover the seed.

Suitable mulching materials or erosion control matting (erosion control blanket) will be applied to seeded areas to provide erosion protection, reduce evaporation, moderate soil temperature, and inhibit weed growth until permanent vegetative cover is established. In areas with slopes flatter than 3:1 and no significant concentrated flows (ditches, swales and similar areas around culverts), wood, straw, or bonded fiber matrix mulch will be applied. For areas with slopes steeper than 3:1 and for areas of concentrated flow, erosion control blanket (double-sided netting with coconut fiber) will be used for temporary stabilization.

5.0 Managing Invasive Species

SWE has developed a weed management plan for the Sand Hills Project (Shell Wind Energy Sand Hills Wind Energy Project Weed Management Plan, updated September 2010). One specific objective of the Weed Management Plan is to manage weeds and control weeds within disturbed areas where their growth could hinder successful reclamation.

As described in Section 5.2, weeds will be inventoried and mapped prior to the initiation of surface-disturbing activities at the Project. Weeds will be mapped in all areas of disturbance. Because there are existing weeds on site and there could possibly be more in the future due to on-going cattle ranching activities, SWE's obligation will be "containment," i.e., management of weeds that were not present in the initial weed survey.

5.1 Weed Control Measures

The Sand Hills Wind Energy Project Weed Management Plan and the site-specific best management practices included in the Sand Hills Environmental Assessment (Appendix H-2) call for the following weed control measures that may have a direct bearing on the success of project site reclamation:

- The extent of surface disturbance will be minimized when possible in order to reduce the area available for noxious and invasive weed establishment.
- Gravel and mineral materials transported to the project site will be certified weed free.
- All construction and reclamation equipment and vehicles will be cleaned of plant propagules and other plant and soil residue prior to entry into BLM lands. Construction equipment and vehicles are required to be certified weed free when arriving on the project site.
- Noxious weed seed sources that might contaminate construction or reclamation sites will be removed from adjacent sites and access routes.
- Vegetation will be reestablished on all areas disturbed by construction, reconstruction, and maintenance activities, except road travelways. Road ditches and the parts of roads that are not part of the road driving surface or required for maintenance purposes will be revegetated.
- Disturbed areas not needed as work areas/road surfaces will be reclaimed/reseeded within 6 months of initial disturbance or during the first available window of opportunity.
- Certified weed-free seed will be used during reclamation or rehabilitation of disturbed areas.
- Hay, straw, or other material used as mulch will be certified weed free.

5.2 Weed Management Plan

The Sand Hills Wind Energy Project Weed Management Plan also provides for monitoring for the presence of noxious weeds and other invasive plant species and treating weed infestations throughout all phases of the Project, including monitoring and treatment of areas to be reclaimed, areas undergoing reclamation, and reclaimed areas, as follows:

- Assessing invasive plants before initiating surface-disturbing activities. Prior to disturbance activities, weed surveys will be conducted to identify existing noxious weeds and other invasive species and their extent. As indicated in the Sand Hills Wind Energy Project Weed Management Plan:
  - Pre-construction weed inventory and mapping by a designated Weed Management Contractor who has knowledge in weed identification will take place on all pre-determined areas of disturbance on BLM lands and on potentially undisturbed areas designated for project use on BLM land.
  - All populations will be identified and carried forward in the inventory.

  - The location and extent of each weed population will be recorded via Global Positioning System (GPS) and plotted on project maps.
  - Inventories will be conducted in accordance with protocols detailed in the North American Invasive Plant Mapping Standards (NAWMA). Weed location information and treatment data will be provided as shape files to the BLM in Universal Trans Mercator (UTM) Zone 13, NAD 83. Unless otherwise agreed upon, a monitoring form will be provided by the BLM for the inventory reporting and treatment tracking.
- Coordination of the Sand Hills Wind Energy Project Weed Management Plan with the RFO Weed Management Specialist, the State Land Office representative and private landowners regarding specific treatment methods for approval on their respective properties.
- Weed management methods (prevention; personnel; equipment; integrated pest management using mechanical treatment, herbicide treatment, and/or biological control during pre-construction, construction, and post-construction periods)
- Monitoring and recordkeeping, including inventories, treatments, monitoring, and re-infestation trends.
- Report submittals, including the pre-disturbance weed inventory, management goals for invasive and noxious weeds, and the annual weed inventory and weed management report, Pesticide Application Records, and Pesticide Use Reports.

Reclamation bonds for noxious weed control will be retained until the Sand Hills Project site is returned to the desired vegetative condition.

6.0 Reclamation Monitoring and Success Evaluation

6.1 Reclamation Monitoring

Areas having undergone reclamation and revegetation activities will be monitored annually to evaluate the recovery status of restored areas, identify the need for additional reclamation, and make a final determination regarding reclamation success.

Line intercept data for each reclamation site and adjacent undisturbed natural area will be collected, including measures of ground cover and species composition. Sufficient sampling will be conducted at each site to adequately represent the area. The reclamation success monitoring methodology will use a standardized protocol for estimating cover determined prior to disturbance in consultation with the RFO.

Presence of noxious weeds and erosional features will be documented via visual inspection of each site. Treatments to address reseeding, weed control, soil stabilization, and other needs will be developed.

Seeding efforts will be monitored during the first growing season after seeding to assess initial vegetation establishment and distribution, as well as soil stability and erosion control.

Monitoring will occur annually during each successive growing season and will cease when reclamation success criteria have been satisfied (see Section 6.2).

During the First Growing Season

- Document current site conditions at the photo reference points previously established to document pre-disturbance conditions at turbine sites and representative points along linear features (see Section 2.5).
- Select representative sites for site-specific monitoring of reclaimed areas and paired adjacent undisturbed areas. Consult with the RFO regarding the selection of sites.
- Establish additional photo reference points at each reclamation monitoring site to document current conditions. Record each photo reference point via GPS. Document current site conditions.
- Monitor germination and growth of plants in the selected sites.
- Visually inspect all reclaimed areas to confirm the representativeness of the monitoring sites and to identify areas that may require additional treatment.
- Use adaptive management to correct plant establishment and growth problems.
- Visually inspect all reclaimed areas to detect problem areas warranting adaptive management (e.g., erosion, invasive weeds).
- Detect and control noxious weeds in all areas, not just selected sites. Notify the RFO prior to treatment and obtain approval.
- Correct erosion problems.
- Put up temporary fencing, where necessary, to avoid adverse effects on reclamation.

Following Each Growing Season

- Document current site conditions at photo reference points established to document pre-disturbance conditions at turbine sites and representative points along linear features (see Section 2.5) and at each reclamation monitoring site.
- Visually inspect all reclaimed areas to confirm the representativeness of the monitoring sites and identify areas that may require additional treatment.
- Review and complete a site-specific vegetation monitoring report for the selected sites and for identified problem areas. A site form indicating the data to be included in the reclamation monitoring report is provided in Table 4.
- Prepare a written, site-specific prescription for actions to be implemented, as described in Section 6.3.
- Provide monitoring results and prescriptions to the RFO.

TABLE 4
Reclamation Monitoring Reporting Data

General	General Site ID/Name
	Project Name
	Project Type
	Location (TRS, quarter/quarter section, county, state)
Disturbance	Disturbance Dates (start/end)
Reclamation	Reclamation Type (interim/final)
	Earthwork Contractor Name
	Earthwork and Topsoil Completion Date
	Soil Preparation/Ripping Depth
	Area (acres or square feet)
Seeding	Seeding Contractor Name
	Seeding Date
	Seedbed Preparation Method (disc, harrow, depths)
	Seeding Method (drill, broadcast, depths)
	Copy of Seed Tag (species %, purity %, germination %)
	Seeding Rate (pounds/acre)
	Area Seeded (acres or square feet)
Other	Soil Amendments Used (describe)
	Mulching/Erosion Netting/Tackifier
	Fenced Location
	Snow Fencing
Weeds	Type(s) of Weed Treated
	Weed Contractor Name
	Weed Contractor License Number
	Weed Treatment Date
	Weed Treatment Type (chemical, mechanical)
	Chemicals Used and Rates Applied
	Area Treated (acres or square feet and GIS extent and location)
Inspection	Inspector’s Name, Company, ID
	Inspection Date
	Time After Seeding
	Seedlings/Square Foot Growing
	% and Extent of Bare Soil
	% Ground Cover (describe)
	% Desirable Species (describe)
	% Noxious/Invasive Weeds (describe)
	Erosion Features Present? (describe)
	Evidence of Livestock Grazing? (describe)
	Reclamation Successful? (yes/no)

TABLE 4
Reclamation Monitoring Reporting Data

Reporting	Completed Spreadsheet or Database
	GIS Layer with Attribute Table with Site Data as Detailed
	Detail Disturbance Extent and Location
Monitoring	Permanent Reference Point
	Reference Photos
	Close-up Photos
Future Management Prescription	Reseeding
	Weed Control Needed
	Erosion Control Needed
	Grazing/Predation Issues
	Other Cultural or Mechanical Needs

6.2 Reclamation Success Criteria

Measures for reclamation success will include percent cover, noxious weeds, and erosion features as compared to adjacent undisturbed natural vegetation communities. Criteria may be modified based on site-specific considerations such as soil and site capabilities, composition and condition of adjacent plant communities, and potential land use.

Reclamation will be considered successful for each monitored site when all of the following conditions are met. Criteria are based on surveys of adjacent undisturbed natural ground cover and species composition conducted in the first growing season:

- Ground cover = 80 percent of adjacent undisturbed natural vegetation community
- Noxious weeds = no increase from pre-construction inventory
- Erosion = features equal to or less than adjacent undisturbed natural area.

Once a reclaimed area meets these criteria, reclamation will be considered complete and reclamation monitoring will cease. If the reclamation area is not successfully reclaimed or otherwise requires further management activities to establish vegetation, such actions will be implemented and further monitoring will continue.

Acceptable levels of revegetation success and the schedule for achieving them could vary based on revegetation seed mixture or site type. The selection of revegetation success monitoring sites and scheduling of success monitoring efforts will be determined in consultation with the RFO.

Reclamation monitoring will also assess the effectiveness of temporary and permanent erosion control structures in stabilizing disturbed areas and controlling runoff. Sites requiring remedial work will be identified, and any additional erosion control work will be performed. It is anticipated that any active erosion problems would be apparent during the first year or two following reclamation or after the first major storm or runoff event.

6.3 Reclamation Monitoring Reporting

Annual reports for the selected monitoring sites and the project area will be provided to the RFO until 5 years after the success criteria listed in Section 6.2 is achieved. Additionally, the monitoring sites will comply with additional management needs including control of weed infestations. The reports will include:

- Copies of the completed site review forms
- A summary of monitoring data and results, including:
  - Individual site data for each reclamation monitoring site
  - Photographs taken at each photo reference point
  - Sites proposed for the end of monitoring
  - Identification of sites successfully reclaimed by reclamation year.
- A written, site-specific prescription for actions to be implemented, including:
  - Reseeding
  - Soil stabilization
  - Weed control
  - Mulching/fertilization or other cultural practices prescribed for the following season.
- GIS layers (shape files) that detail locations, names, types, and extent of:
  - Unreclaimed disturbance
  - Failed or successful reclamation
  - Locations of noxious/invasive weed infestations
  - Planned vegetation treatments (i.e., mulching, matting, weed, and erosion control).

Appendix C
Biological Reports

Wildlife Baseline Studies for the Sand Hills Wind Resource Area Albany County, Wyoming

Final Report
July 2009 – September 2009

Prepared for:

CH2M Hill
9193 South Jamaica Street
Englewood, Colorado 80112

Prepared by:

Greg Johnson, Kimberly Bay, Jamey Eddy and Joel Thompson

Western **E**co**S**ystems **T**echnology**,** Inc.

2003 Central Avenue
Cheyenne, Wyoming

WEST, Inc.

October 9, 2009

EXECUTIVE SUMMARY

Shell Wind Energy has proposed a wind-energy facility in Albany County, Wyoming, near the town of Rock River. CH2MHill has contracted Western EcoSystems Technology, Inc. to conduct surveys and monitor wildlife resources in the Sand Hills Wind Resource Area to estimate the impacts of project construction and operations on wildlife. The purpose of the surveys conducted in 2009 was to supplement previous avian use surveys conducted in the Sand Hills Wind Resource Area in 2006. The following document contains results for fixed-point bird use surveys, raptor nest surveys, Bureau of Land Management sensitive wildlife and plant species surveys, bat hibernacula surveys, incidental wildlife observations, and land cover surveys. Bat acoustical surveys are currently being conducted in the study area and results will be provided once surveys are completed in mid-October, 2009.

Landownership in the study area is a mix of private, State of Wyoming, and Bureau of Land Management lands. The proposed turbine strings are located along a mesa on top of a ridge. Elevation in the study area ranges from approximately 7,100 to 7,400 feet (2,164 to 2,256 meters) above sea level. Habitat at the proposed turbine development area on top of the mesa is primarily short-grass prairie with some sagebrush-dominated grasslands at the western end of the mesa. The north slope of the mesa is dominated by mountain mahogany. There are several dry lake beds in the vicinity and small ridgelines dominated by ponderosa pine located west and north of the study area.

The principal objectives of the study were to (1) provide site specific resource and use data that would be useful in evaluating potential impacts from the proposed wind-energy facility, (2) provide information that could be used in project planning and design of the facility to minimize resource impacts, and (3) recommend further studies, if warranted.

The objective of the fixed-point bird use surveys was to estimate the seasonal, spatial, and temporal use of the study area by birds, particularly raptors. Fixed-point bird use surveys were conducted from July 31 through August 25, 2009, at 11 points established throughout the Sand Hills Wind Resource Area. A total of 55 20-minute fixed-point surveys were completed and 32 bird species were identified.

Raptor use during the summer was 0.93 birds/plot/20-minute survey. The most common raptor observed in the study area was ferruginous hawk. Passerine use in summer was 8.05 birds/plot/20-minute survey. The most common passerines were McCown’s longspurs and horned larks.

Levels of bird use varied within the study area by point. For all large bird species combined, use was highest at point nine, with 2.80 birds/20-minute survey. The mean use at point nine was due mostly to high use by raptors at this point (2.40 birds/20-minute survey). Point nine is located along a proposed transmission line route and is not within the proposed turbine development area. Use at the other points ranged from zero to 2.60 birds/20-minute survey for large bird species. Passerine use was highest at point three, with 51.4 birds/20-minute surveys, and ranged from 1.00 to 13.6 at the other points.

No obvious flyways or concentration areas were observed. No strong association with topographic features within the study area was noted for raptors or other large birds. Although some differences in bird use were detected among survey points, the differences are not large enough to suggest that any portions of the Sand Hills Wind Resource Area should be avoided when siting turbines due to very high bird use.

During the study, 23 single or groups of large birds totaling 23 individuals were observed flying during fixed-point bird use surveys. For all large bird species combined, 78.3% of birds were observed flying below the likely zone of risk, 17.4% were within the zone of risk, and 4.3% were observed flying above the zone of risk for typical turbines that could be used in the Sand Hills Wind Resource Area. Bird types most often observed flying within the turbine zone of risk were vultures (100%) and raptors (14.3%). A total of 260 passerines and other small birds in 30 groups were recorded flying within 100 meters (328 feet) of the survey points in the Sand Hills Wind Resource Area, with 100% flying below the zone of risk.

Based on the use (measure of abundance) of the study area by each species and the flight characteristics observed for that species, the ferruginous hawk had the highest probability of turbine exposure, with an exposure index of 0.04. The raptor species with the second highest exposure index was the golden eagle, which also ranked second among all species, although its exposure index was only 0.02. For passerines and other small birds, none had a measurable exposure index because all were observed flying below the zone of risk.

Based on fixed-point bird use data collected for the Sand Hills Wind Resource Area, mean summer raptor use was 0.93 raptors/plot/20-minute survey. When combined with raptor use estimates from the spring and fall of 2006, overall raptor use of the proposed wind-energy facility was estimated at 0.66 raptors/plot/20-minute survey. Raptor use of the study area was low to moderate relative to raptor use at 36 other wind-energy facilities that implemented similar protocols to the present study and had data for three or four seasons. Mean raptor use in the Sand Hills study area ranked thirteenth compared to the other facilities.

A regression analysis of raptor use and raptor collision mortality for 13 new-generation wind-energy facilities where similar methods were used to obtain raptor use estimates showed a significant (R^2 = 69.9%) correlation between raptor use and raptor collision mortality. Using this regression to predict raptor collision mortality the Sand Hills Wind Resource Area yields an estimated fatality rate of 0.10 fatalities/megawatt/year, or ten raptors per year for each 100-megawatts of wind-energy development. Based on species composition of the most common raptor fatalities at other western wind-energy facilities and species composition of raptors observed at the Sand Hills Wind Resource Area during the surveys, the majority of the fatalities of diurnal raptors will likely consist of ferruginous hawks, golden eagles and red-tailed hawks.

The data collected during this study suggest that the Sand Hills Wind Resource Area does not receive substantial use by waterfowl, shorebirds, or waterbirds during the summer. Highest use of the area is by grassland songbirds. Research concerning displacement impacts of wind-energy facilities are limited, but some show the potential for small scale displacement of 591 feet (180 meters) or less, while impacts to densities of birds at larger scales has not been shown.

The objective of the raptor nest surveys was to record raptor nests that may be subject to disturbance and/or displacement by wind-energy facility construction and/or operation. Nest locations were obtained from the Wyoming Game and Fish Department, who conducted helicopter surveys of the study area in April 2009 as part of a larger research project. Results of these surveys were supplemented by ground based surveys conducted by WEST, Inc., in August 2009. In addition, raptor nest locations in the project area were obtained from a database maintained by the Rawlins Field Office of the BLM. Seven active raptor nests were found within a 1-mile buffer of the project area during the Wyoming Game and Fish Department raptor nest surveys. Thirteen nests were recorded during surveys by WEST, Inc., and 14 were present on the BLM database. Most (11) of the nests recorded on the BLM database were very old (1978). In all cases, nests on the BLM database were not present in 2009 or had been recorded during the WGFD and WEST surveys. Using the latest survey when raptor nests were active (WGFD data) results in an active raptor nest density of 0.13 nests/mi^2. This is average in comparison to ten other WRAs evaluated in the western US, where active raptor nest density ranged from 0.03 to 0.30 nests/$mile^2$ (0.01 to 0.12 nests/$kilometer^2$) and averaged 0.15 nests/$mile^2$ (0.06 nests/$kilometer^2$).

The objective of incidental wildlife observations was to provide a record of wildlife seen outside of the standardized surveys. The most abundant large bird species recorded incidentally were Canada goose and mallards. Pronghorn and mule deer were also recorded incidentally.

No federally listed species were observed during the study. Four BLM sensitive species (ferruginous hawk, mountain plover, sage thrasher, Brewer’s sparrow) and nine Wyoming state species of concern were recorded during fixed-point surveys.

Habitats within 0.25 miles of project infrastructure were mapped. No prairie dog colonies were observed within 0.25 miles of project facilities during the field investigations. Based on this mapping effort approximately 4,442 acres (39.1%) of the project area contain sagebrush cover ranging from 5 to 20%, which may provide suitable greater sage-grouse brood rearing habitat. Another 2,318 acres (20.4%) of the area has sagebrush cover of approximately 30% which may provide suitable nesting habitat for sage-grouse. Most of the remainder of the project area is classified as shortgrass prairie, which provides habitat for mountain plovers and swift foxes.

Surveys were conducted for the presence of two BLM sensitive plants, Nelson’s milkvetch and Beaver Rim phlox, in areas mapped by the BLM as potentially suitable habitat. No individuals of either species were located during the field survey. Surveys for the Nelson’s milkvetch were conducted within the appropriate flowering/fruiting period; therefore, it can be concluded that this species is not present within the SHWRA. Because the surveys for Beaver Rim phlox were conducted outside the recommended survey window, and it is very difficult to distinguish this species from other phlox species based on vegetative characteristics alone, additional surveys for Beaver Rim phlox may be warranted in 2010 during the appropriate survey period.

The project area was evaluated for its potential to support Wyoming pocket gophers. Most of the project area is characterized by a flat plateau of shortgrass prairie considered unsuitable for this species. Some drier, rocky areas occur along steeper slopes which might be considered marginally suitable habitat for Wyoming pocket gophers. Pocket gopher mounds were observed in both of these areas. The mounds located in the grasslands on the plateau are typical of northern pocket gophers. The mounds located on the rocky slopes could potentially be either northern pocket gophers or Wyoming pocket gophers; however, if they were Wyoming pocket gophers, this would be well-outside of the known/suspected range of the species. Additionally, these steep slopes within the survey area are not proposed for disturbance. Based on the range of the species and the marginal habitat present at the site, it would be highly unlikely that Wyoming pocket gophers are present. Without capturing individuals and confirming species identification via genetic testing, however, there is no definitive way to conclude that Wyoming pocket gophers are not present in the project area.

Four swift fox surveys spaced at least seven days apart were conducted by surveying the project area beginning one hour before dark and continuing for one hour after dark using spotlights. A total of nine swift foxes were observed during the four survey periods, with potential dens also located during the surveys. The survey window for conducting mountain plover presence/absence surveys had expired prior to beginning field work for this project; nonetheless, one mountain plover was observed during the surveys as an incidental observation. In addition, during surveys conducted at the project area in 2006, six mountain plovers were observed during point count surveys and 11 groups totaling 13 individuals were observed as incidental observations. Therefore, it can be concluded that mountain plovers are present at the project area.

Surveys were conducted for the presence of potential bat hibernacula within a quarter-mile (0.40 kilometers) of proposed project infrastructure. No potential hibernacula were detected within the survey area. Two very small caves created by overlapping rock structures were observed outside the survey area that do not appear to provide suitable bat hibernacula or sites for maternal colonies, as they are much too shallow to have either an isothermal zone or dark zone. Because of this, combined with the fact that they were outside the required survey area, no additional sampling was conducted to determine if bats were using the caves.

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STUDY PARTICIPANTS

Western EcoSystems Technology

Greg Johnson	Project Manager, Senior Ecologist
Kimberly Bay	Data Analyst and Report Manager
Michelle Sonnenberg	Statistician
JR Boehrs	GIS Technician
Luke Martinson	Report Compiler
Andrea Palochak	Technical Editor
Jamey Eddy	Field Supervisor, Wildlife Biologist
Scott McConnell	Field Technician, Wildlife Biologist
Joel Thompson	Field Technician, Wildlife Biologist
Sue Komarek	Field Technician, Botanist

REPORT REFERENCE

Greg Johnson, Kimberly Bay, Jamey Eddy and Joel Thompson. 2009. Wildlife Baseline Studies for the Sand Hills Wind Resource Area, Albany County, Wyoming. Final Report: July 2009 – September 2009. Prepared by Western EcoSystems Technology, Inc., Cheyenne, Wyoming.

INTRODUCTION

Shell Wind Energy (Shell) has proposed a wind-energy facility in Albany County, Wyoming, near the town of Rock River (Figures 1 and 2). CH2MHilll contracted Western EcoSystems Technology, Inc. (WEST) to conduct surveys and monitor wildlife resources in the Sand Hills Wind Resource Area (SHWRA) to estimate the impacts of wind-energy facility construction and operations on wildlife. The purpose of the surveys conducted in 2009 was to supplement previous avian use surveys conducted in the Sand Hills Wind Resource Area in 2006 (Johnson et al. 2006).

The principal objectives of the study were to (1) provide site specific bird and bat resource and use data that would be useful in evaluating potential impacts from the proposed wind-energy facility, (2) provide information that could be used in project planning and design of the facility to minimize impacts to birds and bats, and (3) recommend further studies, if warranted. The protocols for the baseline avian use studies are similar to those used at other wind-energy facilities across the nation, and follow the guidance of the National Wind Coordinating Collaborative (Anderson et al. 1999). The protocols have been developed based on WEST's experience studying wildlife at proposed wind-energy facilities throughout the US, and were designed to help predict potential impacts to bat and bird species (particularly raptor species).

Baseline surveys at the SHWRA included fixed-point bird use surveys, raptor nest surveys, Bureau of Land Management (BLM) sensitive plant and wildlife species surveys, bat hibernacula surveys, incidental wildlife observations, and general habitat mapping. Bat acoustical surveys are currently being conducted in the study area and results will be provided once surveys are completed in mid-October 2009. In addition to site-specific data, this report presents existing information and results of studies conducted at other wind-energy facilities. The ability to estimate potential bird mortality at the proposed SHWRA is greatly enhanced by operational monitoring data collected at existing wind-energy facilities. For several wind-energy facilities, standardized data on fixed-point surveys were collected in association with standardized post-construction (operational) monitoring, allowing comparisons of bird use with bird mortality. Where possible, comparisons with regional and local studies were made.

STUDY AREA

The Sand Hills project area is located in west-central Albany County, Wyoming approximately three miles (4.8 kilometers [km]) southeast of the town of Rock River (Figure 1). Landownership is a mix of private, State of Wyoming, and Bureau of Land Management (BLM) lands. The study area included all proposed infrastructure (e.g., turbines, access roads, power lines) and an adjacent 0.25-mile (0.4 km) buffer for all resources except raptor nests, which were recorded out to a one-mile (1.6 km) buffer. The proposed turbine strings are located along a mesa on top of a ridge. Elevation in the study area ranges from approximately 7,100 to 7,400 feet (ft; 2,164 to 2,256 meters [m]) above sea level. Habitat at the proposed turbine development area on top of the mesa is primarily short-grass prairie with some sagebrush-dominated grasslands at the western end of the mesa (Table 1). The north slope of the mesa is dominated by mountain mahogany (*Cercocarpus montanus*). There are several dry lake beds in the vicinity of the

SHWRA and small ridgelines dominated by ponderosa pine (*Pinus ponderosa*) located west and north of the study area. The proposed turbine development area is located in Sections 14–16 and 21–24, Township 20N, Range 76W (Figure 1).

The proposed development will be a nominal 50-megawatt (MW) wind-energy facility that will be comprised of 2.5-MW Liberty turbines. The turbines will be mounted on a tubular steel tower extending 80 m [262 ft] above the ground. The turbine blades will be approximately 46 m (150 ft) in length, resulting in tip of blade at the highest point of 125 m (412 ft) above-ground. The likely zone of risk (ZOR) for potential collision with a turbine blade will occupy a space from approximately 34 m (112 ft) at its closest point to the ground to 125 m (412 ft) at the highest point above ground. The diameter of the circle created by the rotors (i.e., the rotor diameter) will be approximately 91 m (298 ft).

METHODS

The study at the SHWRA consisted of the following research components: 1) fixed-point bird use surveys; 2) raptor nest surveys; 3) BLM sensitive plant and wildlife surveys; 4) bat hibernacula surveys; 5) incidental wildlife observations; and 6) habitat mapping. Bat acoustical surveys are also currently being conducted through October 15, 2009, and the results will be provided in a separate report.

Fixed-Point Bird Use Surveys

The objective of the fixed-point bird use surveys was to estimate the seasonal, spatial, and temporal use of the study area by birds, particularly raptors, defined here as kites, accipiters, buteos, harriers, eagles, falcons, and owls. Fixed-point surveys (variable circular plots) were conducted using methods described by Reynolds et al. (1980). The points were selected to survey representative habitats and topography of the study area, while also providing relatively even coverage. All birds seen during each 20-minute (min) fixed-point survey were recorded.

Bird Use Survey Plots
Eleven points were selected to achieve relatively even coverage of the study area and survey representative habitats and topography within the study area (Figure 4). Each survey plot was an 800-m (2,625-ft) radius circle centered on the point.

Bird Survey Methods
All species of birds observed during fixed-point surveys were recorded. Observations of large birds beyond the 800 m radius were recorded, but were not included in the statistical analyses; for small birds observations beyond the 100-m (328-ft) radius were excluded. A unique observation number was assigned to each observation.

The date, start, and end time of the survey period, and weather information such as temperature, wind speed, wind direction, and cloud cover were recorded for each survey. Species or best possible identification, number of individuals, sex and age class (if possible), distance from point when first observed, closest distance, altitude above ground, activity (behavior), and habitat(s) were recorded for each observation. The behavior of each bird observed, and the vegetation type in which or over which the bird occurred, were recorded based on the point of first observation. Approximate flight height and flight direction at first observation were recorded to the nearest 5-m (16-ft) interval. Other information recorded about the observation included whether or not the observation was auditory only and the 10-min interval of the 20-min survey in which it was first observed.

Locations of raptors, other large birds, and species of concern seen during fixed-point bird use surveys were recorded on field maps by observation number. Flight paths and perched locations were digitized using ArcGIS 9.3. Any comments were recorded in the comments section of the data sheet. Any unusual wildlife observations were recorded on the incidental datasheets.

Observation Schedule
Sampling intensity was designed to document bird use and behavior by habitat and season within the study area. Fixed-point bird use surveys were conducted once a week from July 31 through August 25, 2009. Fixed-point surveys were conducted during daylight hours and survey periods were varied to approximately cover all daylight hours during a season. Each point was surveyed the same number of times.

Raptor Nest Surveys

The objective of the raptor nest surveys was to locate and record raptor nests that may be subject to disturbance and/or displacement effects by wind-energy facility construction and/or operation. The search for raptor, corvid, and other large bird nests included the SHWRA and an approximate one-mile buffer. The Wyoming Game and Fish Department (WGFD) conducted surveys of the SHWRA from a helicopter as part of a larger research project. The survey was conducted using one observer on April 23, 2009. Search paths were recorded with a real-time differentially corrected Trimble Trimflight III Global Positioning System (GPS) unit at 5-second intervals; coordinates were set as Universal Transverse Mercator (UTM) North American Datum (NAD) 27. The WGFD aerial raptor nest survey was scheduled after most species of raptor had finished courtship and were incubating eggs or brooding young. Surveys were also scheduled just prior to the onset of leaf-out to increase the visibility of nests within deciduous habitats. Nest searches were conducted by searching habitat suitable for most aboveground nesting species, such as cottonwood (*Populus* spp.), ponderosa pine (*Pinus ponderosa*), tall shrubs, and cliffs or rocky outcrops. During surveys, the helicopter was flown at an altitude of treetop level to approximately 250 ft (76 m) aboveground. If a nest was observed, the helicopter was moved to a position where nest status and species present could be determined. Efforts were made to minimize disturbance to breeding raptors, including keeping the helicopter a maximum distance from the nest at which the species could be identified, with distances varying depending upon nest location and wind conditions. Data recorded for each nest location included species occupying the nest, nest status (inactive, bird incubating, young present, eggs present, adult present, unknown or other), nest substrate (pine, cottonwood, juniper [*Juniperus* spp.], shrub, rocky outcrop, cliff, power line, etc.), number of young present, time and date of observation and the nest location (recorded with both a handheld Garmin GPS 12 unit and the differentially-corrected unit). Some nest sites were ground-truthed when activity was unknown (e.g., at potential cliff eyries).

To supplement the WGFD aerial surveys, ground based surveys were conducted in August 2009. The surveys were conducted after most raptor nests had become inactive. Surveys were completed by driving along accessible roads and walking areas not accessible by road and looking for raptor nest structures within areas of suitable habitat (trees, rock outcrops, etc). Global Positioning System (GPS) coordinates, as well as nesting substrate and current status, were recorded for each nest located, and nests were photographed. In addition to the field surveys, all available data on raptor nests in the project area were obtained from the BLM. The presence/absence and status of nests on the BLM database were confirmed in the field.

BLM Sensitive Wildlife Surveys

Swift Fox

Swift fox (*Vulpes velox*) are often associated with prairie dog (*Cynomys* spp.) towns, but may also occupy other areas such as shortgrass prairie. Surveys for swift fox were conducted by driving on existing roads and walking transects in those areas not accessible by vehicle within the project area. Surveys were conducted beginning one hour prior to nightfall and continued for at least one hour after nightfall using a spotlight. Four surveys were conducted, each spread apart by at least seven days, on September 4, 11, 19, and October 3, 2009.

Wyoming Pocket Gopher

A habitat site assessment was conducted to determine if there is suitable habitat or the potential for Wyoming pocket gopher (*Thomomys clusius*) to occur at the SHWRA. The habitat assessment was conducted on August 24, 2009, by a WEST biologist trained in Wyoming pocket gopher habitat assessments (Joel Thompson). All areas within a quarter-mile (0.4 km) buffer of proposed project facilities were surveyed by foot. Particular attention was placed on the perimeter of the main plateau, which contained the most likely potential habitat due to presence of rocky slopes. Photographs were taken of the general area and to document pocket gopher mound complexes within the SHWRA. The need for additional surveys was determined based on the habitat assessment.

Bat Hibernacula Surveys

Surveys for potential bat hibernacula were conducted within a quarter-mile of the proposed project facilities. The surveys were conducted on foot with observers searching likely areas for caves or rock crevices large enough to potentially host hibernating bats or maternal colonies. Additionally, the potential for any abandoned mines was investigated within the study area. When a potential hibernacula site was identified, surveyors took photographs, recorded detailed notes and UTM coordinates, and investigated the entrance for any potential bat sign. Surveyors did not enter into caves or abandoned mines.

Incidental Wildlife Observations

The objective of incidental wildlife observations was to provide a record of wildlife seen outside of the standardized surveys. All raptors, unusual or unique birds, sensitive species, mammals, reptiles, and amphibians were recorded in a similar fashion to standardized surveys. The observation number, date, time, species, number of individuals, sex/age class, distance from observer, activity, height above ground (for bird species), habitat, and, in the case of sensitive species, the location was recorded by GPS coordinates.

Habitat Mapping

Habitat layers were obtained from the Wyoming GAP analysis project and plotted on a map of the project area. All areas within a quarter-mile (0.40 km) of SHWRA facilities (roads, transmission lines, wind turbines, etc.) were covered by foot and vehicle and habitat types were confirmed and mapped on and aerial photograph. Habitat maps included any prairie dog towns, suitable greater sage-grouse (*Centrocercus urophasianus*) nesting and brood-rearing habitat, and suitable habitat for BLM sensitive species. These polygons were then digitized and plotted on a map of the study area.

BLM Sensitive Plant Surveys

Focused surveys were conducted for BLM sensitive plants (Beaver Rim phlox [*Phlox pungens*] and Nelson’s milkvetch [*Astragalus nelsonianus*]) in all areas of potential habitat identified by the BLM within a quarter-mile of proposed SHWRA infrastructure. The surveys were conducted on July 30-31 and August 1, 2009, by a qualified botanist. Meandering pedestrian surveys were conducted to visually inspect the survey areas for the species. Populations of Beaver Rim phlox or Nelson’s milkvetch or suspected populations that were found were photographed and mapped using a GPS. While surveys for Nelson’s milkvetch were conducted within the recommended time frame to detect flowering/fruiting individuals, surveys for Beaver Rim phlox occurred outside of the suggested flowering/fruiting (May to June) time periods. Additional emphasis was put on indentifying vegetative characteristics that distinguish the Beaver Rim phlox from other phlox species.

Statistical Analysis

Quality Assurance and Quality Control
Quality assurance and quality control (QA/QC) measures were implemented at all stages of the study, including in the field, during data entry and analysis, and report writing. Following field surveys, observers were responsible for inspecting data forms for completeness, accuracy, and legibility. A sample of records from an electronic database was compared to the raw data forms and any errors detected were corrected. Irregular codes or data suspected as questionable were discussed with the observer and/or project manager. Errors, omissions, or problems identified in later stages of analysis were traced back to the raw data forms, and appropriate changes in all steps were made.

Data Compilation and Storage
A Microsoft® ACCESS database was developed to store, organize, and retrieve survey data. Data were keyed into the electronic database using a pre-defined format to facilitate subsequent QA/QC and data analysis. All data forms, field notebooks, and electronic data files were retained for reference.

Fixed-Point Bird Use Surveys

Bird Diversity and Species Richness

Bird diversity was illustrated by the total number of unique species observed. Species lists, with the number of observations and the number of groups, were generated by season, including all observations of birds detected regardless of their distance from the observer. Species richness was calculated as the mean number of species observed per plot per survey (i.e., number of species/plot/20-min survey). Species diversity and richness were compared between seasons for fixed-point bird use surveys.

Bird Use, Composition, and Frequency of Occurrence

For the standardized fixed-point bird use estimates, only observations of large birds detected within the 800-m radius plot were used; small birds observations were limited to 100 m. Estimates of mean bird use (i.e., number of birds/plot/20-min survey) were used to compare differences between bird types, seasons, and other wind-energy facilities.

The frequency of occurrence was calculated as the percent of surveys in which a particular bird type or species was observed. Percent composition was calculated as the proportion of the overall mean use for a particular species/bird type. Frequency of occurrence and percent composition provide relative estimates of species exposure to the proposed wind-energy facility. For example, a particular species might have high use estimates for the study area based on just a few observations of large flocks; however, the frequency of occurrence would indicate that it only occurred during a few of the surveys, therefore making it less likely to be affected by the wind-energy facility.

Bird Flight Height and Behavior

To calculate potential risk to bird species, the first flight height recorded was used to estimate the percentages of birds flying within the likely ZOR for collision with turbine blades. For the purposes of analysis, a ZOR of 35 m to 130 m above ground level (AGL) was used, which is the blade height of typical turbines.

Bird Exposure Index

A relative index of collision exposure (R) was calculated for bird species observed during the fixed-point bird use surveys using the following formula:

$$R = A*P_f*P_t$$

Where A equals mean relative use for species *i* (large bird observations within 800 m of the observer or 100 m for small birds) averaged across all surveys, P_f equals the proportion of all observations of species *i* where activity was recorded as flying (an index to the approximate percentage of time species *i* spends flying during the daylight period), and P_t equals the proportion of all initial flight height observations of species *i* within the likely ZOR.

Spatial Use

Data were analyzed by comparing use among plots. Mapped flight paths were qualitatively compared to study area features such as topographic features. The objective of mapping observed bird locations and flight paths was to look for areas of concentrated use by raptors and other large birds and/or consistent flight patterns within the study area. This information can be useful in turbine layout design or adjustments of individual turbines for micro-siting.

RESULTS

Fixed-Point Bird Use Surveys

A total of 55 20-minute fixed-point surveys were conducted at the SHWRA (Table 2). Two different viewsheds were utilized when calculating the different statistics; species richness, use, percent composition, percent frequency, and exposure index; 800 m for large birds and 100 m for small birds.

Bird Diversity and Species Richness
Thirty-two unique species were observed over the course of all fixed-point bird use surveys, with a mean number of 0.82 large bird species/plot/20-min survey and 1.2 small species/100-m plot/20-min survey (Table 2). A total of 706 individual bird observations within 222 separate groups were recorded during the fixed-point surveys (Table 3). For all species combined, one species (3.1% of all species) composed over half (58.2%) of the observations: McCown's longspur (*Calcarius mccownii*; 411 observations). Only two other species composed at least 5.0% of the observations: horned lark (*Eremophila alpestris*; 11.5% of the observations) and ferruginous hawk (*Buteo regalis*; 8.5% of the observations). The most abundant large bird species was ferruginous hawk (54 groups, 60 observations). A total of 102 individual raptors were recorded within the SHWRA, representing seven species (Table 3).

Bird Use, Composition, and Frequency of Occurrence by Season
Mean bird use, percent composition, and frequency of occurrence were calculated (Tables 4a and 4b). The overall large bird use in the summer was 1.20 birds/plot/20-min survey (Table 4a). For small birds, the overall use in the summer was 8.07 birds/plot/20-min survey (Table 4b).

<u>Waterbirds/Waterfowl</u>
No waterbirds or waterfowl were observed within the 800-m radius of plots while conducting summer surveys. One group of eight American white pelicans (*Pelecanus erythrorhyncos*) and single observations of great blue heron (*Ardea herodias*) and sandhill crane (*Grus canadensis*) were observed beyond the 800-m plot radius, but were not included in the statistical analyses.

<u>Shorebirds</u>
Shorebird use in summer was 0.04 birds/plot/20-min survey (Table 4a). Shorebirds comprised 3.0% of the overall bird use, and were observed during 3.6% of the surveys in the summer. The only shorebird species observed was upland sandpiper.

<u>Raptors</u>
Raptor use in the summer was 0.93 birds/plot/20-min survey (Table 4a). The most common raptors observed were ferruginous hawk (0.49 birds/plot/20-min survey), American kestrel (*Falco sparverius*; 0.15), and red-tailed hawk (*Buteo jamaicensis;* 0.11). Raptors comprised

77.3% of the overall large bird use in the summer, and were observed during 50.9% of the surveys (Table 4a).

Vultures

Use by vultures consisted of turkey vulture (*Cathartes aura*) in the summer. Vultures had a use of 0.02 birds/plot/20-min survey (Table 4a). Vultures comprised 1.5% of the overall bird use and were observed in 1.8% of the summer surveys.

Large Corvids

Large corvids consisted of black-billed magpie (*Pica pica*) and common raven (*Corvus corax*). Use by large corvids in the summer was 0.20 birds/plot/20-min survey (Table 4a). Large corvids comprised 16.7% of the overall bird use and were observed in 9.1% of summer surveys.

Passerines

A 100 m viewshed was used for small birds; therefore, use by small birds is not directly comparable to that by large birds, which were recorded out to 800 m. Passerine use in summer was 8.05 birds/plot/20-min survey (Table 4b). McCown's longspur was the most abundant passerine (6.16 birds/plot/20-min survey), followed by horned lark (0.91) and vesper sparrow (*Pooecetes gramineus*; 0.31). Passerines were observed during 70.9% of the surveys in summer (Table 4b).

Bird Flight Height and Behavior

Flight height characteristics were estimated for both bird types and bird species (Tables 5 and 6). For large bird species, 23 single birds or groups totaling 23 individuals were observed flying within the 800 m plot (Table 5). Overall, 17.7% of large birds observed flying were recorded within the ZOR for collision with turbine blades of 35 to 135 m (114 – 427 ft) AGL, 78.3% were below the ZOR, and 4.3% were above the ZOR (Table 5). The majority (81.0%) of flying raptors were observed below the ZOR, 14.3% were within the ZOR, and only 4.8% were above the ZOR. Vultures were observed within the ZOR 100.0% of the time, while large corvids were observed below the ZOR 100.0% of the time; however, these values are based on single observations. Raptors had the second highest percentage of birds within the ZOR, primarily due to 33.3% of eagle observations recorded at this height.

Of all large bird species, only three species were observed flying within the ZOR. For ferruginous hawk (nine observed), 22.2% were observed flying within the ZOR. For golden eagle (*Aquila chrysaetos*; three observed), 33.3% were observed flying within the ZOR, and the one turkey vulture observed during the study was flying within the ZOR (Table 6a). No groups of passerines or other small bird species were observed flying within the ZOR (Table 6b).

Bird Exposure Index

A relative exposure index was calculated for each bird species (Tables 6a and 6b). This index is based on initial flight height observations and relative abundance (defined as the use estimate) and does not account for other possible collision risk factors such as foraging or courtship behavior. Ferruginous hawk had the highest exposure index with 0.04. Golden eagles and turkey vultures were the only other large bird with a measurable exposure index (0.02; Table 6a).

Because no passerines were observed flying within the ZOR, no passerine species had a measurable exposure index (Table 6b).

Spatial Use

For all large bird species combined, use was highest at point nine (2.80 birds/20-min survey). Bird use at other points ranged from zero to 2.60 birds/20-min survey (Figure 5). The high mean use estimate for point nine was largely due to high raptor use at this point (2.40 birds/20-min survey). Point nine is located along a transmission line route at the south end of the SHWRA and is not located near any proposed wind turbine locations. Raptor use at other points ranged from zero to 1.80 birds/20-min survey. Shorebird use was only recorded at points three and seven (0.20 birds/20-min survey). Vultures were only seen at point two (0.20 birds/20-min survey). Passerine use was highest at point three (51.4 birds/20-min survey), and ranged from 1.0 to 13.6 at other points. Flight paths for waterbirds, waterfowl, shorebirds, raptors, and vultures were digitized and mapped (Figures 6a-d). No obvious flyways or concentration areas were observed for any species. The available data do not indicate that any portions of the study area warrant being excluded from turbine development due to very high bird use.

Sensitive Species Observations

No federally listed species were observed during the study. Four BLM sensitive species (ferruginous hawk, mountain plover [*Charadrius montanus*], sage thrasher [*Oreoscoptes montanus*], Brewer's sparrow) and nine Wyoming state species of concern were recorded during fixed-point surveys (Table 7). Only WGFD Native Species Status (NSS) 3 and NSS4 species were observed during the fixed-point surveys; these species are generally of lower concern than those ranked NSS1 or NSS2.

Raptor Nest Surveys

Raptor nest data were compiled from three sources: WGFD 2009 aerial surveys, WEST 2009 ground surveys, and the BLM raptor nest database (Figure 7). Active raptor nest density of the survey area and a 1-mile buffer surrounding the area, based off the WGFD survey results, was 0.13 nests/mi^2 (Table 8). Only the WGFD data were used to calculate active raptor nest density as the surveys conducted by WEST in 2009 occurred after most raptors had completed breeding (August 2009). Based on the WGFD data, two active ferruginous hawk nests, one active golden eagle nest, three active prairie falcon (*Falco mexicanus*) nests, and one active red-tailed hawk nest were found within the 1-mile buffer around the project area. Further surveys by WEST found six ferruginous hawk nests, one golden eagle nest, three prairie falcon nests, one red-tailed hawk nest, and two unidentified raptor nests. Although the survey was conducted after the nesting period, an attempt was made to classify the species as well as nest status based on sign at the nest and the status of each nest during the surveys conducted in 2006 (Johnson et al. 2006). The BLM database contained four ferruginous hawk nests, two golden eagle nests, three prairie falcon nests, four red-tailed hawk nests, and one Swainson's hawk (*Buteo swainsoni*) nests. Most (11) of the nests recorded on the BLM database were very old (1978). In all cases, nests on the BLM database were not present in 2009 or had been recorded during the WGFD and/or WEST surveys.

BLM Sensitive Wildlife Surveys

Wyoming Pocket Gopher Habitat Assessment

The SHWRA is characterized by a flat plateau of shortgrass prairie (Figure 8 – Photograph 1) with steeper slopes (Figure 8 – Photograph 2) tapering off to more shortgrass prairie mixed with sagebrush (*Artemesia* spp.) in the valleys (Figure 8 – Photograph 3). Along the steeper slopes, there are drier, rocky areas which might be considered marginally suitable habitat for Wyoming pocket gophers (Figure 8 – Photograph 2), although they still seem to have fairly deep soils. Numerous pocket gopher mounds were documented on the plateau area (Figure 8 – Photograph 1), as well as along the rocky slopes (Figure 8 – Photograph 4 and 5). The mounds located in the grasslands on the plateau are typical of northern pocket gophers (*Thomomys talpoides*). The mounds located on the rocky slopes could potentially be either northern pocket gophers or Wyoming pocket gophers; however, if they were Wyoming pocket gophers, this would be well-outside of the known/suspected range of the species south of Rawlins, Wyoming. Additionally, these steep slopes within the survey area are not proposed for disturbance.

Based on the range of the species and the marginal habitat present in the site, it would be highly unlikely that Wyoming pocket gophers are present at the site. Without capturing individuals and confirming species identification via genetic testing, however, there is no definitive way to conclude that Wyoming pocket gophers are not present at the SHWRA.

Swift Fox

A total of nine swift foxes were observed during the four survey periods, including three individuals observed on September 11, two individuals observed on September 19, and four individuals observed on October 3, 2009. Two of the individuals observed on October 3 were visiting a pronghorn carcass. Based on the survey information, swift fox presence within the SHWRA has been confirmed. Four of the nine individuals were found on the edge of the mesa within the project area, one individual was observed slightly north of the 0.25-mile buffer surrounding project facilities, while the remaining four were sighted in the eastern portion of the project area north of Copper Lake (Figure 9).

Mountain Plover

The survey window for conducting mountain plover presence/absence surveys had expired prior to beginning field work for this project. Nonetheless, one mountain plover was observed during the surveys as an incidental observation. In addition, during surveys conducted at the SHWRA in 2006, six mountain plovers were observed during point count surveys and 11 groups totaling 13 individuals were observed as incidental observations (Johnson et al. 2006). Therefore, it can be concluded that mountain plovers are present at the SHWRA.

Bat Hibernacula Surveys

Two potential bat hibernacula sites were located just outside of the 0.25-mile buffer survey area (Figure 10). The two sites were very small caves created by overlapping rock structures. Photographs of the caves were taken to document the sites, and GPS coordinates were recorded (Figure 11). Caves and mine shafts may provide important habitat for bat maternal colonies and may also be important hibernacula. However, for a shaft or cave to serve as bat habitat it should have a dark zone. Caves or shafts used as hibernacula also must have an isothermal zone (nonfluctuating annual temperature). Generally speaking, if it is possible to see the bottom or end of the cave, it will not be used by bats, and shafts or caves over 100 ft in depth are preferred habitat. The small caves observed near the project area do not exhibit any of these characteristics, as they are much too shallow to have either an isothermal zone or dark zone. Because of this, combined with the fact that they were outside the required survey area, no additional sampling was conducted to determine if bats were using the caves. Bat acoustical surveys currently being conducted will provide data to evaluate the risk to bats potentially using these or other nearby hibernacula.

Incidental Wildlife Observations

A total of 16 bird species were observed incidentally, totaling 595 birds within 18 separate groups, during the study (Table 9). Two mammal species were also observed incidentally at the SHWRA.

Bird Observations

The most abundant bird species recorded as incidental wildlife observations were Canada goose (*Branta canadensis*; 150 individuals) and mallards (*Anas platyrhynchos*; 150 individuals). Fifteen of the 16 species recorded were only observed during incidental observations (Table 9). Only ferruginous hawk was recorded during both fixed-point bird use surveys and incidental observations.

Mammal Observations

Twenty-seven groups totaling 283 pronghorn (*Antilocapra americana*) and two mule deer (*Odocoileus hemionus*) in one group were observed incidentally at the SHWRA (Table 9).

Sensitive Species Observations

In addition to sensitive species recorded during avian use surveys, BLM sensitive species observed during incidental observations included one group of two ferruginous hawks (also a WGFD NSS3 species) and one single mountain plover (also a WGFD NSS4 species). Other species observed incidentally with WGFD sensitive species status included single lesser scaup (*Aythya affinis*) and peregrine falcon as well as one group of four northern pintails (*Anas acuta*), all of which are classified as NSS3 (Table 8). No greater sage-grouse were observed during surveys. Pellet count surveys were conducted within the proposed turbine development area in the spring and fall of both 2007 and 2008 (Johnson and Martinson 2009). No greater sage-grouse pellets were found. Based on results of those surveys, the presence of important sage grouse nesting/brood rearing and winter habitat is suspected to be low.

Habitat Mapping

No prairie dog colonies were observed within 0.25 miles of project facilities during the field investigations. Major community types present on the SHWRA are discussed below (Table 1; Figure 3).

Sagebrush steppe communities are the dominant cover type within the survey area. Approximately 4,442 acres (39.1%) of the survey area is covered in sagebrush steppe. Sagebrush steppe communities have sagebrush coverage ranging from approximately 5% to 20% cover, with Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) being the dominant shrub. Areas designated as sagebrush steppe communities do not typically provide enough sagebrush cover to be used as nesting habitat for greater sage-grouse, but are potentially used by greater-sage grouse as brood rearing habitat.

Sagebrush communities within the survey area commonly bordered the sagebrush steppe communities. The sagebrush communities can be differentiated from the steppe community type by a higher percentage of big sagebrush cover. Sagebrush cover within this land use type is approximately 30%. A total of 2,318 acres (20.4%) of the sagebrush cover type is present within the SHWRA. Sagebrush communities provide potential nesting habitat for greater-sage grouse. One area dominated by greasewood (*Sarcobatus vermiculatus*) covered 295 acres (2.6%) and one area of mountain mahogany containing 141 acres (1.2%) was also present in the survey area.

Grasslands communities can be characterized as a mix of native grasses and crested wheat grass (*Agropyron cristatum*), with a small representation (<5% cover) of big sagebrush and weedy species. Many of the grassland sections are expansive areas of unbroken shortgrass prairie. This cover type is present over 3,225 acres (28.4%) of the SHWRA. Grassland areas provide potential suitable habitat for mountain plovers and swift foxes.

Other community types present within the survey area are wetlands (2.4% of survey area) and riparian areas dominated by cottonwoods (*Populus* spp.) and willow (*Salix* spp.; 0.4%). Other "wet" land use types were noted (open water, playa wetland, and canal) in negligible amounts. These community types tend to support a greater diversity of vegetation and wildlife species due to the increased hydrologic conditions. Areas associated with elevations changes were also noted during the field survey. These areas include escarpment (1.3% of the survey area), stony knolls (2.0%), and cushion plant communities (1.5%). These cover types have varied vegetation including grasses, forbs, and woody species.

BLM Sensitive Plant Surveys

One area of potential habitat for Beaver Rim phlox and one area of potential habitat for Nelson's milkvetch have been identified and mapped by the BLM in the SHWRA (Figure 12). The area identified for the Beaver Rim phlox was located along a linear waterbody. The area identified for Nelson's milkvetch was located along a ridgeline. No populations of either species were located during the field survey. Surveys for the Nelson's milkvetch were conducted within the appropriate flowering/fruiting period; therefore, it can be concluded that this species is not present within the SHWRA. Because the surveys for Beaver Rim phlox were conducted outside the recommended survey window, and it was not possible to distinguish this species from other phlox species based on vegetative characteristics alone, additional surveys for Beaver Rim phlox may be warranted in 2010 during the appropriate survey period if direct disturbance is proposed for the area of potential habitat.

DISCUSSION AND IMPACT ASSESSMENT

Bird Impacts

Direct Effects
The most probable direct impact to birds from wind-energy facilities is direct mortality or injury due to collisions with turbines or guy wires of meteorological (met) towers. Collisions may occur with resident birds foraging and flying within the study area or with migrant birds seasonally moving through the study area. Project construction could affect birds through loss of habitat, or potential fatalities from construction equipment. Impacts from the decommissioning of the facility are anticipated to be similar to construction in terms of noise, disturbance, and equipment. Potential mortality from construction equipment is expected to be very low. Equipment used in wind-energy facility construction generally moves at slow rates or is stationary for long periods (e.g., cranes). The risk of direct mortality to birds from construction is most likely potential destruction of a nest for ground- and shrub-nesting species during initial site clearing.

At 15 modern facilities in the western US (West) where raptor fatality estimates are available, raptor fatality rates have ranged from 0 to 0.87/MW/year, and averaged 0.16/MW/year (Johnson and Stephens 2010). The two facilities with the highest raptor fatality rates (0.87 and 0.53/MW/year) are in California. Of the 13 facilities located outside California, raptor fatality rates have ranged from 0 to 0.15, and averaged 0.07/MW/year, or approximately seven raptors for each 100 MW of development. These facilities include nine located in Washington and Oregon, and one each in Montana, Wyoming, Nebraska, Oklahoma, and Texas.

Mortality estimates for all bird species combined are publicly available for 18 wind energy facilities in the West (Johnson and Stephens 2010). Bird fatality rates have ranged from 0.08 – 4.29/MW/year, and averaged 1.90/MW/year. Avian mortality in the West is lower than the national average. Using mortality data from a 10-year period from wind-energy facilities throughout the entire U.S., the average number of bird collision fatalities is 3.1/MW/year, or 2.3/turbine/year (NWCC 2004). Based on data from 18 fatality monitoring studies conducted in the western US at modern wind energy facilities, where 1,137 avian fatalities representing 124 species were reported, raptor fatalities comprised 20.0% of the identified fatalities. The most common raptor fatalities were American kestrel (81 fatalities), red-tailed hawk (45), turkey vulture (42), and burrowing owl (*Athene cunicularia*; 13). Passerines were the most common collision victims, comprising 59.8% of the fatalities, with horned lark (258 fatalities), western meadowlark (*Sturnella neglecta*; 45), and golden-crowned kinglet (*Regulus satrapa*; 43) being found as fatalities the most often. Upland gamebirds were the third most common group found, comprising 10.1% of the fatalities. Ring-necked pheasant (*Phasianus colchicus*; 45 fatalities), gray partridge (*Perdix perdix*; 35) and chukar (*Alectoris chukar*; 18) were the most common fatalities found. Mourning doves (*Zenaida macroura*; 27 fatalities) and rock pigeons (*Columba livia*; 16) comprised 3.9%. Waterbirds such as American coot (*Fulica americana*; eight fatalities) and eared grebe (*Podiceps nigricollis*; five) were relatively uncommon, representing 3.1% of all fatalities. Waterfowl, primarily mallard (six fatalities) were also infrequently found (1.3% of all fatalities). Only two shorebirds (0.2% of all fatalities) were found. Other groups, such as nightjars, woodpeckers, and swifts combined accounted for 1.8% of all fatalities. Birds that could not be identified to any avian group comprised 2.1% of all reported fatalities.

Although collision mortality is well documented at most wind-energy facilities, population level effects have not been detected, although few studies have addressed this issue. According to The Wildlife Society (TWS 2007), available data from wind-energy facilities suggest that fatalities of passerines from turbine strikes generally are not significant at the population level, although exceptions to this could occur if facilities are sited in areas where rare species are concentrated. Johnson and Erickson (2008) examined the potential for population level impacts caused by avian collision mortality associated with 6,700 MW of existing and proposed wind-energy development in the Columbia Plateau Ecoregion of eastern Oregon and Washington. The number and species composition of bird collision fatalities was estimated based on results of 11 existing mortality studies in the Ecoregion. Estimated breeding population sizes were available for most birds in the Ecoregion based on Breeding Bird Survey (BBS) data. Predicted mortality rates for avian groups as well as species of concern were compared to published annual mortality rates. Because the additional wind-energy associated mortality was found to comprise only a small fraction of existing mortality rates, it was concluded that population level impacts would not be expected for the Ecoregion as a whole, but that local impacts to some species could occur. In the only study to quantitatively assess potential population level impacts, Hunt (2002) conducted a 4-year radio telemetry study of golden eagles at the Altamont Pass Wind Resource Area (APWRA) in California and found that the resident golden eagle population appeared to be self sustaining despite sustaining high levels of fatalities, but the effect of these fatalities on eagle populations wintering within and adjacent to the APWRA was unknown. Additional research conducted in 2005 by Hunt and Hunt (2006) found that all 58 territories occupied by golden eagle pairs in the APWRA in 2000 remained active in 2005.

<u>Raptor Use and Exposure Risk</u>

Mean raptor use at the SHWRA based on surveys conducted in the spring and fall of 2006 (see Johnson et al. 2006) and the summer of 2009 (0.66 raptors/plot/20-min survey) was compared with other wind-energy facilities that implemented similar protocols and had data for three or four seasons. Similar studies were conducted at 36 other wind-energy facilities. The annual mean raptor use at these wind-energy facilities ranged from 0.09 to 2.34 raptors/plot/20-min survey (Figure 13). Based on the results from these wind-energy facilities, a ranking of seasonal raptor mean use was developed as: low (0 – 0.5 raptors/plot/20-min survey); low to moderate (0.5 – 1.0); moderate (1.0 – 2.0); high (2.0 – 3.0); and very high (> 3.0). Under this ranking, mean raptor use (number of raptors divided by the number of 800-m plots and the total number of surveys) at the SHWRA is considered to be low to moderate, and ranked thirteenth when compared to the 36 other wind-energy facilities (Figure 13).

Although raptors occur in most areas with the potential for wind-energy development, individual species appear to differ from one another in their susceptibility to collision (NRC 2007). Results from Altamont Pass in California suggest that mortality for some species is not necessarily related to abundance (Orloff and Flannery 1992). American kestrels, red-tailed hawks, and golden eagles were killed more often than predicted based on abundance. Thus far, only three northern harrier (*Circus cyaneus*) fatalities at existing wind energy facilities have been reported in publicly available documents, despite the fact they are commonly observed during point counts at these facilities (Erickson et al. 2001a, Whitfield and Madders 2006). Because northern harriers often forage close to the ground, risk of collision with turbine blades is considered low for this species. In addition, reports from the High Winds wind-energy facility in California document high American kestrel mortality. Relative use by American kestrels at the High Winds facility is almost six times the use of American kestrels at the Altamont Pass facility (Kerlinger 2005). It is likely that many factors, in addition to abundance, are important in predicting raptor mortality.

Exposure indices may also provide insight into which species might be the most likely turbine casualties; however, the index only considers relative probability of exposure based on abundance, proportion of observations flying, and proportion of flight height of each species within the ZOR for turbines likely to be used at the wind-energy facility. This analysis is based on observations of birds during the surveys and does not take into consideration behavior (e.g., foraging, courtship), habitat selection, the varying ability among species to detect and avoid turbines, and other factors that may vary among species and influence likelihood for turbine collision. For these reasons, the index is only a relative index among species observed during the surveys and within the SHWRA. Actual risk for some species may be lower or higher than indicated by these data. At the SHWRA, the raptor species with the highest exposure index was ferruginous hawk due primarily to the relatively higher use estimate by this species. All other species ranked much lower due primarily to the lower use estimates or low proportion of flight heights observed in the ZOR.

A regression analysis of raptor use and mortality for 13 new-generation wind-energy facilities, where similar methods were used to estimate raptor use and mortality, found that there was a significant correlation between use and mortality (R^2 = 69.9%; Figure 14). Using this regression to predict raptor collision mortality at the SHWRA, based on an adjusted mean raptor use of 0.66 raptors/20-min survey, yields an estimated fatality rate of 0.10 fatalities/MW/year, or 10 raptor fatalities per year for each 100-MW of wind-energy development. A 90% prediction interval around this estimate is zero to 0.36 fatalities/MW/year. Based on the relative abundance of ferruginous hawks, golden eagles and red-tailed hawks during the spring, summer and fall, as well as a higher exposure index than other raptor species, there is higher potential for fatalities of these three species compared to other species.

Active raptor nest density within the SHWRA and 1.0 mile buffer was 0.13 nests/mi^2 This is average in comparison to ten other wind resource areas evaluated in the western US, where active raptor nest density ranged from 0.03 to 0.30 nests/mi^2 (0.01 to 0.12 nests/km^2) and averaged 0.15 nests/mi^2 (0.06 nests/km^2; Erickson et al. 2002b). Since few raptor species targeted during nest surveys have been observed as fatalities at newer wind energy facilities, correlations are very low between the number of collision fatalities and raptor nest density within one mile of project facilities. Raptors nesting closest to turbines likely have higher probabilities of being impacted from collision with turbines, but data on nests very close to turbines (e.g., within a half-mile) are currently inadequate to determine the level of these impacts. The existing wind-energy facility with the highest reported nest density is Foote Creek Rim, Wyoming. Most of the nests within two miles of the wind-energy facility are red-tailed hawks (Johnson et al. 2000b), but no red-tailed hawk fatalities have been documented at this facility (Young et al. 2003c).

<u>Non-Raptor Use and Exposure Risk</u>

Most bird species in the US are protected by the Migratory Bird Treaty Act (MBTA 1918). Passerines have been the most abundant bird fatality at wind energy facilities in the western US. Both migrant and resident passerine fatalities have been observed. Given that passerines made up a large proportion of the birds observed during the baseline study, passerines would be expected to make up the largest proportion of fatalities at the SHWRA. All non-raptor species had no measurable exposure indices due to the fact that all individuals were observed flying below the likely ZOR. Based on the zero value exposure risks at SHWRA, it is unlikely that non-raptor populations will be adversely affected by direct mortality from the operation of the wind-energy facility.

<u>Sensitive Species Use and Exposure Risk</u>

No federally listed threatened or endangered species were observed in the SHWRA during fixed-point bird use surveys or incidentally. Thirteen bird species considered BLM sensitive or Native Species Status (NSS) by the WGFD were observed within the SHWRA during summer 2009 surveys. Of these species, the most abundant were McCown's longspur (411), ferruginous hawk (62), and Brewer's sparrow (17). These are tallies that in some cases represent repeated observations of the same individuals. The ferruginous hawk was the most common raptor recorded at the SHWRA and some collision mortality may occur over the life of the wind-energy facility. However, overall raptor collision mortality is expected to be relatively low based on our analysis, and significant population level impacts would not be expected. McCown's longspur and Brewer's sparrow were never observed flying within the turbine ZOR. Therefore, significant risk of collision mortality is not expected for these species. Use of the SHWRA by the other sensitive species recorded was relatively low and no significant direct impacts are likely to occur.

Indirect Effects

In addition to direct effects through collision mortality, wind-energy development results in direct loss of habitat where infrastructure is placed and indirect loss of habitat through behavioral avoidance and perhaps habitat fragmentation. Direct loss of habitat associated with wind-energy development is relatively minor for most species compared to most other forms of energy development. Although wind-energy facilities can cover substantial areas, the permanent footprint of wind energy facilities such as the turbines, access roads, maintenance buildings, substations and overhead transmission lines, generally occupies only 5 to 10% of the entire development area (BLM 2005). Estimates of temporary construction impacts range from 0.2 to 1.0 hectares (0.5 to 2.5 acres) per turbine (AWEA 2009). Behavioral avoidance, however, may render much larger areas unsuitable or less suitable for some species of wildlife, depending on how far each species are displaced from wind-energy facilities. Based on some studies in Europe, displacement effects associated with wind energy were thought to have a greater impact on birds than collision mortality (Gill et al. 1996). The greatest concern with displacement impacts for wind-energy facilities in the western US has been where these facilities have been constructed in native habitats such as grasslands or shrublands (Leddy et al. 1999,Mabey and Paul 2007).

Most studies on raptor displacement at wind-energy facilities indicate effects appear to be negligible. A before-after/control impact (BACI) study of avian use at the Buffalo Ridge wind-energy facility in Minnesota found evidence of northern harriers avoiding turbines on both a small scale (< 100 m] from turbines) and a larger scale (range of 105 - 5,364 m [345 – 17,598 ft]) in the year following construction (Johnson et al. 2000a). Two years following construction, however, no large-scale displacement of northern harriers was detected. The only published report of avoidance of wind turbines by nesting raptors occurred at the Buffalo Ridge facility, where raptor nest density on 101 mi^2 (261.6 km^2) of land surrounding the facility was 5.94 nests/39 mi^2 (5.94 nests/101.0 km^2) yet no nests were present in the 12 mi^2 (31.1 km^2) facility itself, even though habitat was similar (Usgaard et al. 1997). At a wind-energy facility in eastern Washington, based on extensive monitoring using helicopter flights and ground observations, raptors still nested in the study area at approximately the same levels after construction, and several nests were located within a half-mile (0.8 km) of turbines (Erickson et al. 2004). Howell and Noone (1992) found similar numbers of raptor nests before and after construction of Phase 1 of the Montezuma Hills wind-energy facility in California, and anecdotal evidence indicates that raptor use of the APWRA in California may have increased since installation of wind turbines (Orloff and Flannery 1992, AWEA 1995). At the Foote Creek Rim wind-energy facility in southern Wyoming, one pair of red-tailed hawks nested within 0.3 miles (0.5 km) of the turbine strings, and seven red-tailed hawk nests, one great horned owl (*Bubo virginianus*) nest, and one golden eagle nest located within one mile of the wind-energy facility successfully fledged young (Johnson et al. 2000b, WEST unpublished data). The golden eagle pair successfully nested a half-mile (0.8 km) from the facility for three different years after the project became operational.

Studies in the western US concerning displacement of non-raptor species have concentrated on grassland passerines and waterfowl. Wind-energy facility construction appears to cause small-scale local displacement of some grassland passerines and is likely due to the birds avoiding turbine noise and maintenance activities. Construction also reduces habitat effectiveness because of the presence of access roads and large gravel pads surrounding turbines (Leddy 1996, Johnson et al. 2000a). Leddy et al. (1999) surveyed bird densities in Conservation Reserve Program (CRP) grasslands at the Buffalo Ridge wind-energy facility in Minnesota, and found mean densities of 10 grassland bird species were four times higher at areas located 180 m (591 ft) from turbines than they were at grasslands nearer turbines. Johnson et al. (2000a) found reduced use of habitat within 100 m of turbines by seven of 22 grassland-breeding birds following construction of the Buffalo Ridge facility. Results from the Stateline wind-energy facility in Oregon and Washington (Erickson et al. 2004), and the Combine Hills wind-energy facility in Oregon (Young et al. 2005b), suggest a relatively small impact of the wind-energy facilities on grassland nesting passerines. Transect surveys conducted prior to and after construction of the wind-energy facilities found that grassland passerine use was significantly reduced within approximately 50 m (164 ft) of turbine strings, but areas further away from turbine strings did not have reduced bird use.

Shaffer and Johnson (2008) examined displacement of grassland birds at two wind energy facilities in the northern Great Plains. Intensive transect surveys were conducted within grid cells that contained turbines as well as reference areas. The study focused on five species at two study sites, one in South Dakota and one in North Dakota. Based on this analysis, killdeer (*Charadrius vociferous*), western meadowlark, and chestnut-collared longspur (*Calcarius ornatus*) did not show any avoidance of wind turbines. However, grasshopper sparrow (*Ammodramus savannarum*) and clay-colored sparrow (*Spizella pallida*) showed avoidance out to 200 m (656 ft).

At the Buffalo Ridge facility, the abundance of several bird types, including shorebirds and waterfowl, was found to be significantly lower at survey plots with turbines than at reference plots without turbines (Johnson et al. 2000a). The report concluded that the area of reduced use was limited primarily to those areas within 100 m of the turbines. These results are similar to those of Osborn et al. (1998), who reported that birds at Buffalo Ridge avoided flying in areas with turbines.

Results of a long-term mountain plover monitoring study at the Foote Creek Rim wind-energy facility in Wyoming suggest that construction of the facility resulted in some displacement of mountain plovers. The mountain plover population was reduced during construction but has slowly increased since, although not to the same level as it was prior to construction. It is not known if the initial decline was due to presence of the wind-energy facility or to regional declines in mountain plover populations. The subsequent increase may also be influenced by regional changes in mountain plover abundance. Nevertheless, some mountain plovers have apparently become habituated to the turbines, as several mountain plover nests have been located within 75 m (246 ft) of turbines, and many of the nests were successful (Young et al. 2005a).

Breeding puddle ducks (mallard, blue-winged-teal [*Anas discors*], gadwall [*A. strepera*], northern pintail, and northern shoveler [*A. clypeata*]) were counted on wetland complexes within two wind-energy facilities, as well as similar reference areas, in North and South Dakota during the 2008 breeding season (Walker et al. 2008, unpublished report). Based on results of the surveys, breeding puddle duck abundance was not lower than expected in areas of wind-energy development, and wind turbines did not appear to displace breeding ducks. The study is continuing through 2010 to further assess response of breeding ducks to wind-energy development.

Much debate has occurred recently regarding the potential impacts of wind-energy facilities on prairie grouse, including greater sage-grouse. It is currently unknown how sage-grouse, which are accustomed to a relatively low vegetation canopy, would respond to numerous wind turbines hundreds of feet taller than the surrounding landscape. Some scientists speculate that such a skyline may displace sage-grouse hundreds of meters or even miles from their normal range (Manes et al. 2002, USFWS 2003, NWCC 2004). If birds are displaced, it is unknown whether, in time, local populations may become acclimated to elevated structures and return to the area. Under a set of interim voluntary guidelines, the USFWS suggested a precautionary approach and recommended wind turbines be placed at least five miles (eight km) from known prairie grouse lek locations (USFWS 2004). The USFWS argued that because prairie grouse evolved in habitats with little vertical structure, placement of tall man-made structures, such as wind turbines, in occupied prairie grouse habitat may result in a decrease in habitat suitability (USFWS 2004). Several studies have shown that prairie grouse avoid other anthropogenic features, such as roads, power lines, oil and gas wells, and buildings (Robel et al. 2004, Holloran 2005, Pruett et al. 2009). Much of the infrastructure associated with wind energy facilities, such as power lines and roads, are common to most forms of energy development and it is assumed that impacts would be similar. Nevertheless, there are substantial differences between wind energy facilities and most other forms of energy development, particularly related to human activity. While results of these studies suggest the potential exists for wind turbines to displace prairie grouse from occupied habitat, well-designed studies examining the potential impacts of wind turbines themselves on prairie grouse are currently lacking. Ongoing telemetry research being conducted by Kansas State University to examine response of greater prairie-chickens to wind-energy development in Kansas and a similar study being conducted by WEST (Johnson et al. 2009) on greater sage-grouse response to wind-energy development in Wyoming will help to address this lack of knowledge.

Other than these two ongoing telemetry studies, we are aware of only two publicly-available studies that examined response of prairie grouse species to wind energy development. The Nebraska Game and Parks Commission (NGPC) monitored both greater prairie-chicken and sharp-tailed grouse leks following construction of the 36-turbine Ainsworth wind-energy facility in Brown County, Nebraska (NGPC 2009). Surveys for leks were conducted four years post-construction (2006-2009) within a 1- to 2-mile (1.6- to 3.2-km) radius of the facility, an area that covered approximately 25 mi^2 (65 km^2). The number of leks of both species combined in the study area was 13, 12, 9 and 12 in the first four years post-construction. The number of greater prairie chickens counted on leks increased from 70 to 95 during the 4-year period, whereas the number of sharp-tailed grouse decreased from 66 to 56. No pre-construction data were available on prairie grouse leks near the site; however, densities of lekking grouse on the study area at the Ainsworth facility were within the range of expected grouse densities in similar habitats in Brown County and the adjacent Rock County (NGPC 2009). The leks ranged from approximately 0.42 to 1.65 miles (0.68 to 2.66 km) from the nearest turbine, with an average distance of 0.88 miles (1.42 km).

At a three-turbine wind energy facility in Minnesota, researchers documented six active greater prairie-chicken leks within two miles of the turbines, with the nearest lek located within 0.6 miles (one km) of the nearest turbine. One hen with a brood was also documented immediately adjacent to a turbine (USFWS 2004).

Although the data collected during these two studies indicate that prairie grouse may continue to use habitats near wind-energy facilities, research conducted on greater sage-grouse response to oil and gas development has found population declines due to oil and gas development may not occur until four or five years post-construction (Holloran 2005). Therefore, data spanning two or more grouse generations will be required to adequately assess impacts of wind-energy development on prairie grouse.

There is little information regarding wind-energy facility operation effects on big game. At the Foote Creek Rim wind-energy facility, pronghorn antelope observed during raptor use surveys were recorded year round (Johnson et al. 2000b). The mean number of pronghorn antelope observed at the six survey points was 1.07/survey prior to construction of the wind-energy facility and 1.59 and 1.14/survey the two years immediately following construction, indicating no reduction in use of the immediate area. During a study of interactions of a transplanted elk (*Cervus elaphus*) herd with operating wind-energy facilities in Oklahoma, no evidence was found that operating wind turbines have a measurable impact on elk use of the surrounding area (Walter et al. 2009). Current telemetry studies being conducted to assess response of elk to wind-energy development in Wyoming and Oregon, as well as pronghorn antelope response in Wyoming, will help to address potential impacts to big game.

CONCLUSIONS

Based on data collected during this study, raptor and all bird use of the SHWRA is generally similar to most wind resource areas evaluated throughout the western US using similar methods. Based on the results of the studies to date, bird mortality at the SHWRA would likely be similar to that documented at other wind-energy facilities located in the western US, where bird collision mortality has been relatively low.

Currently, few published studies are available from the western US that compare bird use to bird mortality rates. Based on research conducted at wind-energy facilities throughout the US, raptor use at the SHWRA is within the range of or generally lower than use levels recorded at other wind-energy facilities. Raptor fatality rates are expected to be within the range of fatality rates observed at other facilities where raptor use levels are similar. To date, no relationships have been observed between overall use by other bird types and fatality rates of those bird types at wind-energy facilities. However, the flight characteristics and foraging habits of some species may result in increased exposure for these species at the SHWRA. The surveys conducted for this proposed wind resource area also do not address the impacts of the proposed facility to nocturnal migrants, such as passerines. To date, overall fatality rates for birds (including nocturnal migrants) at wind-energy facilities have been relatively low and consistent in the West. As more research is conducted at facilities in the West, more information regarding the potential direct impacts of wind-energy facilities to bird species will be obtained.

The proposed wind-energy facility is comprised of native habitats such as scrub-shrub and grasslands (Table 1, Figure 3). Some species considered to be sensitive were observed breeding within these habitats at the SHWRA, and some potential exists for wind turbines to displace breeding birds. Research concerning displacement impacts to passerines, waterfowl, and waterbirds associated with wind-energy facilities is limited, but some studies show the potential for small scale (200 m [656 ft] or less) displacement, while impacts to densities of birds at larger scales have not been shown.

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Table 1. The land cover types, coverage, and composition within the Sand Hills Wind Resource Area.

Habitat	Acres	% Composition
Canal	6.22	0.1%
Cottonwoods/Salix	43.52	0.4%
Cushion Plant Community	174.57	1.5%
Escarpment	149.62	1.3%
Grassland	3,225.31	28.4%
Greasewood	295.35	2.6%
Hordeum brachyantherum	10.76	0.1%
Mountain Mahogany	140.88	1.2%
Native Grassland	34.04	0.3%
Open Water	4.60	0.0%
Playa Wetland	16.48	0.1%
Sagebrush	2,317.56	20.4%
Sagebrush Steppe	4,442.25	39.1%
Stony Knolls	222.52	2.0%
Wetland	276.98	2.4%
Total	**11,360.65**	**100.0%**

Table 2. Summary of species richness (species/plot[a]/20-min survey), and sample size by season and overall during the fixed-point bird use surveys at the Sand Hills Wind Resource Area, July 31 – August 25, 2009.

Season	Number of Visits	# Surveys Conducted	# Unique Species	Species Richness	
				Large Birds	Small Birds
Summer	5	55	32	0.82	1.2
Overall	**5**	**55**	**32**	**0.82**	**1.2**

[a] 800 m radius for large birds and 100 m radius for small birds.

Table 3. Total number of individuals and groups for each bird type and species[a], by season and overall, during the fixed-point bird use surveys at the Sand Hills Wind Resource Area[a], July 31 – August 25, 2009.

Species/Type	Scientific Name	# grps	# obs
Waterbirds		**3**	**10**
American white pelican	*Pelecanus erythrorhyncos*	1	8
great blue heron	*Ardea herodias*	1	1
sandhill crane	*Grus canadensis*	1	1
Shorebirds		**2**	**2**
upland sandpiper	*Bartramia longicauda*	2	2
Raptors		**93**	**102**
Buteos		*68*	*76*
ferruginous hawk	*Buteo regalis*	54	60
red-tailed hawk	*Buteo jamaicensis*	9	11
Swainson's hawk	*Buteo swainsoni*	5	5
Northern Harrier		*2*	*2*
northern harrier	*Circus cyaneus*	2	2
Eagles		*8*	*9*
golden eagle	*Aquila chrysaetos*	8	9
Falcons		*15*	*15*
American kestrel	*Falco sparverius*	10	10
prairie falcon	*Falco mexicanus*	5	5
Vultures		**1**	**1**
turkey vulture	*Cathartes aura*	1	1
Doves/Pigeons		**1**	**1**
mourning dove	*Zenaida macroura*	1	1
Large Corvids		**10**	**30**
black-billed magpie	*Pica pica*	3	7
common raven	*Corvus corax*	7	23
Passerines		**109**	**556**
American robin	*Turdus migratorius*	1	1
bank swallow	*Riparia riparia*	1	1
Brewer's blackbird	*Euphagus cyanocephalus*	1	1
Brewer's sparrow	*Spizella breweri*	9	17
brown-headed cowbird	*Molothrus ater*	1	2
chipping sparrow	*Spizella passerina*	4	10
horned lark	*Eremophila alpestris*	35	81
lark bunting	*Calamospiza melanocorys*	2	5
McCown's longspur	*Calcarius mccownii*	43	411
mountain chickadee	*Poecile gambeli*	2	6
northern rough-winged swallow	*Stelgidopteryx serripennis*	1	1
red-breasted nuthatch	*Sitta canadensis*	1	1

Table 3. Total number of individuals and groups for each bird type and species[a], by season and overall, during the fixed-point bird use surveys at the Sand Hills Wind Resource Area[a], July 31 – August 25, 2009.

Species/Type	Scientific Name	# grps	# obs
sage thrasher	*Oreoscoptes montanus*	1	1
unidentified empidonax		1	1
vesper sparrow	*Pooecetes gramineus*	6	17
Other Birds		**3**	**4**
common nighthawk	*Chordeiles minor*	2	3
northern flicker	*Colaptes auratus*	1	1
Overall		**222**	**706**

[a] Regardless of distance from observer.

Table 4a. Mean bird use (number of birds/800-m plot/20-min survey), percent of total composition (%), and frequency of occurrence (%) for each large bird type and species by season during the fixed-point bird use surveys at the Sand Hills Wind Resource Area, July 31 – August 25, 2009.

Species/Type	Use	% Composition	% Frequency
Shorebirds	**0.04**	**3.0**	**3.6**
upland sandpiper	0.04	3.0	3.6
Raptors	**0.93**	**77.3**	**50.9**
Buteos	*0.64*	*53.0*	*36.4*
ferruginous hawk	0.49	40.9	27.3
red-tailed hawk	0.11	9.1	7.3
Swainson's hawk	0.04	3.0	3.6
Northern Harrier	*0.02*	*1.5*	*1.8*
northern harrier	0.02	1.5	1.8
Eagles	*0.05*	*4.5*	*5.5*
golden eagle	0.05	4.5	5.5
Falcons	*0.22*	*18.2*	*18.2*
American kestrel	0.15	12.1	12.7
prairie falcon	0.07	6.1	7.3
Vultures	**0.02**	**1.5**	**1.8**
turkey vulture	0.02	1.5	1.8
Doves/Pigeons	**0.02**	**1.5**	**1.8**
mourning dove	0.02	1.5	1.8
Large Corvids	**0.20**	**16.7**	**9.1**
black-billed magpie	0.13	10.6	3.6
common raven	0.07	6.1	5.5
Overall	**1.20**	**100**	

Table 4b. Mean use (number of birds/100-m plot/20-min survey), percent of total composition (%), and frequency of occurrence (%) for each small bird type and species by season during the fixed-point bird use surveys at the Sand Hills Wind Resource Area, July 31 – August 25, 2009.

Species/Type	Use	% Composition	% Frequency
Passerines	**8.05**	**99.8**	**70.9**
American robin	0.02	0.2	1.8
bank swallow	0	0	0
Brewer's blackbird	0.02	0.2	1.8
Brewer's sparrow	0.16	2.0	10.9
brown-headed cowbird	0.04	0.5	1.8
chipping sparrow	0.18	2.3	7.3
horned lark	0.91	11.3	34.5
lark bunting	0.09	1.1	3.6
McCown's longspur	6.16	76.4	36.4
mountain chickadee	0.09	1.1	1.8
northern rough-winged swallow	0.02	0.2	1.8
red-breasted nuthatch	0.02	0.2	1.8
sage thrasher	0.02	0.2	1.8
unidentified empidonax	0.02	0.2	1.8
vesper sparrow	0.31	3.8	10.9
Other Birds	**0.02**	**0.2**	**1.8**
common nighthawk	0	0	0
northern flicker	0.02	0.2	1.8
Overall	**8.07**	**100**	

Table 5. Flight height characteristics by bird type during fixed-point bird use surveys at the Sand Hills Wind Resource Area, July 31 – August 25, 2009. Large bird observations were limited to within 800 m and small bird observations were limited to within 100 m.

Bird Type	# Groups Flying	# Obs Flying	Mean Flight Height (m)	% Obs Flying	% within Flight Height Categories 0-35 m	35- 135 m	> 135m
Shorebirds	0	0	0	0	0	0	0
Raptors	21	21	25.57	41.2	81.0	14.3	4.8
Buteos	*11*	*11*	*37.45*	*31.4*	*72.7*	*18.2*	*9.1*
Northern Harrier	*1*	*1*	*1.00*	*100*	*100*	*0*	*0*
Eagles	*3*	*3*	*27.00*	*100*	*66.7*	*33.3*	*0*
Falcons	*6*	*6*	*7.17*	*50.0*	*100*	*0*	*0*
Vultures	1	1	50.00	100	0	100	0
Doves/Pigeons	0	0	0	0	0	0	0
Large Corvids	1	1	2.00	9.1	100	0	0
Large Bird Overall	**23**	**23**	**25.61**	**34.8**	**78.3**	**17.4**	**4.3**
Passerines	30	260	3.10	58.7	100	0	0
Other Birds	0	0	0	0	0	0	0
Small Bird Overall	**30**	**260**	**3.10**	**58.6**	**100**	**0**	**0**

ZOR: The likely "zone of risk" for potential collision with a turbine blade, or 35-130 m (114-427 ft) above ground level (AGL).

Table 6a. Relative exposure index and flight characteristics by large bird species during the fixed-point bird use surveys at the Sand Hills Wind Resource Area, July 31 – August 25, 2009.

Species	# Groups Flying	Overall Mean Use	% Flying	% Flying within ZOR based on initial obs	Exposure Index	% Within ZOR at anytime
ferruginous hawk	9	0.49	33.3	22.2	0.04	22.2
golden eagle	3	0.05	100	33.3	0.02	33.3
turkey vulture	1	0.02	100	100	0.02	100
American kestrel	4	0.15	50.0	0	0	0
black-billed magpie	1	0.13	14.3	0	0	0
red-tailed hawk	0	0.11	0	0	0	0
prairie falcon	2	0.07	50.0	0	0	0
common raven	0	0.07	0	0	0	0
upland sandpiper	0	0.04	0	0	0	0
Swainson's hawk	2	0.04	100	0	0	0
northern harrier	1	0.02	100	0	0	0
mourning dove	0	0.02	0	0	0	0

ZOR: The likely “zone of risk” for potential collision with a turbine blade, or 35-130 m (114-427 ft) above ground level (AGL).

Table 6b. Relative exposure index and flight characteristics for small bird species during the fixed-point bird use surveys at the Sand Hills Wind Resource Area, July 31 – August 25, 2009.

Species	# Groups Flying	Overall Mean Use	% Flying	% Flying within ZOR based on initial obs	Exposure Index	% Within ZOR at anytime
McCown's longspur	13	6.16	64.9	0	0	0
horned lark	9	0.91	50.0	0	0	0
vesper sparrow	2	0.31	35.3	0	0	0
chipping sparrow	3	0.18	60.0	0	0	0
Brewer's sparrow	0	0.16	0	0	0	0
mountain chickadee	0	0.09	0	0	0	0
lark bunting	1	0.09	20.0	0	0	0
brown-headed cowbird	0	0.04	0	0	0	0
unidentified empidonax	0	0.02	0	0	0	0
sage thrasher	0	0.02	0	0	0	0
red-breasted nuthatch	0	0.02	0	0	0	0
northern rough-winged swallow	1	0.02	100	0	0	0
northern flicker	0	0.02	0	0	0	0
Brewer's blackbird	1	0.02	100	0	0	0
American robin	0	0.02	0	0	0	0

ZOR: The likely “zone of risk” for potential collision with a turbine blade, or 114-427 ft (35-130 m) above ground level (AGL).

Table 7. Summary of sensitive species observed at the Sand Hills Wind Resource Area during fixed-point bird use surveys (FP) and as incidental wildlife observations (Inc.), July 31 – August 25, 2009.

			FP		Inc.		Total	
Species	**Scientific Name**	**Status**	**# of grps**	**# of obs**	**# of grps**	**# of obs**	**# of grps**	**# of obs**
McCown's longspur	*Calcarius mccownii*	NSS4	43	411	0	0	43	411
ferruginous hawk	*Buteo regalis*	BLM, NSS3	54	60	1	2	55	62
Brewer's sparrow	*Spizella breweri*	BLM, NSS4	9	17	0	0	9	17
American white pelican	*Pelecanus erythrorhyncos*	NSS3	1	8	0	0	1	8
lark bunting	*Calamospiza melanocorys*	NSS4	2	5	0	0	2	5
Swainson's hawk	*Buteo swainsoni*	NSS4	5	5	0	0	5	5
northern pintail	*Anas acuta*	NSS3	0	0	1	4	1	4
upland sandpiper	*Bartramia longicauda*	NSS4	2	2	0	0	2	2
great blue heron	*Ardea herodias*	NSS4	1	1	0	0	1	1
lesser scaup	*Aythya affinis*	NSS3	0	0	1	1	1	1
mountain plover	*Charadrius montanus*	BLM, NSS4	0	0	1	1	1	1
peregrine falcon	*Falco peregrinus*	NSS3	0	0	1	1	1	1
sage thrasher	*Oreoscoptes montanus*	BLM, NSS4	1	1	0	0	1	1
Total	**13 species**		**118**	**510**	**5**	**9**	**123**	**519**

BLM – Rawlins Field Office BLM sensitive species

Native Status Species (NSS) definitions:

NSS1 - Populations greatly restricted or declining, extirpation possible OR ongoing significant loss of habitat.

NSS2 - Populations declining, extirpation possible; habitat restricted or vulnerable but no recent or ongoing significant loss; species likely sensitive to human disturbance OR populations declining or restricted in numbers or distribution, extirpation not imminent; ongoing significant loss of habitat.

NSS3 - Populations greatly restricted or declining, extirpation possible; habitat not restricted, vulnerable but no loss; species not sensitive to human disturbance OR populations declining or restricted in numbers or distribution, extirpation not imminent; habitat restricted or vulnerable but no recent or ongoing significant loss; species likely sensitive to human disturbance OR species widely distributed; population status or trends unknown but suspected to be stable; on-going significant loss of habitat.

NSS4 - Populations greatly restricted or declining, extirpation possible; habitat stable and not restricted OR populations declining or restricted in numbers or distribution, extirpation not imminent; habitat not restricted, vulnerable but no loss; species not sensitive to human disturbance OR species widely distributed, population status or trends unknown but suspected to be stable; habitat restricted or vulnerable but no recent or on-going significant loss; species likely sensitive to human disturbance OR populations stable or increasing and not restricted in numbers or distribution; on-going significant loss of habitat.

NSS Definitions from WGFD (2005) and Wyoming's Natural Diversity Database (WYNND 2009).

Table 8. Nesting raptor species and nest density for the Sand Hills Wind Resource Area and the study area, based on WEST, Bureau of Land Management (BLM), and Wyoming Game and Fish Department (WGFD) raptor nest surveys.

Species	# of nests from WEST surveys	# of nests from BLM database	# of nests from WGFD surveys	Nest density within 1-mi buffer (nests/mi^2)*
ferruginous hawk	6	4	2	0.04
golden eagle	1	2	1	0.02
prairie falcon	3	3	3	0.05
red-tailed hawk	1	4	1	0.02
Swainson’s hawk	0	1	0	-
inactive/unknown	2	0	0	-
Overall	**13**	**14**	**7**	**0.13**

*raptor nest density based only on the WGFD spring 2009 survey as that was the latest survey of entire study area when nests were active

Table 9. Incidental wildlife observed while conducting all surveys at the Sand Hills Wind Resource Area, July 31 – August 25, 2009.

Species	Scientific Name	#grps	# obs
Canada goose	*Branta canadensis*	1	150
mallard	*Anas platyrhynchos*	1	150
American coot	*Fulica americana*	1	90
Wilson's phalarope	*Phalaropus tricolor*	1	75
gadwall	*Anas strepera*	1	34
eared grebe	*Podiceps nigricollis*	1	30
American wigeon	*Anas americana*	1	23
ruddy duck	*Oxyura jamaicensis*	1	20
American avocet	*Recurvirostra americana*	3	7
killdeer	*Charadrius vociferus*	1	5
northern pintail	*Anas acuta*	1	4
ferruginous hawk	*Buteo regalis*	1	2
northern shoveler	*Anas clypeata*	1	2
lesser scaup	*Aythya affinis*	1	1
mountain plover	*Charadrius montanus*	1	1
willet	*Catoptrophorus semipalmatus*	1	1
Bird subtotal	**16 species**	**18**	**595**
pronghorn	*Antilocapra americana*	27	283
mule deer	*Odocoileus hemionus*	1	2
Mammal subtotal	**2 species**	**28**	**285**

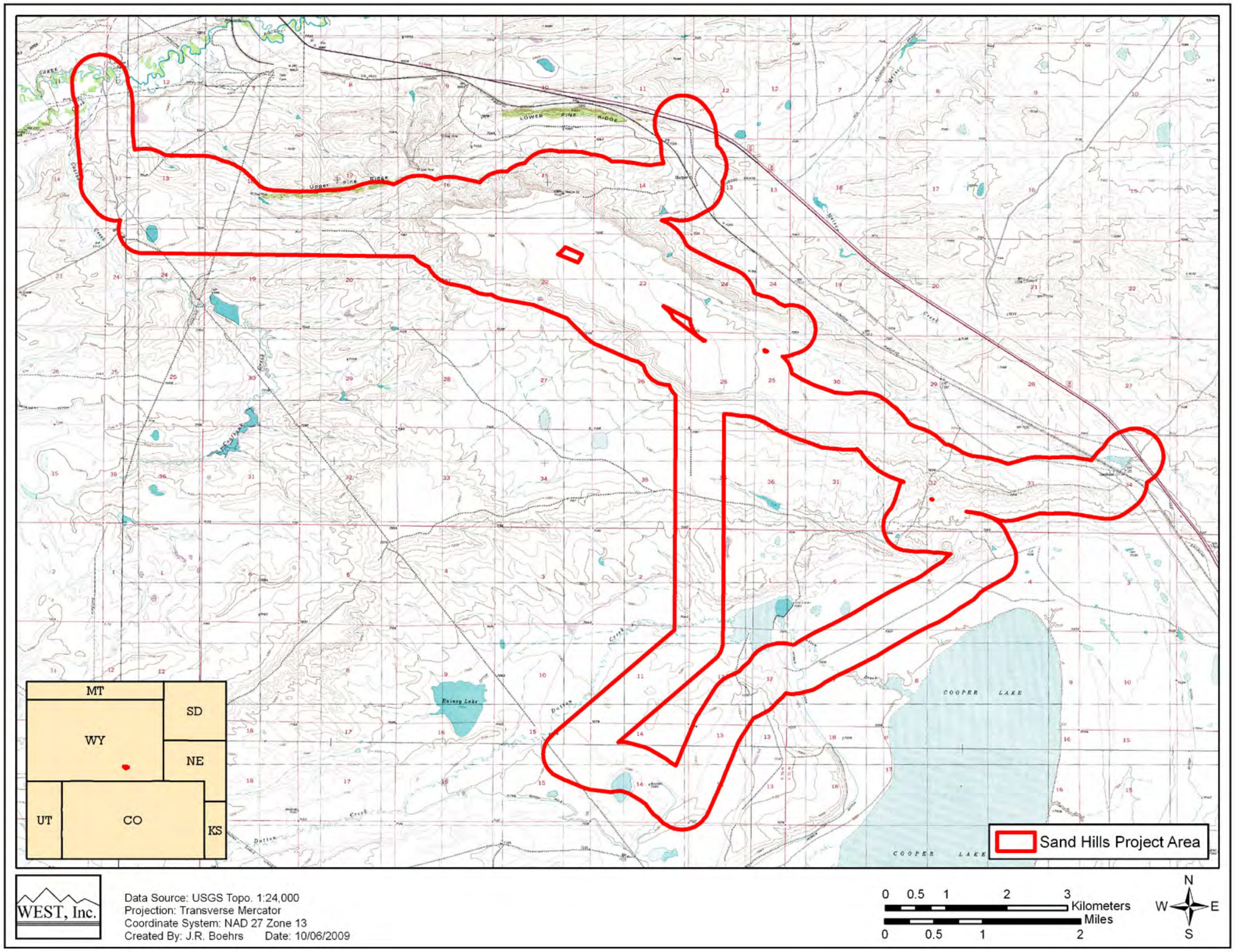


Figure 1. Location and elevation and topography of the Sand Hills Wind Resource Area.

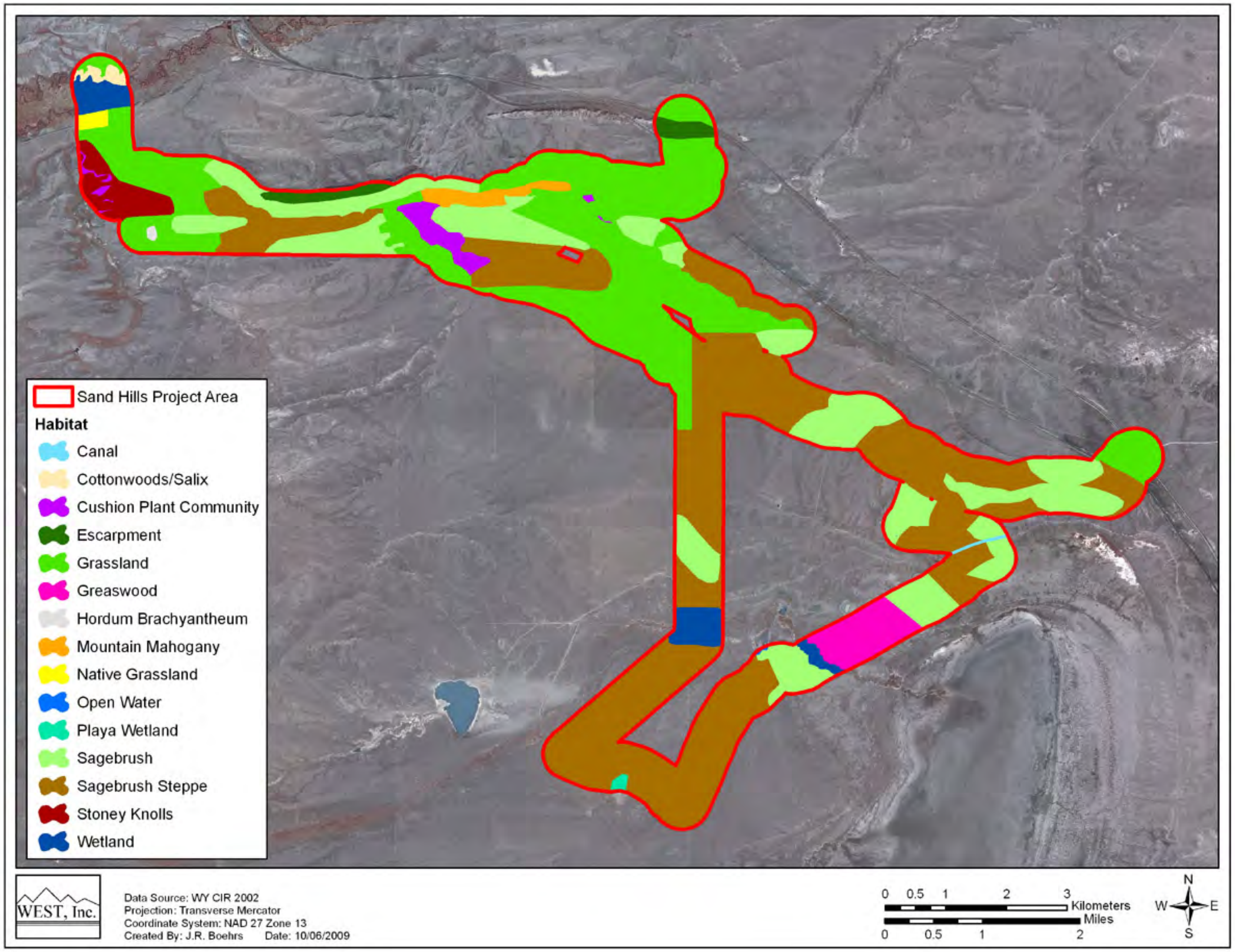


Figure 2. The land cover types and coverage within the Sand Hills Wind Resource Area. Areas classified as Sagebrush provide suitable greater sage-grouse nesting habitat; areas classified as Sagebrush Steppe provide potentially suitable sage-grouse brood rearing habitat.

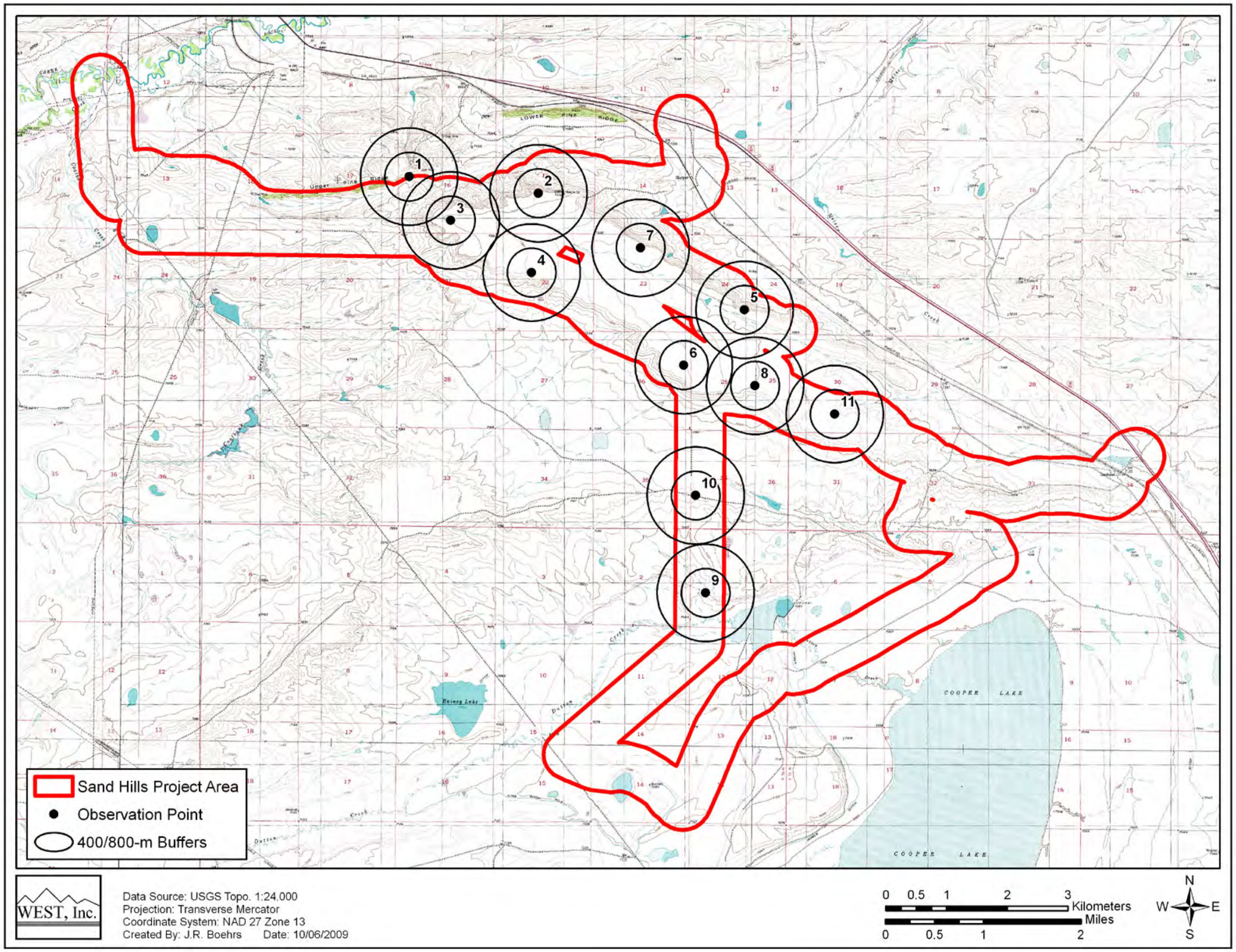


Figure 3. Fixed-point bird use survey points at the Sand Hills Wind Resource Area.

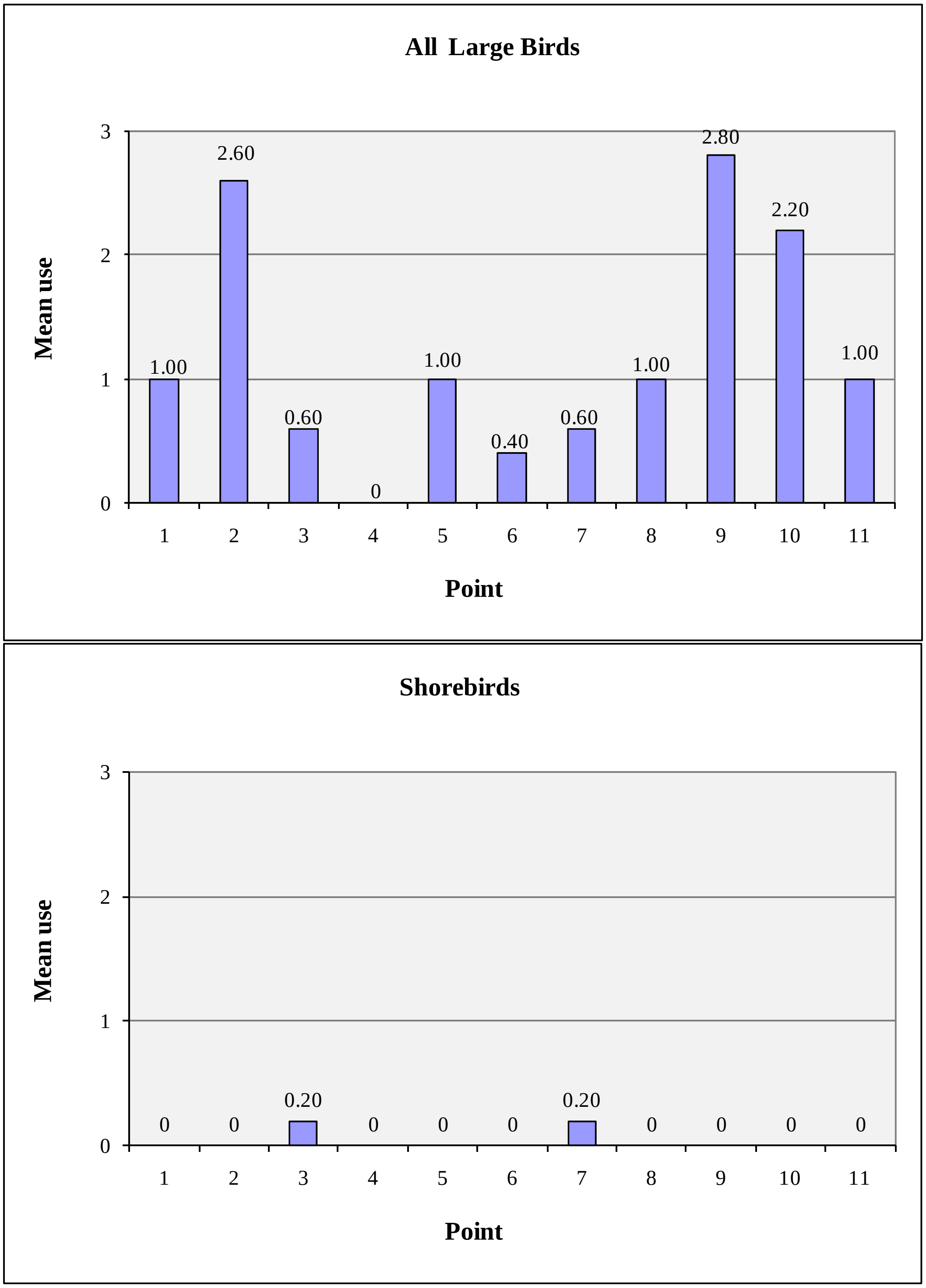
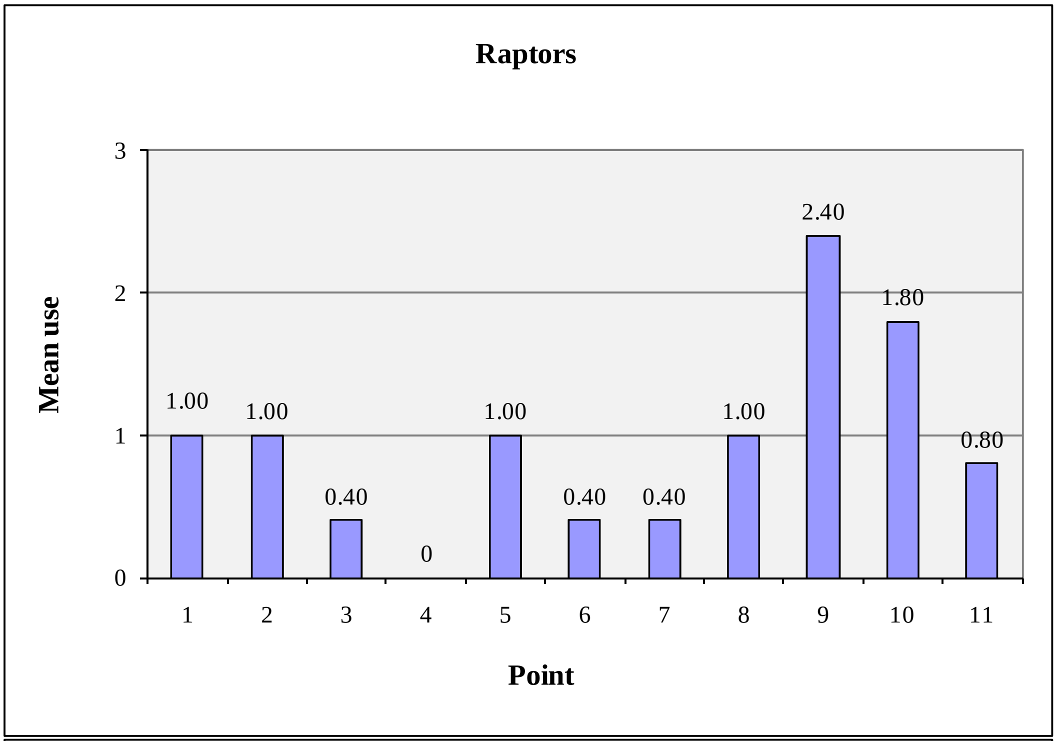


Figure 4. Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Sand Hills Wind Resource Area.



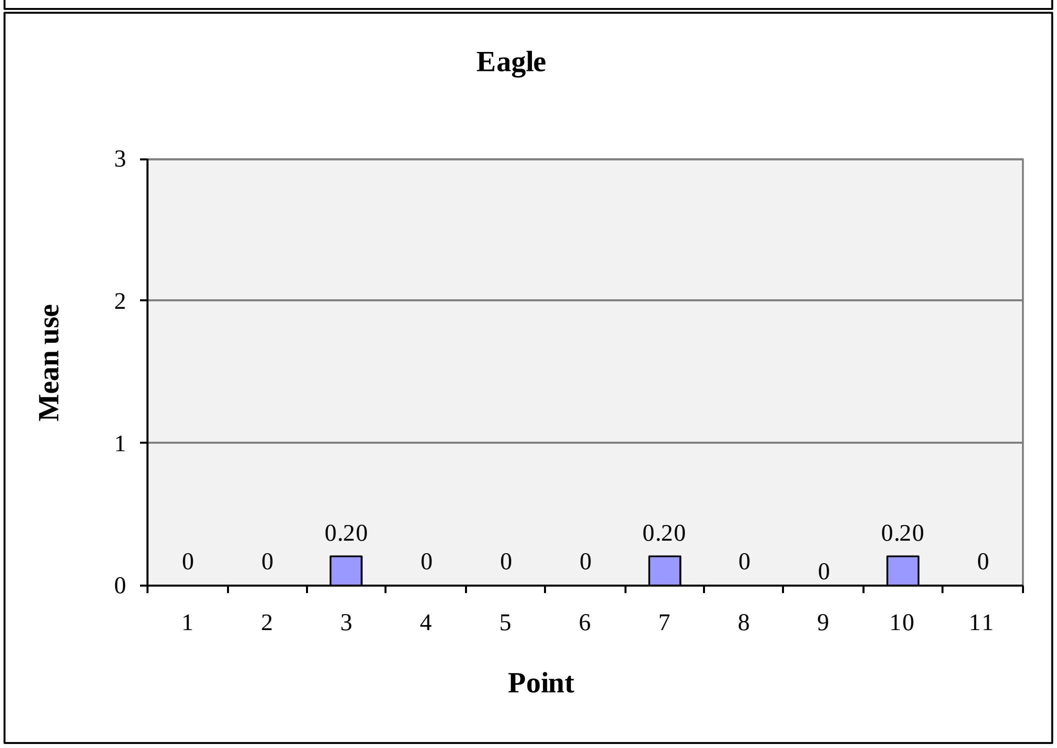


Figure 4 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds major and bird types at the Sand Hills Wind Resource Area.

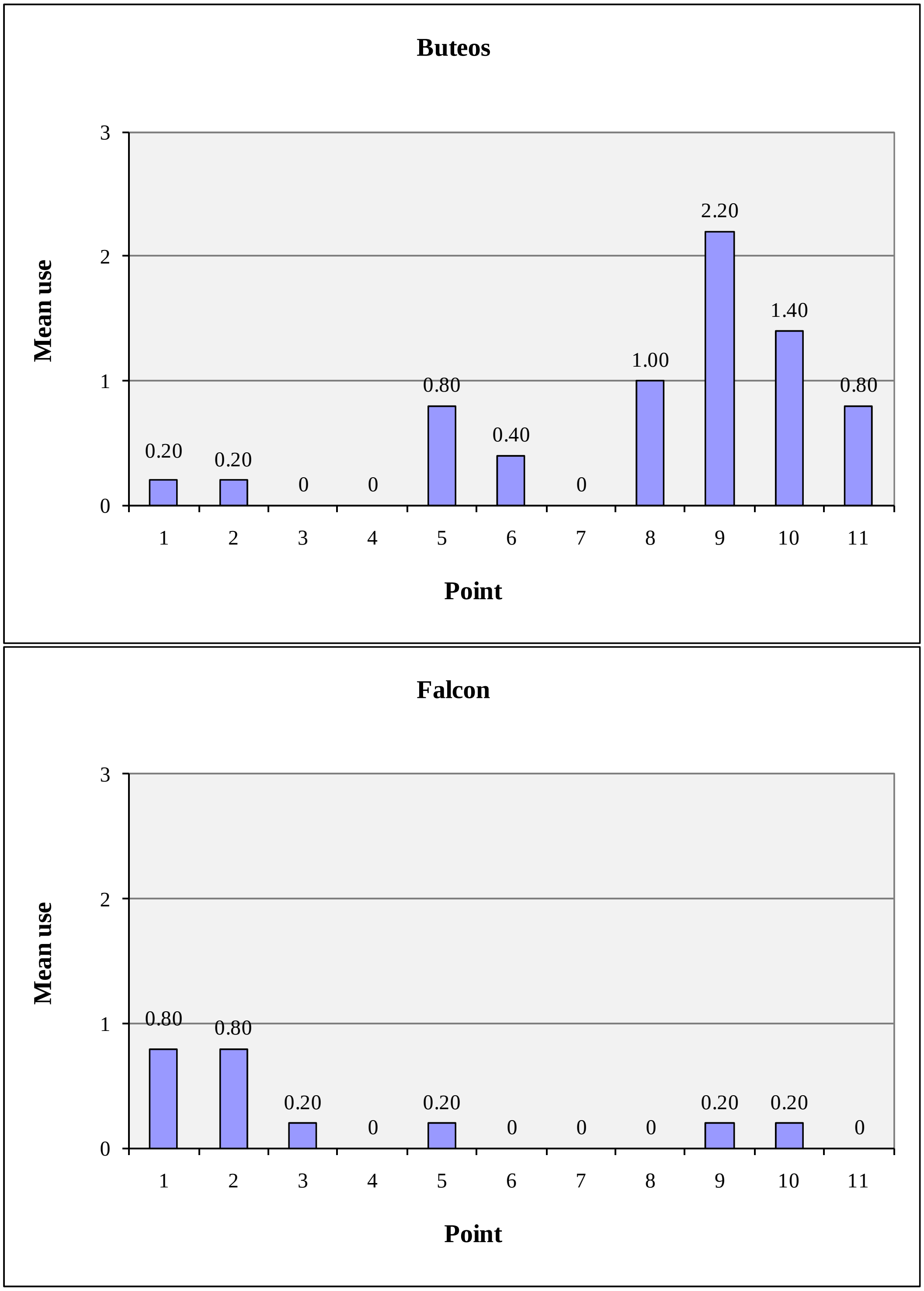
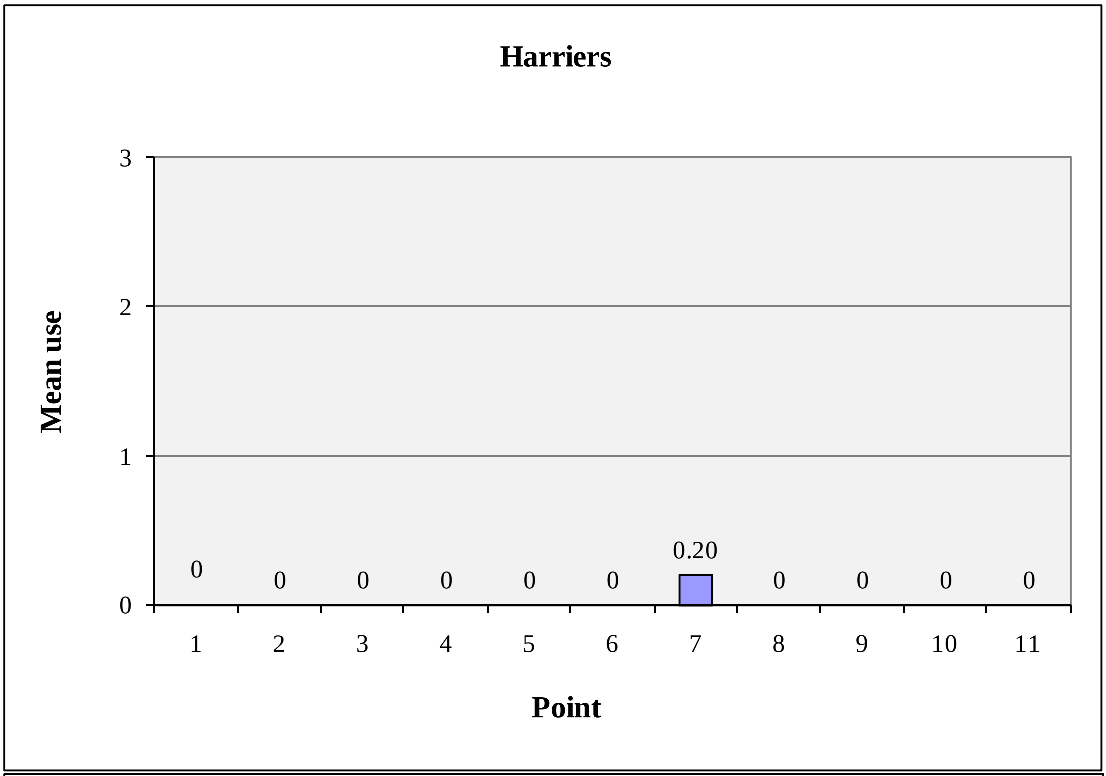


Figure 4 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Sand Hills Wind Resource Area.



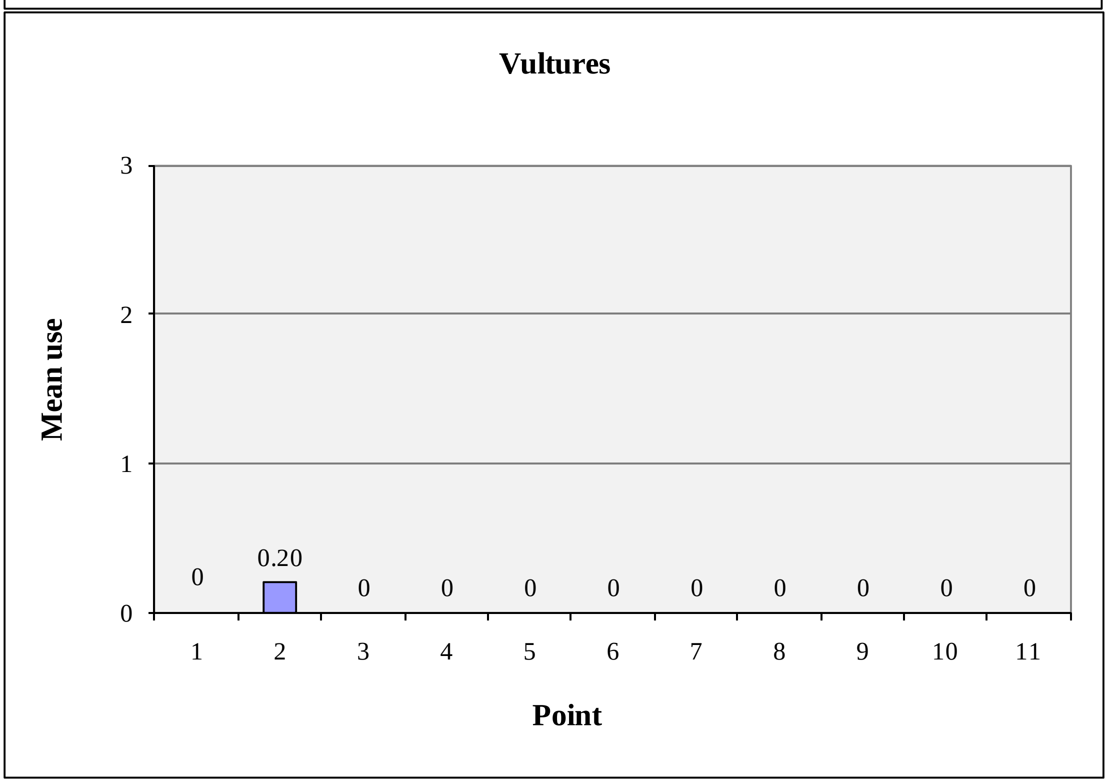
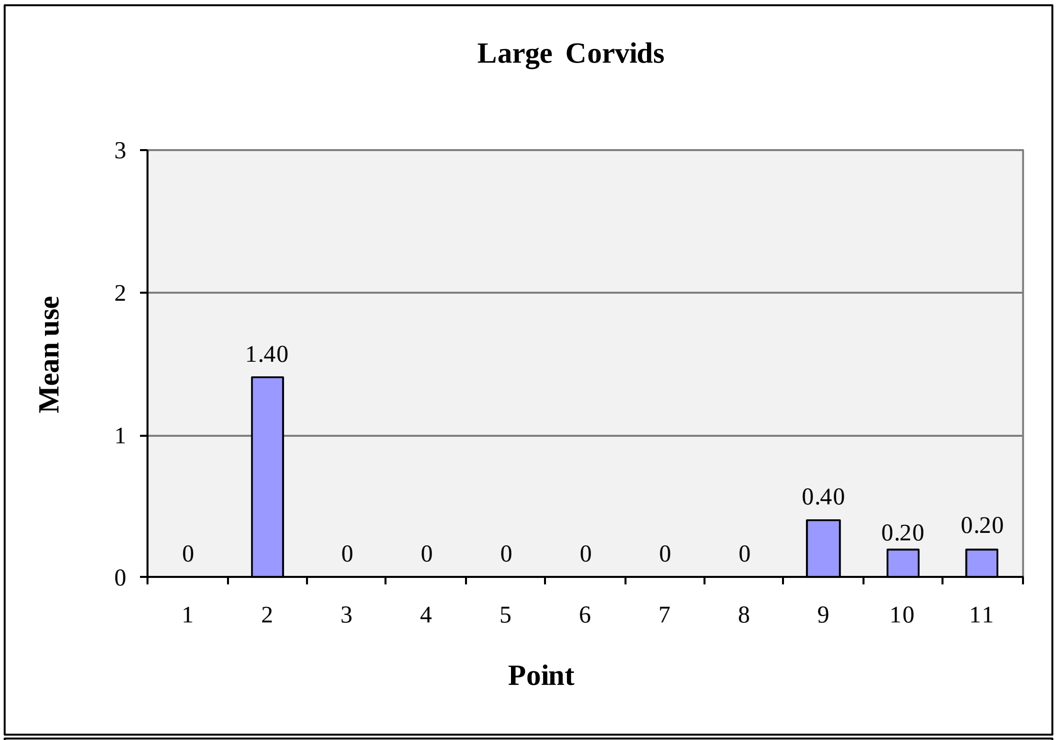


Figure 4 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Sand Hills Wind Resource Area.



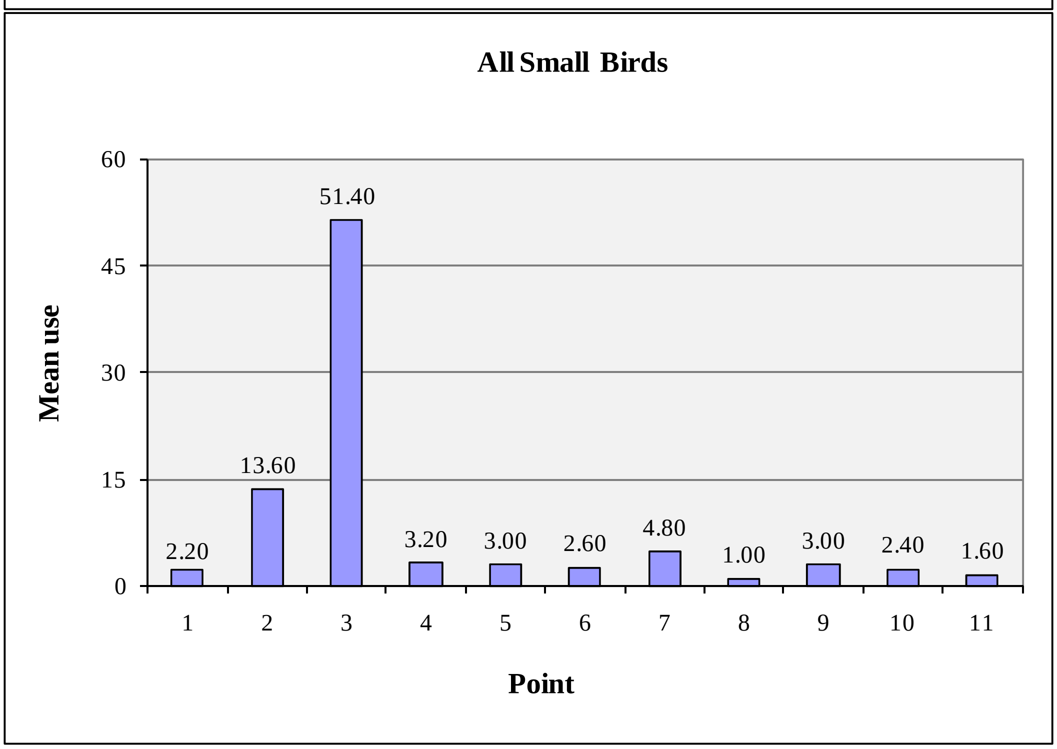
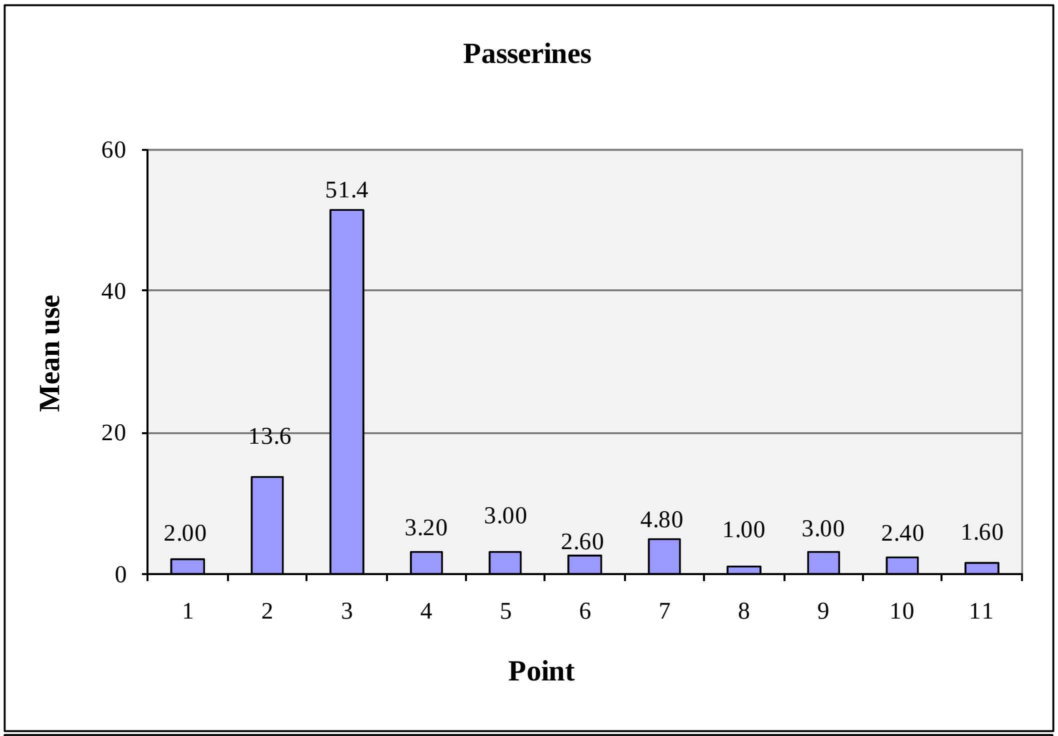


Figure 4 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds major bird types at the Sand Hills Wind Resource Area. All small bird observations were focused within 100 m viewsheds.



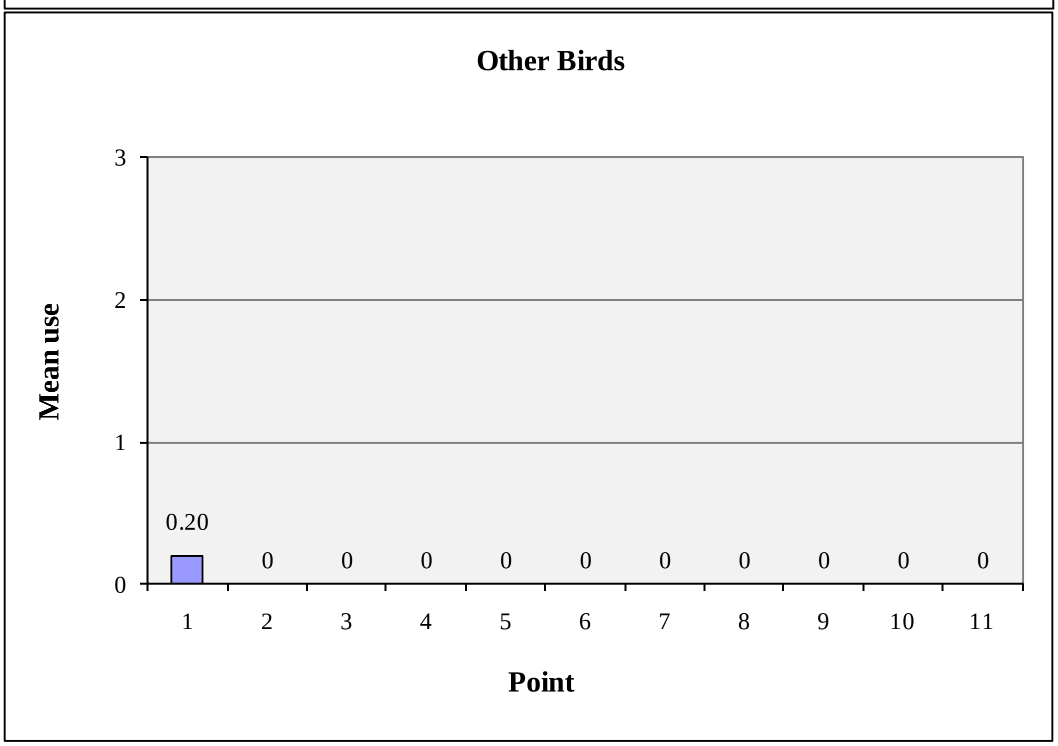


Figure 4 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds major bird types at the Sand Hills Wind Resource Area. Observations of passerines and other birds were focused within 100 m viewsheds.

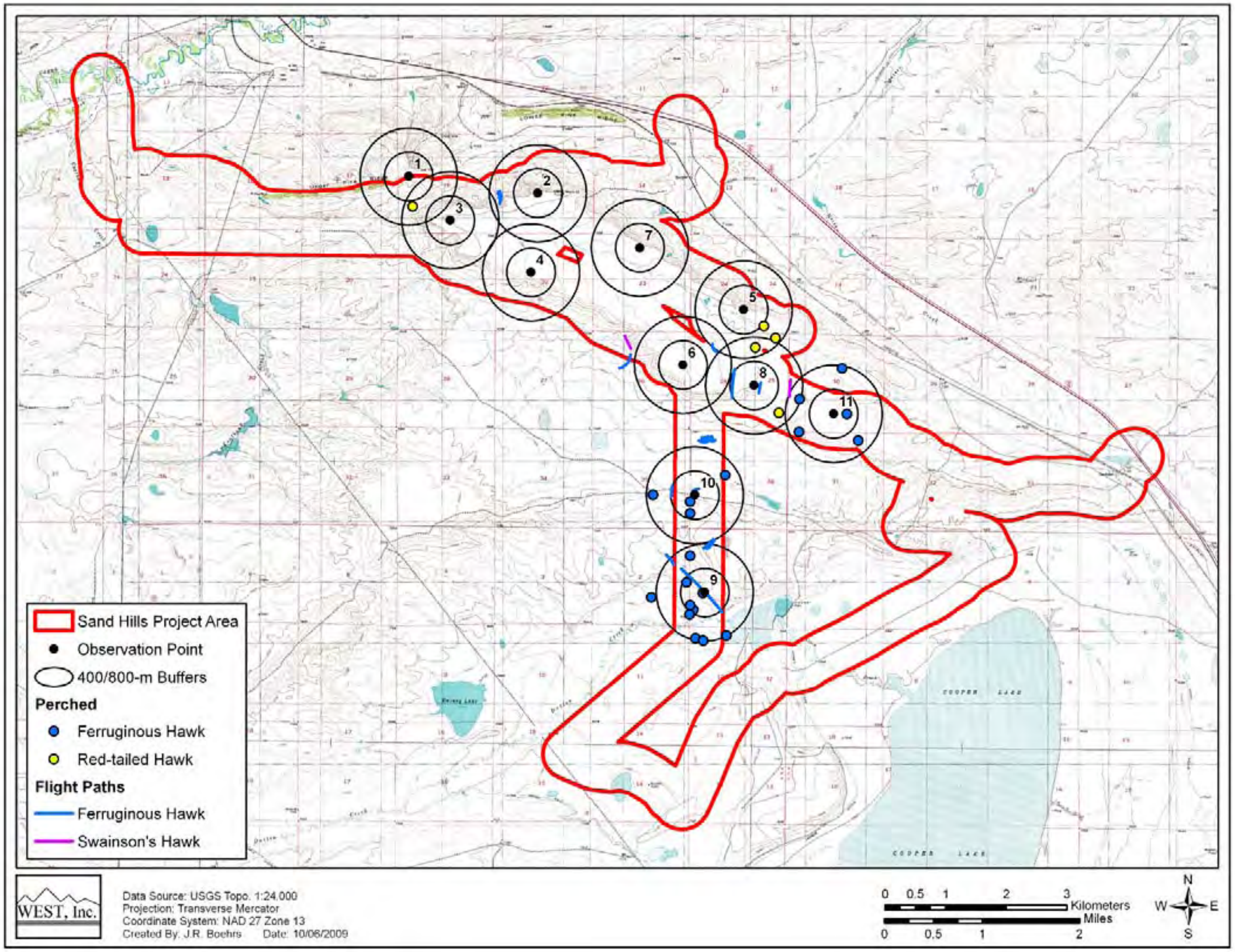


Figure 5a. Flight paths of buteos at the Sand Hills Wind Resource Area.

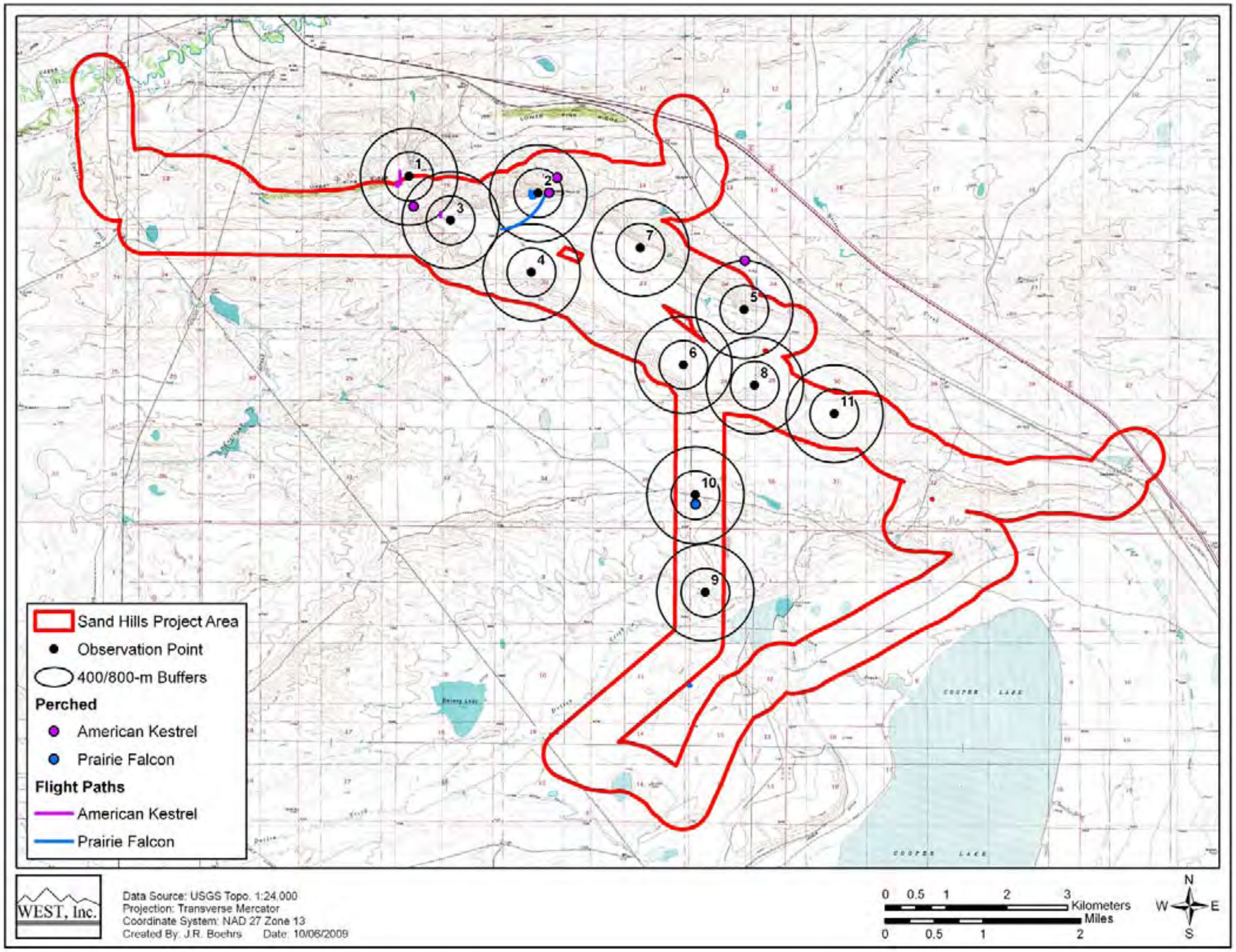


Figure 5b. Flight paths of falcons at the Sand Hills Wind Resource Area.

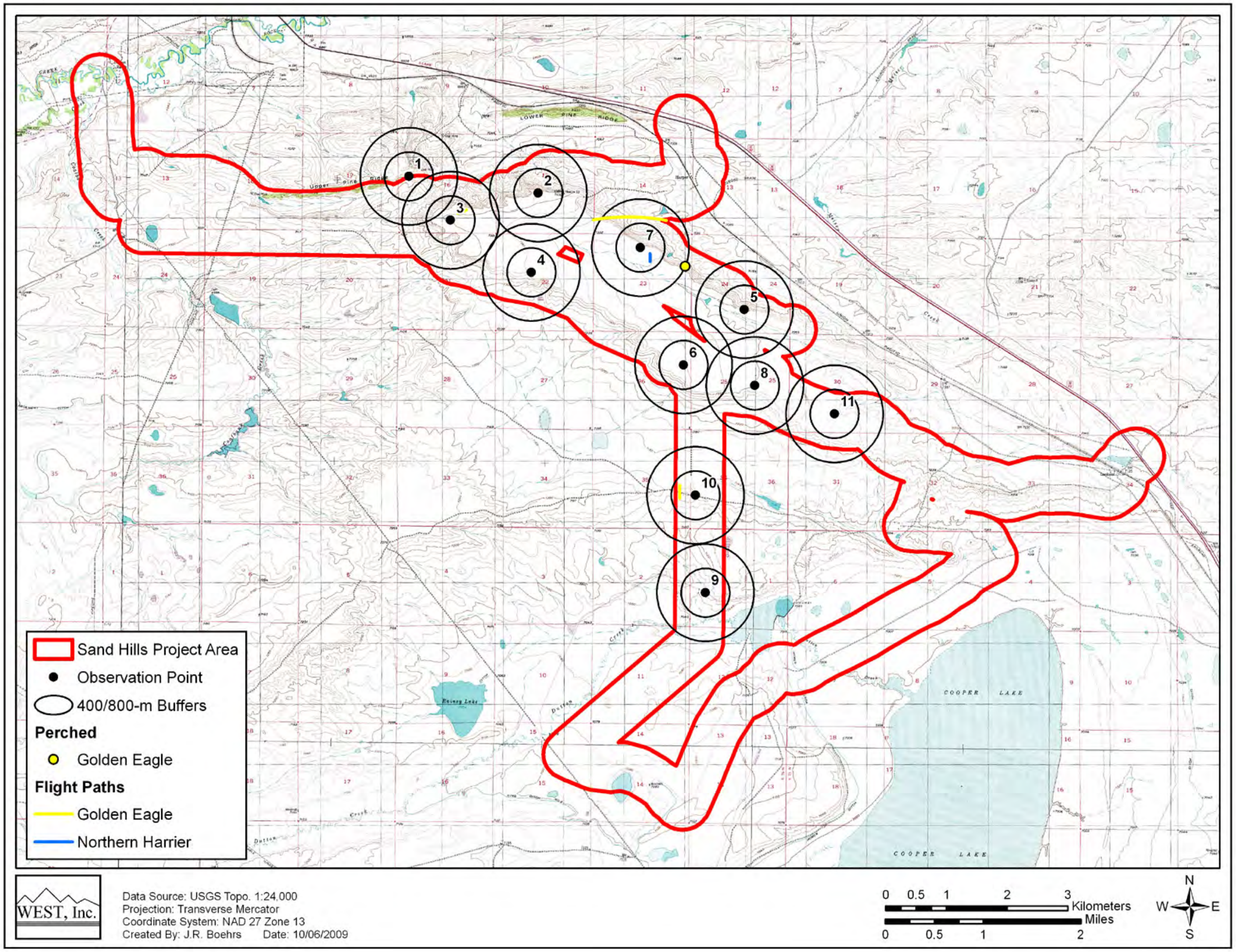


Figure 5c. Flight paths of northern harriers and eagles at the Sand Hills Wind Resource Area.

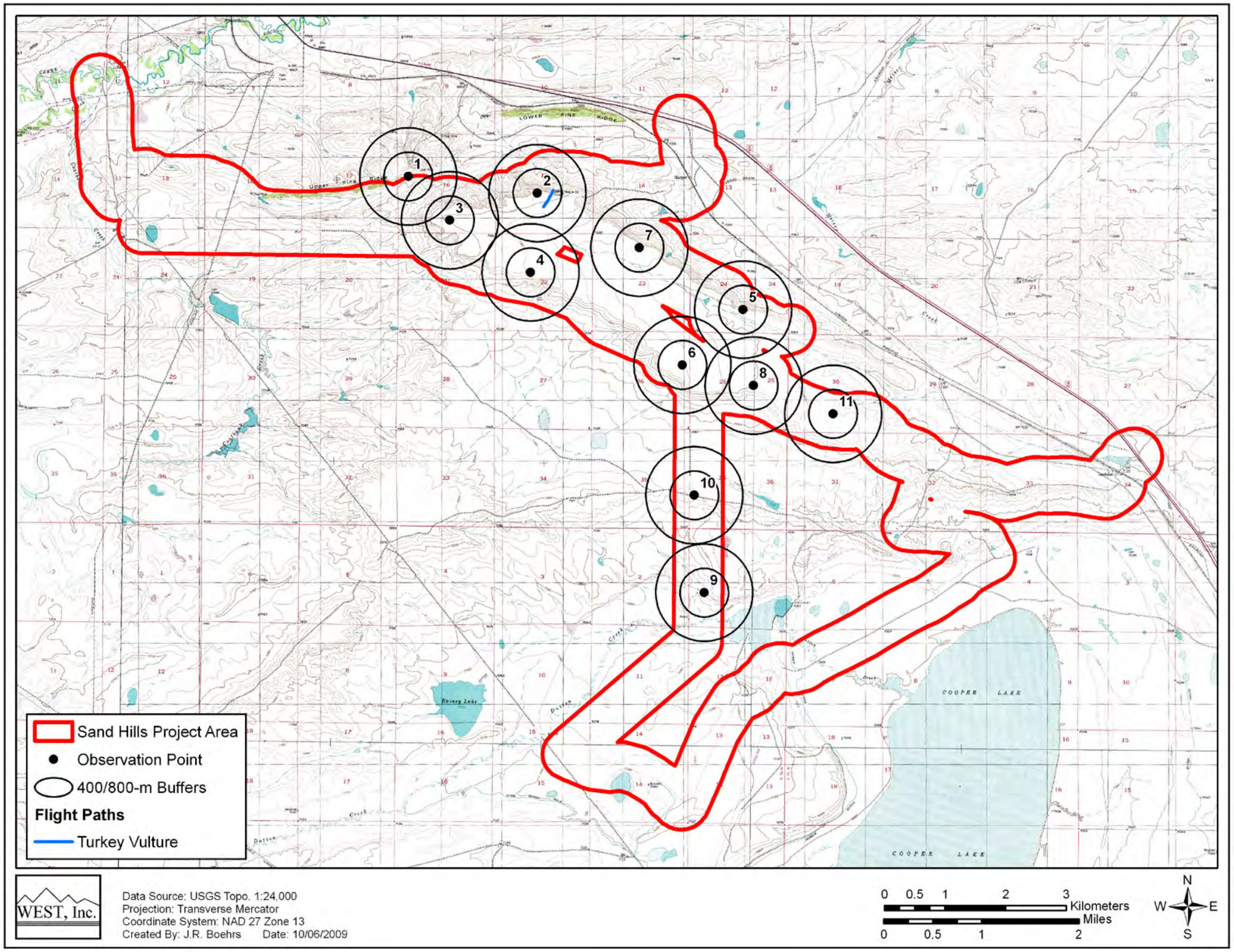


Figure 5d. Flight paths of vultures at the Sand Hills Wind Resource Area.

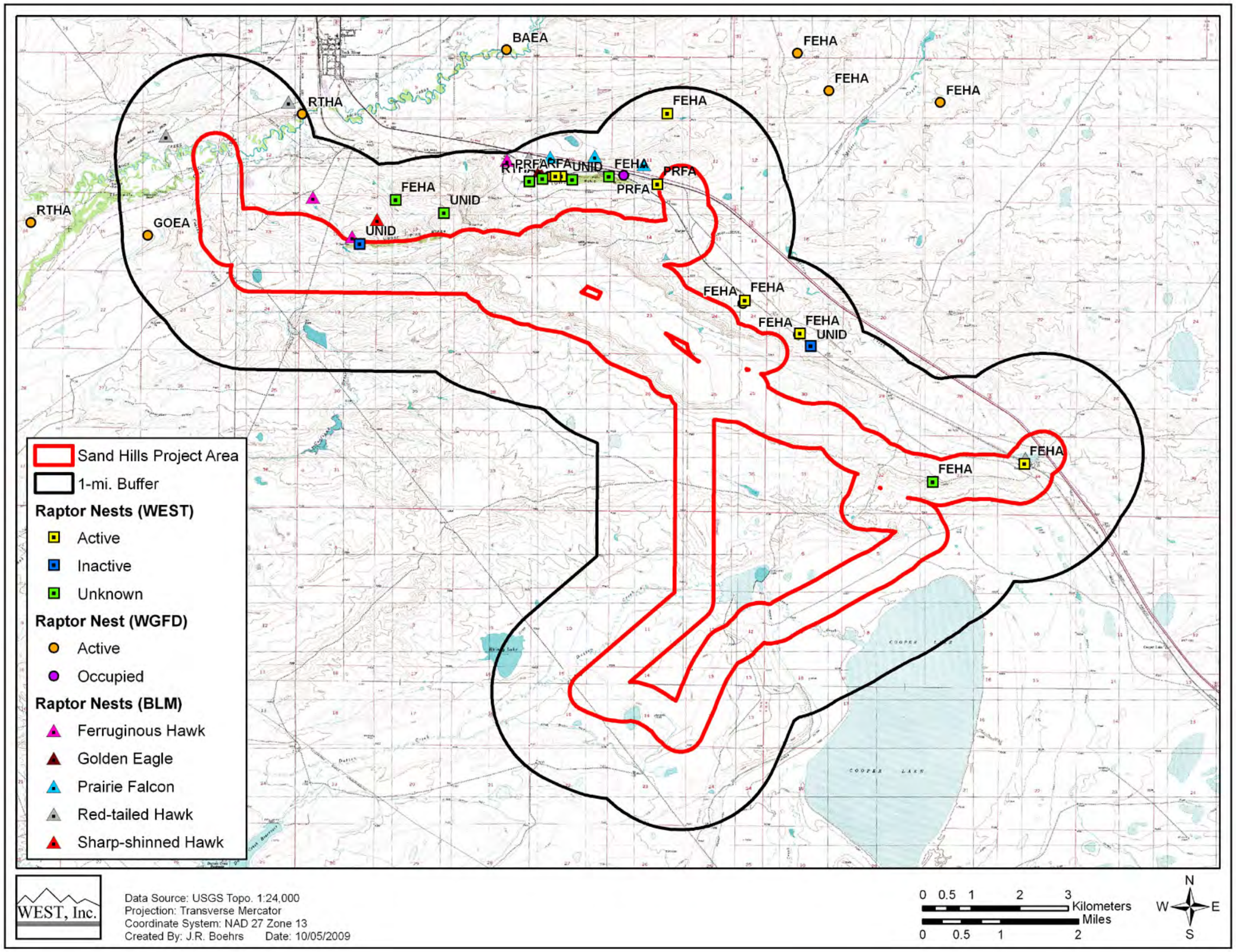


Figure 7. Location of raptor nests at the Sand Hills Wind Resource Area.

Figure 8 (Photographs 1 and 2). Grassland plateau with presumed northern pocket gopher mounds (upper photo) and steeper slopes with rocky shoulders adjacent to the plateau (lower photo).

Figure 8 (*continued*; Photographs 3 and 4). Slopes tapering to grassland/sagebrush valley (upper photo) and pocket gopher mounds on rocky hillslope (lower photo).

Figure 8 (*continued*; Photograph 5). Pocket gopher mounds on shoulder of rocky hillslope.

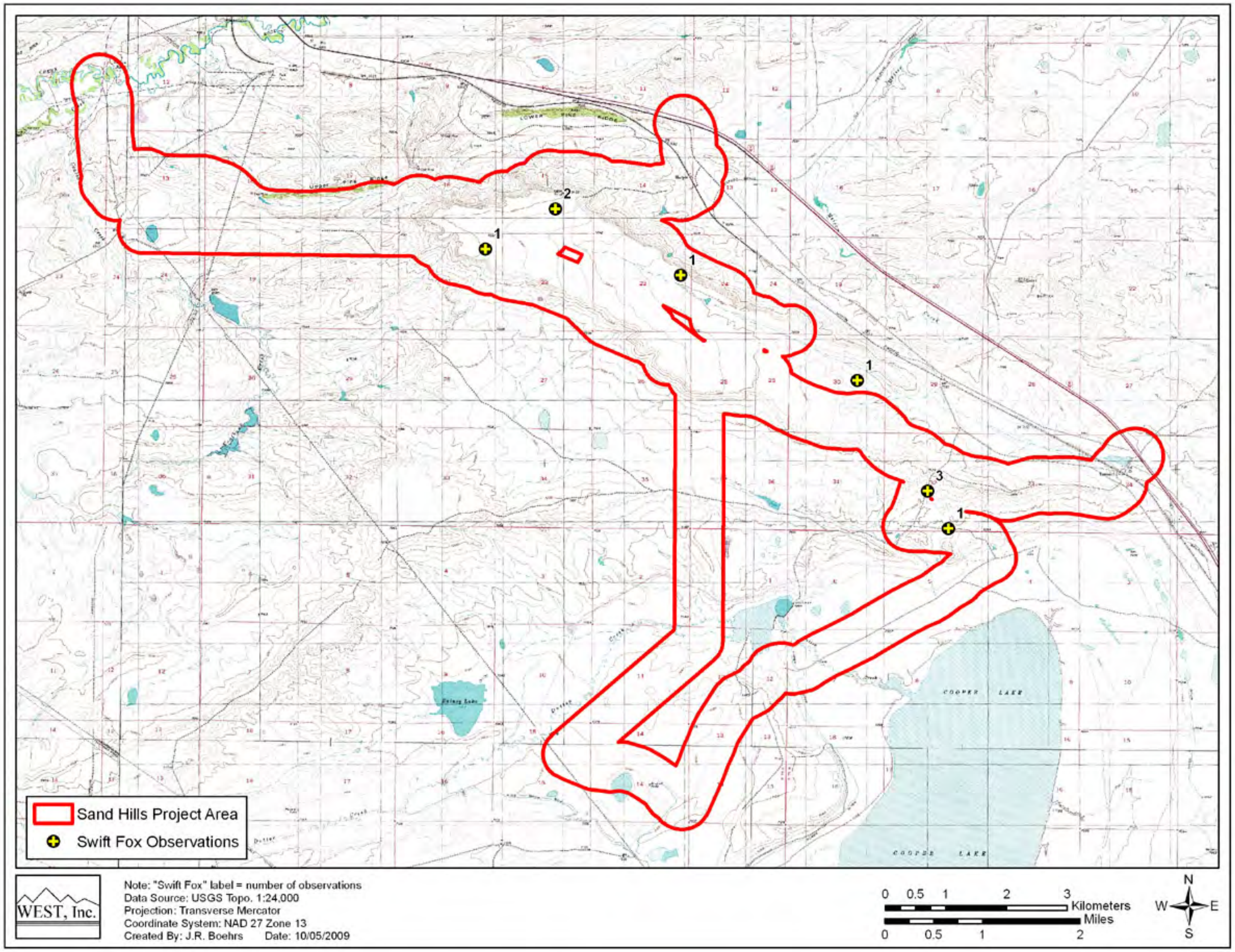


Figure 9. Swift fox locations within the Sand Hills Wind Resource Area.

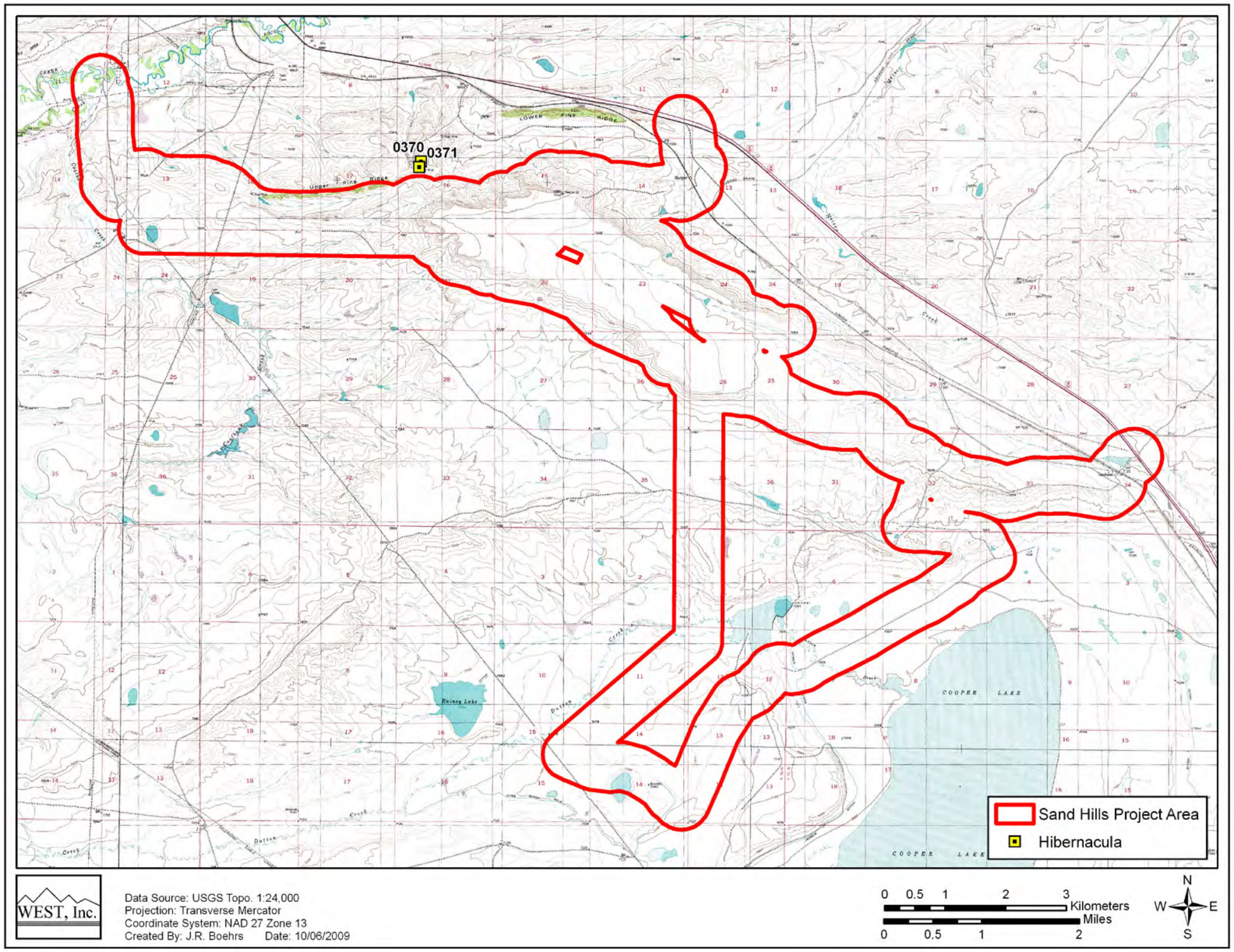


Figure 10. Potential bat hibernacula locations adjacent to the Sand Hills Wind Resource Area.

Figure 11 (Photographs 1 and 2). Caves potentially used as bat hibernacula at the Sand Hills Wind Resource Area

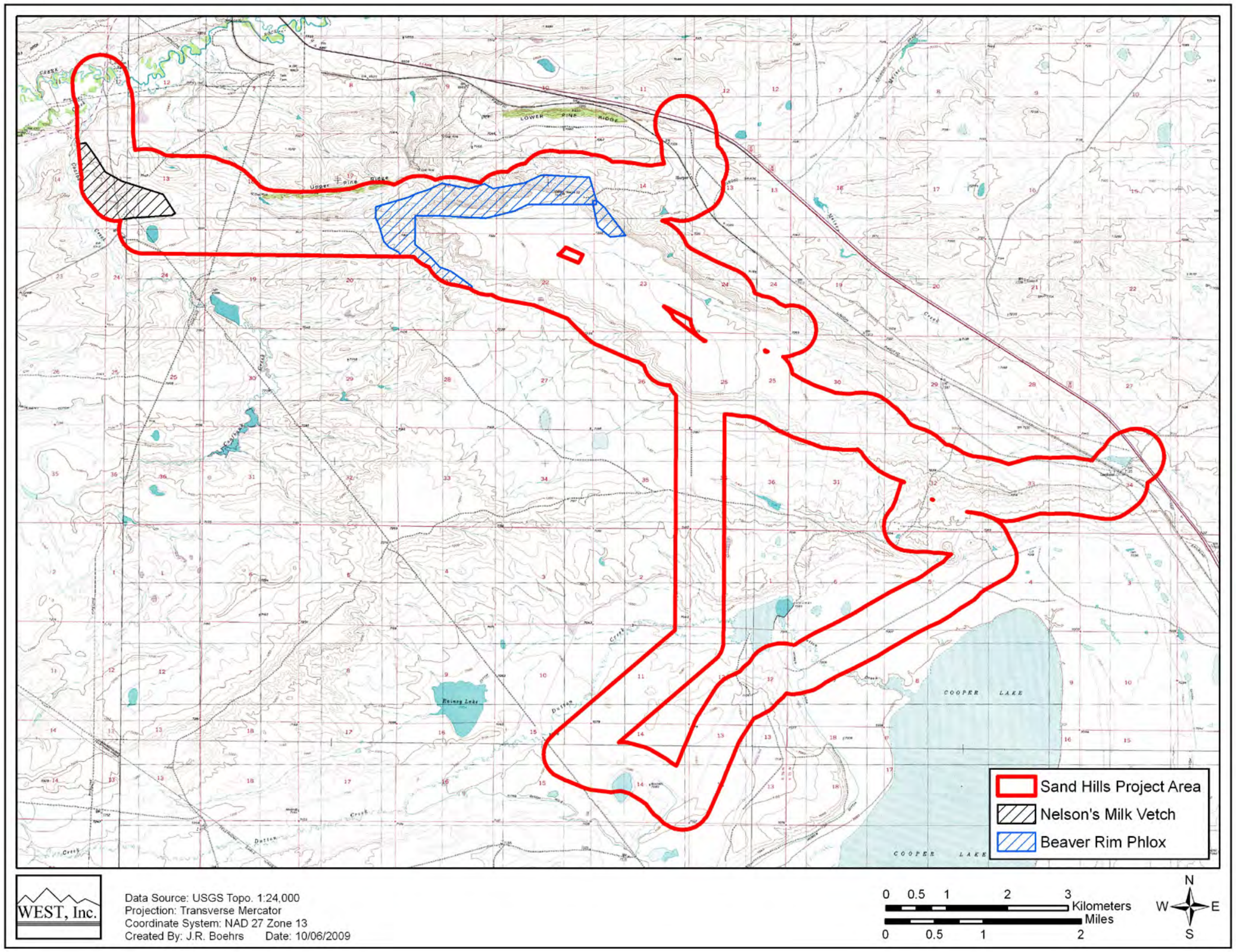


Figure 12. BLM sensitive plant species survey areas at the Sand Hills Wind Resource Area.

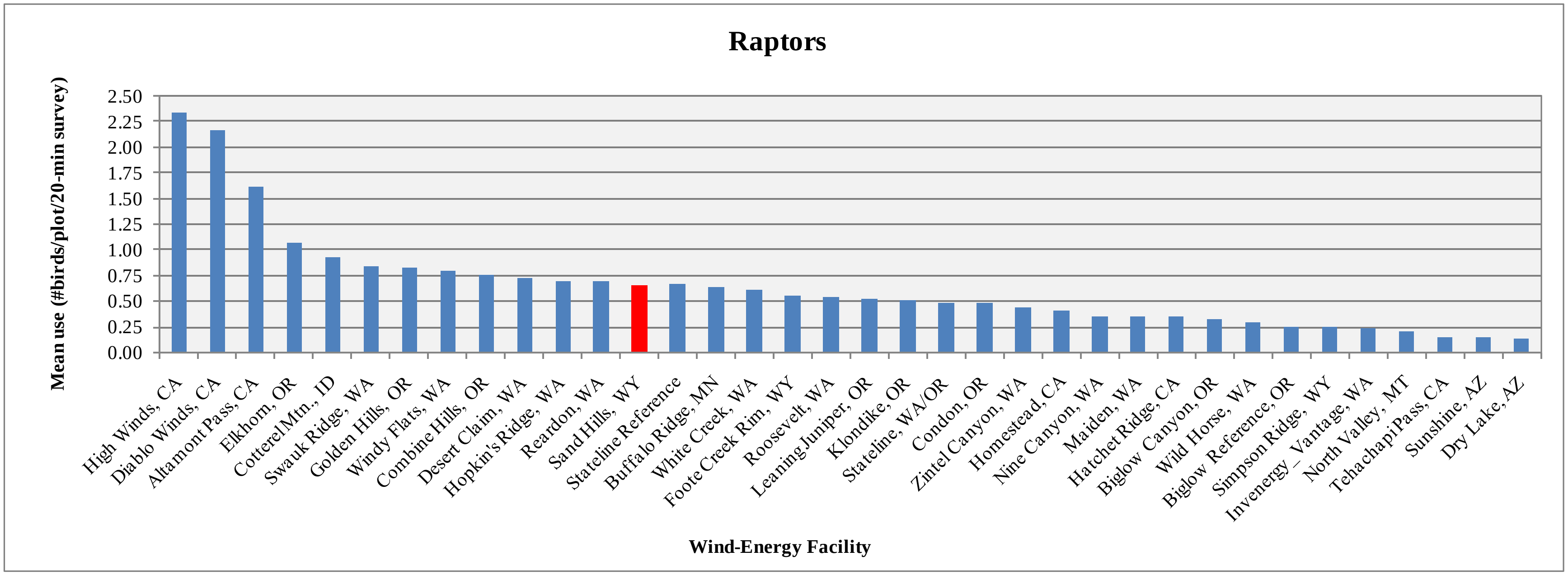
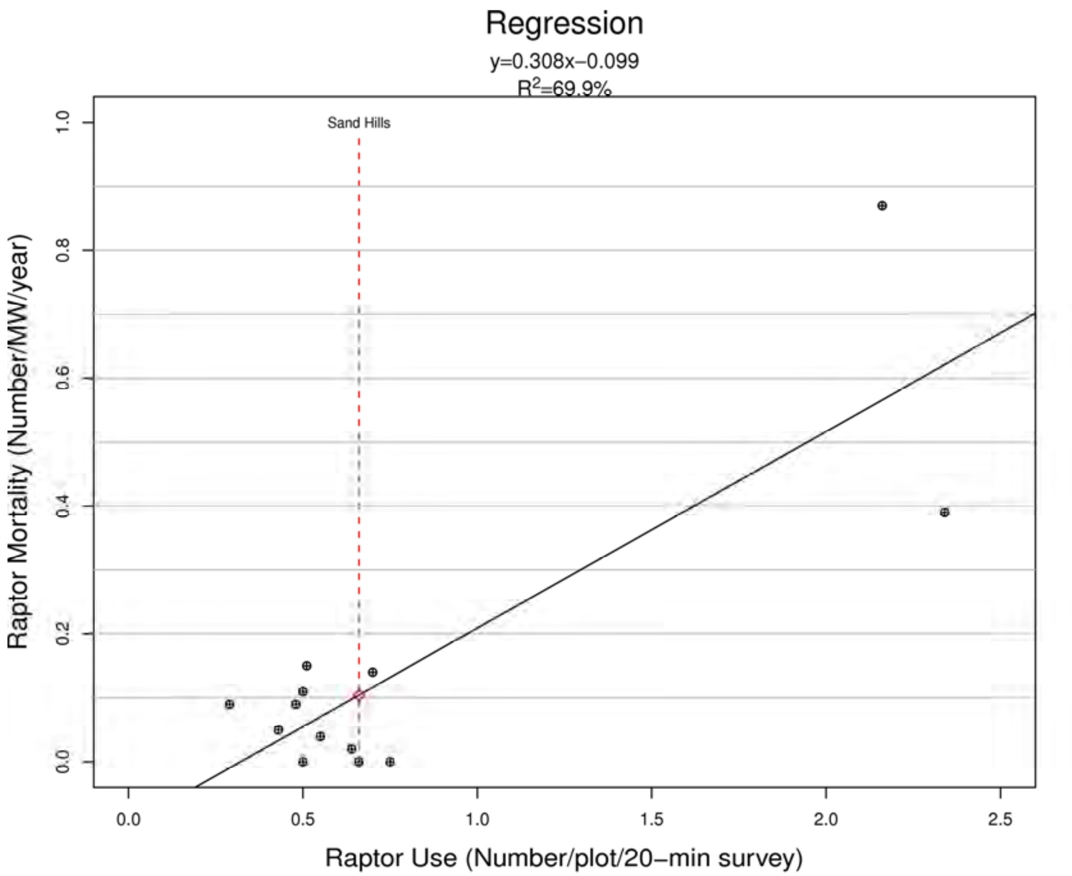


Figure 13. Comparison of raptor use between the Sand Hills Wind Resource Area and other US wind-energy facilities with data for three or four seasons.

Data from the following sources:

Sand Hills, WY	This study.				
High Winds, CA	Kerlinger et al. 2005	Stateline Reference	URS et al. 2001	Maiden, WA	Erickson et al. 2002b
Diablo Winds, CA	WEST 2006a	Buffalo Ridge, MN	Erickson et al. 2002b	Hatchet Ridge, CA	Young et al. 2007b
Altamont Pass, CA	Erickson et al. 2002b	White Creek, WA	NWC and WEST 2005	Biglow Canyon, OR	WEST 2005c
Elkhorn, OR	WEST 2005a	Foote Creek Rim, WY	Erickson et al. 2002b	Wild Horse, WA	Erickson et al. 2003a
Cotterel Mtn., ID	Cooper et al. 2004	Roosevelt, WA	NWC and WEST 2004	Biglow Reference, OR	WEST 2005c
Swauk Ridge, WA	Erickson et al. 2003b	Leaning Juniper, OR	Kronner et al. 2005	Simpson Ridge, WY	Johnson et al. 2000b
Golden Hills, OR	Jeffrey et al. 2008	Klondike, OR	Johnson et al. 2002	Invenergy_Vantage, WA	WEST 2007
Windy Flats, WA	Johnson et al. 2007	Stateline, WA/OR	Erickson et al. 2002b	North Valley, MT	WEST 2006b
Combine Hills, OR	Young et al. 2003d	Condon, OR	Erickson et al. 2002b	Tehachapi Pass, CA	Erickson et al. 2002b
Desert Claim, WA	Young et al. 2003b	Zintel Canyon, WA	Erickson et al. 2002a	Sunshine, AZ	WEST and the CPRS 2006
Hopkin's Ridge, WA	Young et al. 2003a	Homestead, CA	WEST et al. 2007	Dry Lake, AZ	Young et al. 2007c
Reardon, WA	WEST 2005b	Nine Canyon, WA	Erickson et al. 2001b	San Gorgonio, CA	Erickson et al. 2002b



Overall Raptor Use 0.66
Predicted Fatality Rate 0.10 fatalities/MW/year
90.0% Prediction Interval (0, 0.36 fatalities/MW/year)

Figure 14. Regression analysis comparing raptor use estimates versus estimated raptor mortality.

Data from the following sources:

Study and Location	Raptor Use (birds/plot /20-min survey)	Source	Raptor Mortality (fatalities/MW/yr)	Source
Buffalo Ridge, MN	0.64	Erickson et al. 2002b	0.02	Erickson et al. 2002b
Combine Hills, OR	0.75	Young et al. 2003d	0.00	Young et al. 2005b
Diablo Winds, CA	2.161	WEST 2006a	0.87	WEST 2006a
Foote Creek Rim, WY	0.55	Erickson et al. 2002b	0.04	Erickson et al. 2002b
High Winds, CA	2.34	Kerlinger et al. 2005	0.39	Kerlinger et al. 2006
Hopkins Ridge, WA	0.70	Young et al. 2003a	0.14	Young et al. 2007a
Klondike II, OR	0.50	Johnson 2004	0.11	NWC and WEST 2007
Klondike, OR	0.50	Johnson et al. 2002	0.00	Johnson et al. 2003
Stateline, WA/OR	0.48	Erickson et al. 2002b	0.09	Erickson et al. 2002b
Vansycle, OR	0.66	WCIA and WEST 1997	0.00	Erickson et al. 2002b
Wild Horse, WA	0.29	Erickson et al. 2003a	0.09	Erickson et al. 2008
Zintel, WA	0.43	Erickson et al. 2002a	0.05	Erickson et al. 2002b
Bighorn, WA	0.51	Johnson and Erickson 2004	0.15	Kronner et al. 2008

Appendix D
Visual Simulations

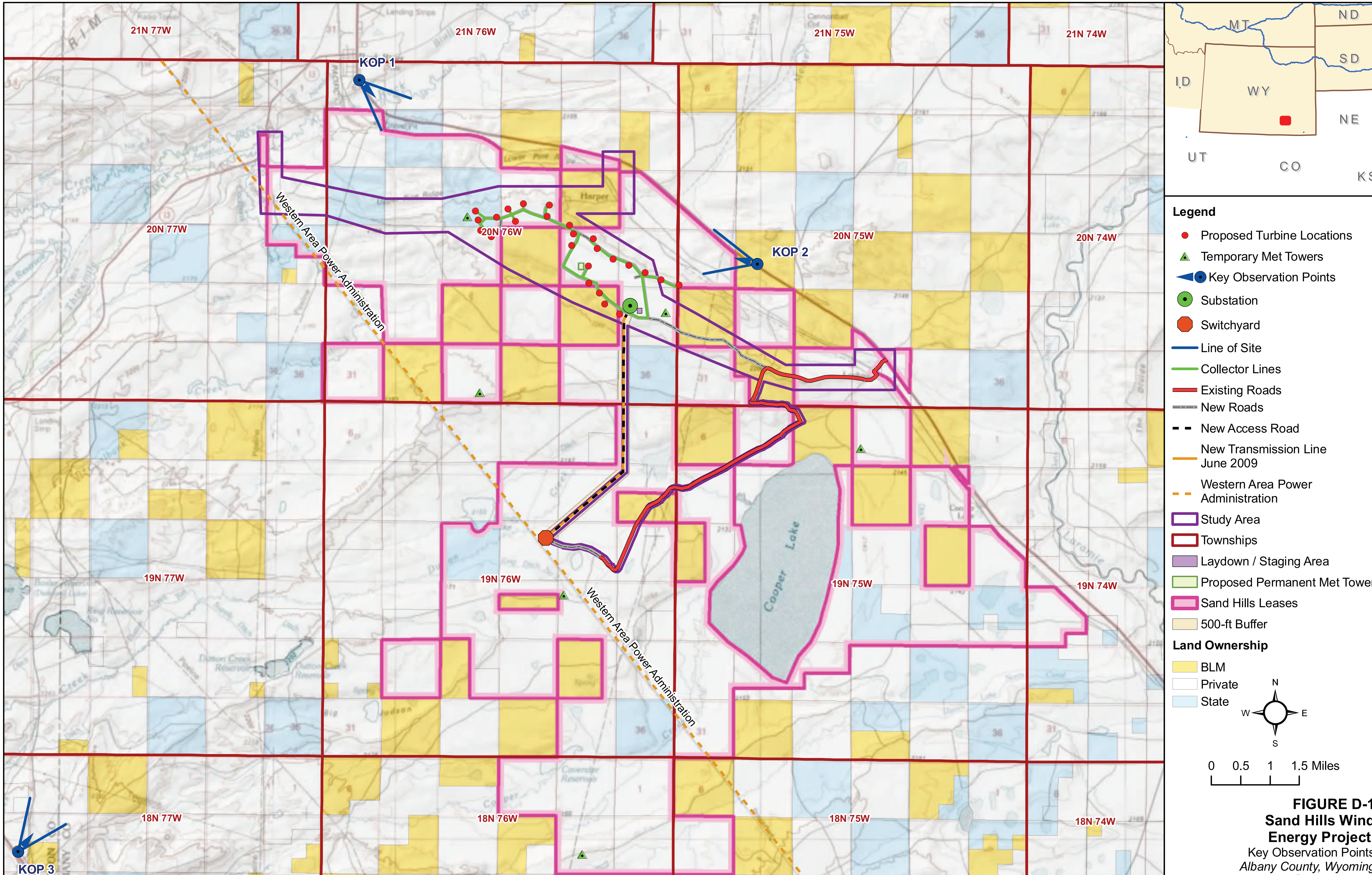


FIGURE D-1
Sand Hills Wind Energy Project
Key Observation Points
Albany County, Wyoming

CH2MHILL

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Figure D-2a: KOP 1 (existing): View looking south from Rock River, along US Highway 287/30. The project site is located on the top of the mesa that rises above the landscape in the area to the south of Rock Creek.

Figure D-2b: KOP 1 (proposed): Partially screened view of the project site with proposed project features in place.

Figure D-3a: KOP 2 (existing): View looking west of US Highway 287/30 at a point approximately 7.6 miles southeast of Rock River. The project site is located on the top of the mesa visible on the left side of the view.

Figure D-3b: KOP 2 (proposed): Partially screened view of the project site with proposed project features in place.

Figure D-4a: KOP 3 (existing): View of the project site from Interstate 80, looking northeast. The project site is located on top of the mesa that is visible as the second ridgeline in the photo.

Figure D-4b: KOP 3 (proposed): Unobstructed view of the project site from approximately 13.21 miles from the closest proposed turbine.

Appendix E
Environmental Compliance Inspection Program

Shell Wind Energy
Sand Hills Wind Farm Project

Environmental Compliance/Inspection Program

1.0 INTRODUCTION

Shell WindEnergy Inc. (SWE) has established an inspection and monitoring program to be implemented where BLM land is affected for the Sand Hills Wind Farm Project (Project) consisting of Field Project Manager (FPM), Compliance Manager (CM) and Compliance Inspector(s) (CI). The FPM will provide oversight of the Project activities and the CM will work with the contractors' key personnel to ensure compliance with SWE's obtained environmental permits, agency agreements, and approved mitigation measures. SWE will implement an Environmental Training Program (ETP) as specified in Section 4 ranging from classroom-style group meetings to field "tail-gate" sessions with individual crews to ensure that all Project personnel are aware of the Project's requirements and commitments.

This Environmental Compliance/Inspection Program (ECIP) discusses:

- How SWE will incorporate permit requirements into the various Project documents;
- How SWE would implement the Project mitigation measures through its environmental inspection and resource monitoring program;
- Distribution and control copies of Project materials;
- SWE's plans for environmental training;
- The Project's organizational management structure to be used during construction; and
- The procedures SWE will implement should a noncompliance activity occur.

Implementation of the plan will allow the plan administrators to monitor and document the implementation of mitigation measures included in the Environmental Assessment (EA) Decision Record (DR) and the Bureau of Land Management (BLM) Right-of-Way (ROW) Grant. SWE will comply with the BLM ROW Grant (including the Plan of Development [POD] and Appendices).

The BLM Rawlins Field Office (RFO) will ensure requirements and mitigation measures provided in these documents and included in the EA and DR provided for the Project are implemented by SWE.

2.0 PROJECT DOCUMENTS

2.1 Environmental Documents

SWE will compile documentation of applicable environmental permits, authorizations, and approvals, into Project-specific Environmental Compliance Manuals and Environmental Permit Books that will be available to all construction personnel, including contractors, prior to construction. The environmental requirements included in these documents will be reviewed with key construction personnel prior to construction to promote compliance with the Project's requirements. SWE's Environmental Compliance Manuals and Environmental Permit Books would likely include:

- SWE POD with appendices, including:
  - BLM Stipulations – EA DR
  - Typical Construction Drawings
  - Waterbody and Wetland Location Tables
  - Approved Seed Mixes
  - Traffic and Transportation Management Plan
  - Fire Prevention and Suppression Plan
  - Conservation Measure Plan (Mitigation Section)
  - Spill Prevention, Containment, and Countermeasure Plan
  - Weed Management Plan
- U.S. Fish and Wildlife Service Special Status Species Survey Plan
- BLM Sensitive Species Survey Plan
- U.S. Fish and Wildlife Service Conservation Measure Plan
- Stormwater Pollution Prevention Plan and Construction Stormwater Permit
- Cultural Resources Monitoring and Mitigation Plan

2.2 Contract Penalties

SWE's contracts with construction companies will include language that specifies the consequences for environmental non-compliance, including the following penalties and affirmative obligations:

- All contractors and any subcontractors will comply with the environmental permits and regulations;

- SWE and its authorized representatives have the authority to stop activities that are not in compliance with environmental requirements and to consult on necessary remediation/corrective measures;
- SWE and its authorized representatives have the authority to require retraining or removal of any personnel, as deemed necessary or fit; and
- All contractors and any subcontractors shall correct any work that fails to conform to the requirements of the contract.

3.0 ENVIRONMENTAL COMPLIANCE/INSPECTION PROGRAM

The ECIP describes the measures that SWE and its contractors will implement to construct and operate the Project in compliance with all federal, state, and local permits and requirements. The primary purpose of the ECIP is to outline procedures and protocols for managing environmental compliance during construction of the Project. SWE will provide oversight of the Project activities and will work with the contractors' key personnel to ensure compliance with SWE's Project permits, and approved mitigation measures. SWE will implement an environmental training program designed to ensure that all Project personnel are aware of the Project's requirements and commitments.

SWE expects that all staff working on the Project will work cooperatively to ensure that terms and conditions of the ROW grant will be adhered to throughout construction, reclamation and operation of the wind farm.

Guidelines identified in this ECIP apply to work within the Project Area as defined in the ROW grant.

3.1 Environmental Inspection Reporting

The CI will use an electronic reporting system to record information for each individual inspection and to document environmental compliance. The CIs will compile the daily reports for submission to the CM. The Compliance Monitoring Contractor (CMC, see section 3.4) will receive the daily reports from the CM for review, rely on field observations in order to assign compliance levels for activities monitored in the daily reports, and use the daily reports to compile weekly reports to the BLM. The CMC will submit weekly reports to the BLM Project Manager and the CM.

Daily Inspection Reports – The CI will prepare daily inspection reports and submit them to the CM for compilation. The CM will then submit the compiled daily inspection reports to the CMC. These reports will record information such as:

- inspection date, location, and site conditions;
- type of construction activities occurring at the site;
- document federal, state, and local permits conditions evaluated/inspected and compliance with these conditions; and
- document any corrective actions that may be needed or have been completed at the site.

Each separate activity inspected and documented in a daily inspection report will be assigned a compliance level (see section 6.0).

The CI will also use digital photographs to document compliance activities, noncompliance issues, and sensitive resource areas throughout construction. The pertinent digital photos will be included with each report and submitted electronically to the CM

Weekly Inspection Summary Reports – The CMC will prepare a weekly inspection summary report documenting activities that have occurred during that week where BLM lands are affected. The report will include:

- a summary of the current construction status;
- a schedule of planned activities such as waterbody crossings or work in other environmentally sensitive areas;
- a list of noncompliance activities observed;
- corrective actions observed or to be implemented to address problem areas or noncompliance activities; and
- a description of the effectiveness of implemented corrective actions.

The weekly status report will be submitted to CM and BLM PM by close of business Wednesday of the following week. Each weekly status report will include a description of any landowner/resident complaints that may relate to compliance with the requirements of the BLM DR and other environmental conditions, and the measures taken to satisfy their concerns. Copies of correspondence received by SWE from other federal, state, or local permitting agencies concerning instances of noncompliance on or affecting BLM lands and SWE's response will also be included. SWE will provide copies of the weekly status report to other federal, state, and local agencies with permitting responsibilities as stipulated in those permit conditions.

3.2 BLM Third-Party Compliance Monitors

SWE has committed to providing funding to hire a third-party Compliance Monitoring Contractor (CMC) to oversee the compliance monitoring program during construction of the Project. The overall objective of the compliance monitoring program is to monitor and document SWE's compliance with the Project's environmental requirements during construction. The compliance monitoring program will be implemented under the direction of the BLM and is included in Appendix 1 of this plan.

4.0 PROJECT ENVIRONMENTAL TRAINING

SWE will implement an Environmental Training Program (ETP) prior to the start of construction and on an ongoing, as-needed basis during construction to support compliance with environmental requirements. SWE's ETP is designed to consistently communicate the Project requirements to every individual working on the Project so that both managers and workers understand SWE's expectations, Project-specific requirements, and how to incorporate them into their daily work activities. The training program will focus on SWE's environmental mitigation plans and procedures, the BLM's DR, and other Project-specific permit conditions. All personnel working on the Project will be required to attend environmental training prior to entering the right-of-way, and other associated areas (e.g., staging areas). SWE will ensure that all visitors to the Project do not violate any conditions prior to entering the Project during construction activities.

Each person trained will be required to sign a training attendance roster and will be issued a certification (i.e., hard-hat sticker) identifying that they have been notified of and understand the Project's environmental requirements. No person will be allowed to enter any construction work area without prior environmental training. SWE will maintain environmental training attendance records through the end of construction.

SWE will conduct several levels of environmental training or may conduct one highest level of training for all personnel. The FPM, CM, CI, CMC, and construction managers and foremen will undergo the most thorough environmental training. Training will include presentations as well as small group discussions of general topics such as:

- permit requirements;
- reporting and corrective action requirements;
- erosion and sediment controls;
- waterbody crossing and mitigation procedures;
- wetland crossing and mitigation procedures;

- refueling restrictions;
- spill prevention and cleanup measures;
- incised bank stabilization measures;
- noxious and invasive weed control procedures;
- noise and dust mitigation measures;
- solid waste disposal;
- restoration and reseeding; and
- emergency response procedures.

Site-specific topics such as avoidance of threatened and endangered species and cultural resources sites will also be discussed. Training will include an overview of each environmental permit's requirements and the environmental plans associated with the Project. The FPM, CM, CI, CMC, construction managers and foremen will also be trained in the third-party variance request process (included in Variance Plan), as well as the compliance tasks that will be assigned to construction activities. The BLM management staff will be invited to attend and participate in these training sessions.

Training Sessions

Training – The FPM, CM, CI and CMC's training program will cover in detail the Project-specific environmental plans and permits, environmental compliance and reporting procedures, proper documentation, and noncompliance issue resolution process. The participants will be provided with detailed information regarding permit conditions, Project-specific mitigation plans, and Project-wide environmental and construction issues. Particular attention and emphasis will be given to how SWE's environmental mitigation requirements will apply to the site-specific conditions found on the Project. SWE's training sessions will take place at a location near the Project site prior to preconstruction activities (e.g., ROW flagging, installation of signs and exclusion fencing). SWE's training sessions will include presentations, distribution of Project environmental documents, and in-depth discussions of the Project-specific requirements and reporting procedures. The BLM management staff will be invited to participate in these training sessions.

Company Inspection Staff and Contractor Supervision Personnel Training – SWE will conduct separate one day environmental training sessions for craft inspectors, contractor supervisory personnel, and SWE personnel. These environmental training sessions will include in-depth discussions of the Project-specific environmental requirements; describe the role and responsibility of the FPM, CM, CI and CMC; and discuss general environmental resource protection measures to be employed during construction. Each training session will take place prior to the commencement of construction activities.

General Crew Training – SWE will require all other Project personnel who do not receive the training mentioned above (general construction crews, etc.) to attend an environmental training session prior to starting work on the Project. These environmental training sessions will be conducted as large group sessions. As with the other types of training, these sessions will include discussions of general topics such as waterbody and wetland crossing procedures, refueling restrictions, and site-specific topics such as avoidance of protected species and habitat and cultural resource sites. Contractor personnel will be provided a point of contact for questions regarding environmental matters and in the event of an emergency. These sessions will also present other general information such as the use of Project markers (e.g., wetland crossing signs, flagging, avoidance fencing), and the repercussions of noncompliance with the Project's environmental requirements.

New Arrival Training – After construction kickoff, the CM will conduct environmental training for new employees as they arrive on the Project. These training sessions will include short, area-specific presentations by the CM and/or CI tailored to the respective audiences. All new arrivals will be provided appropriate training prior to being allowed on the Project. SWE will determine whether visitors will be allowed on the Project, taking into account safety. The CM will also provide additional selected crew training and remedial training for individuals and crews, as necessary, throughout construction to maintain an appropriate level of environmental compliance.

Tailgate Training – Daily tailgate training will be provided by the CM or CI to select crews prior to beginning work in sensitive environmental areas or where specialized construction techniques are required. The tailgate training will be brief, will typically be held onsite, will be held in conjunction with the daily safety tailgate and will focus on the environmental requirements for the specific site. Remedial tailgate training may also occur following a noncompliance activity to discuss the noncompliance with the appropriate individual(s) or crew.

5.0 PROJECT ORGANIZATIONAL MANAGEMENT STRUCTURE

This section describes the roles and responsibilities of key Project personnel involved with SWE's ECIP. Some personnel may have multiple roles as is appropriate and could be employed directly by SWE or through a contractor.

5.1 Field Project Manager (FPM) : The FPM will direct construction of the components of the Project and oversee the Compliance Manager (CM) and Compliance Inspector(s) (CI). Responsibilities to include:

- safe construction of the Project in compliance with company specifications, applicable professional codes, environmental aspects of the BLM ROW grant

(including the POD and appendices), and environmental regulations and requirements;
- review and evaluate variance requests with the CM.

5.2 Compliance Manager (CM): a CM will be on the Project for the duration of construction. Responsibilities include:

- work with the CI to ensure compliance with company specifications, safety code and regulations, applicable professional codes, environmental aspects of the BLM ROW grant (including the POD and appendices) and environmental regulations and requirements;
- prepare and evaluate variance requests with CI before they are sent to the FPM for final review;
- submit variance request to the CMC for required approval;
- compile daily reports submitted by the CI;
- timely submittal of daily reports to CMC;
- overall responsibility for implementation of the environmental training program;
- communicate with the CI regularly to obtain/verify environmental guidance, and evaluate implementation of environmental mitigation measures; and
- interact with regulatory agencies.

5.3 Compliance Inspectors (CI): Oversees and inspects implementation of environmental and other mitigation on the Project. The CI reports directly to the CM. Responsibilities include:

- assist in developing training programs and materials;
- oversee implementation of environmental mitigating measures;
- verify boundaries designating sensitive resources are properly identified and marked, and provide photo documentation where required;
- coordinate with the CM and CMC regarding implementation of environmental requirements, and significant environmental issues;
- conduct on-going quality assurance field visits to evaluate environmental compliance and facilitate resolution of issues;
- provide interpretation and clarification regarding conditions included in the BLM ROW grant, and other mitigating documents (including the POD and appendices);
- anticipate and correct potential environmental compliance problems;
- coordinate regularly with FPM, CM, BLM Project Manager and land owners, and BLM Compliance Monitors to address agency/land owner concerns;
- ensure implementation of corrective measures; and
- ensure construction is in compliance with environmental conditions and requirements contained in the BLM ROW grant (including the POD) and environmental regulations and requirements.

SWE may also retain a CI that acts as Resource Inspectors (RIs) (i.e., Biological RIs, and Cultural RIs) if they have the expertise. RIs will be assigned to inspect and monitor construction and restoration activities in areas containing sensitive environmental features. The RIs will be considered integral members of SWE's Compliance Inspection team and, accordingly, will be included in all relevant job communications and work plans and will report directly to the CM. The RIs will, among other responsibilities, help ensure that provisions of the applicable resource mitigation measures are adhered to by the construction contractor and subcontractors, and that concerns related to compliance with the applicable mitigation measures are addressed.

Biological Resource Inspectors

The Biological RI will monitor construction activities in areas that have been identified as having sensitive biological resources including known locations of threatened, endangered, or sensitive species and/or species habitat. The monitoring will occur as defined in the Wildlife Monitoring Plan, Appendix I of the EA. The CM will coordinate with the Biological RI during construction to ensure that appropriate inspection and monitoring coverage is maintained where necessary throughout the Project.

Cultural Resource Inspectors

The Cultural RI will follow the guidelines of the Unanticipated Discovery Plan for cultural resources set forth in the BLM ROW grant. The CM will coordinate with the Cultural RI during construction to ensure that all stipulations as defined in the BLM ROW grant are maintained throughout the Project.

6.0 COMPLIANCE MANAGEMENT

6.1 Compliance Levels

Throughout construction, the CI will conduct site inspections to evaluate compliance with the Project's environmental requirements. Verification of Project compliance will be documented by the CI in daily inspection reports submitted to the CMC.

Each separate activity inspected and documented will be assigned one of the five following compliance levels:

- acceptable;
- incident;
- minor problem;
- noncompliance; or
- serious noncompliance.

The CI will assess non-acceptable activities (i.e., incidents, minor problems, noncompliances, and serious noncompliances) based on the extent and nature of actual impacts on resources, the potential for additional impacts, the intent behind an action, and the history of occurrence.

Acceptable – An acceptable inspection report will be issued when the activities observed are in compliance with the Project environmental requirements.

Incident – An incident report will be issued when an accidental or unforeseeable event is determined to be inconsistent with SWE's specified environmental mitigation measures but has little or no damage to an environmental resource, and the response to the event is in compliance with the Project environmental requirements. An example of an incident is when a fuel leak is observed and the Project personnel respond by stopping, containing, and cleaning up the spill in accordance with the project environmental requirements. Typically, incidents will be handled on an informal basis if they are addressed in a timely manner so that risks are not compounded and site environmental integrity is not compromised. When an incident is observed by a CI, the CI will point out the incident to an appropriate individual or crew, specify the required corrective action and timeframe, and confirm that the correction has been made. The CI will document incidents to track occurrence and identify areas that may require follow-up inspections. If an incident is found to be a repeat occurrence, the CI will document the incident as a noncompliance. Such situations will also be discussed with the contractor's management staff.

Minor Problem – A minor problem report will be issued when an event is determined to be inconsistent with SWE's specified environmental mitigation measures, but has little or no damage to an environmental resource. An example of a minor problem would be if a small amount of soils has escaped erosion controls and observed off the ROW but has no effect on sensitive resources. The EI will inform the construction staff about the problem before issuing the minor problem report. Typically, minor problems will be handled on an informal basis if they are addressed in a timely manner so that risks are not compounded and site environmental integrity is not compromised. If a minor problem is found to be a repeat occurrence or multiple occurrences of a similar nature, or is not corrected within the established timeframe, the CI will document the minor problem as a noncompliance.

Noncompliance – A noncompliance report will be issued when an activity is observed that violates the Project's environmental permits, plans, or conditions; causes damage to an environmental resource; or places environmental resources at risk. Examples of noncompliance issues can include, but are not limited to: the failure to install or maintain required erosion control devices; activities conducted outside the approved right-of-way limits or approved temporary use areas and access roads; and insufficient biological, paleontological, or cultural resources resource inspectors for the scope of work. A noncompliance report may also be issued for repeated incidents or minor problem where a pattern of noncompliance is evident. The CI will inform the CMC of all noncompliance activities.

In the event of a noncompliance activity, the CI will take immediate action to inform the appropriate contractor personnel, and to identify the required corrective action and appropriate priority and timeframe for completing the corrective action. Where practicable and where the nature of the noncompliance activity warrants, the CI will work closely and collaboratively with the other monitors (e.g., CMC) in accordance with the Project's Compliance Monitoring Program to determine the appropriate corrective action.

Resolution of noncompliance activities will involve close coordination between the CM and CI and construction supervisory personnel to ensure that the corrective measures are properly understood and implemented. Corrective actions may include additional field environmental training or disciplinary action including removal of personnel involved in the noncompliance event if SWE believes it is warranted. The CI will follow up to confirm that corrective actions have been completed, and will document noncompliance activities and their resolution in daily inspection reports and the weekly inspection summary reports that will be compiled and submitted to the BLM Project Manager as the weekly status report. Noncompliance events and the status of corrective actions will be reported on a daily basis to the CM and CMC.

Serious Noncompliance – A serious noncompliance report will be issued when an activity causes harm or poses a serious threat to human safety and environmental resources. Examples of serious noncompliances may include:

- ongoing clearing in unapproved areas;
- placing unapproved fill in a waterbody or wetland;
-
- improper refueling in or near a waterbody or wetland;
- unapproved disturbance to cultural resources or protected species and/or habitat;
- conducting construction-related activities within restricted areas or timeframes;
- ongoing work out of approved work areas (including storing materials off ROW ;
- disturbance of an unapproved access road;
- inappropriate or lack of vehicle cleaning where cleaning is required to avoid the spread of noxious or invasive weed species;
- heavy equipment working without required mats in wetlands;
- inadequate or failed practices that are causing ongoing impacts on the environment; or
- unsafe equipment operations.

The FPM and CM will be notified of the serious noncompliance as soon as practicable. A serious noncompliance activity requires that the FPM, CM, CMC and the BLM PM participate in a conference call with the CI and assigned SWE representative to discuss the noncompliance, the proper corrective actions, and follow-up enforcement actions that should be imposed.

6.2 Stop Work Authority

As appropriate and practicable, if the CI observes an activity that is a noncompliance or serious noncompliance, the CI will coordinate with the CM, the CMC, other agency or environmental monitors, and seek concurrence from the BLM RFO Field Manager before halting work. However, the CI will not hesitate to immediately stop the activity if necessary, and will communicate directly with an individual crew member if the activity Foreman is unavailable. If appropriate or required by law or permit conditions, the CM will make necessary agency contacts.

In the case of disturbance to a known historic property, the notification process will be as follows. The person observing the disturbance (typically a Cultural RI or CI) will take immediate action to stop the activity so that further impacts are minimized. Notification to the CMC will be made with a "same day" verbal report, followed by a written report. Same day will be interpreted to be a phone call to the CMC on the day of the incident, or if near the end of the work day, the following morning. Information to be provided in the notification needs to include the name of the person seeing the incident and action or response taken. The CMC will pass the notification on to the BLM Project Manager and the BLM RFO Archaeologist promptly upon notification of the incident. In the case of disturbance to previously unknown cultural resources, the procedures identified in the Project Unanticipated Discoveries Plan will be followed.

In the event the CI or Cultural RI has a question or needs clarification, he/she should directly contact the appropriate BLM RFO Archaeologist for clarification along with a simultaneous contact to the CM. The CI or Cultural RI and CM may find it beneficial to make a joint call to the BLM RFO Archaeologist for guidance and clarification.

After a work stoppage, the construction activity will resume only when SWE and, as applicable, agency representatives, are satisfied that alternative methods or corrective actions have been implemented so that further noncompliance is avoided. Serious noncompliance activities will be documented and included in daily inspection reports where BLM land is affected will be submitted to the BLM.

Appendix 1

Compliance Monitoring Program

for the

Sand Hills Wind Farm Project

Bureau of Land Management
Rawlins Field Office

Sand Hills Wind Farm Project
Compliance Monitoring Program

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SAND HILLS WIND FARM PROJECT
Environmental Compliance Monitoring Program

1.0 INTRODUCTION

A high level of environmental compliance on the Sand Hills Wind Farm Project (Project) can be achieved by routine physical inspection of all construction utilizing a Compliance Manager (CM) and Compliance Inspectors (CIs). Shell Wind Energy LLC (SWE) will employ a CM and CIs during construction of the Project to ensure compliance with the mitigation measures contained in the project documents. In addition, SWE has committed to provide funding to implement a third-party Compliance Monitoring Contractor (CMC) to oversee the compliance monitoring program during construction of the project. The compliance monitoring program will be implemented under the direction of the Bureau of Land Management (BLM) as outlined in this document. This document presents the objectives of the program, describes the responsibilities of the CMC, outlines the level of effort anticipated, defines the decision-making authority of the selected CMC, and reviews participation by the CMC in the project training program. In addition, this document discusses the reporting and documentation requirements, and stop work authority.

2.0 PROGRAM OBJECTIVES

The overall objective of the compliance monitoring program is to monitor and document SWE's compliance with the project's environmental requirements during construction of the Project. The environmental requirements to be monitored are limited to those requirements and conditions that are either located on federal lands or those conditions that result from federal oversight of a program or resource such as requirements of the National Historic Preservation Act and the Endangered Species Act and may include:

- the environmental mitigation measures that were proposed by SWE and approved by jurisdictional agencies throughout the permitting phase of the project;
- the Plan of Development (POD), which will be appended to the BLM Right-of-Way Grant;
- the conditions contained in the BLM Decision Record and the BLM Right-of-way Grant and Temporary Use Permits;
- the U.S. Fish and Wildlife Service (FWS) Biological Opinion (BO) or letter of concurrence for listed endangered or threatened federal species or their habitat; and
- the approved treatment plan(s) for the treatment and protection of cultural resources;

During construction, full-time CMC will liaise with the CM to monitor construction activities and mitigation measures and provide regular feedback on compliance issues to the BLM and SWE. Construction progress and environmental compliance will be tracked and documented through the preparation and submittal of daily and weekly reports (see section 4.0). The CMC will report directly to the designated BLM Project Manager.

Other objectives of the compliance monitoring program are to:

- facilitate the timely resolution of compliance-related issues in the field;

- to provide continuous information to the BLM regarding noncompliance issues and their resolution; and

- to review, process, and track construction-related variance requests in a timely manner.

The CMC will assist with implementation of the variance process in accordance with a predetermined level of decision-making authority granted by the BLM (see Appendix XXX).

3.0 COMPLIANCE MONITORING AND MANAGEMENT

3.1 Level of Effort

Construction would begin with the development of roadways in the summer of 2011. The construction of the wind farm and balance of plant would likely last from spring to autumn of 2012. Because only 25 turbines will be constructed, one CMC should be sufficient for the project.

3.2 Compliance Monitoring Contractor (CMC)

The CMC will oversee management of the program; review, compile, and distribute weekly reports to the BLM; and review and approve variance requests, as appropriate to their level of authority (see Section 5.0). Specifically, the CMC will:

- report directly to the BLM Project Manager;

- participate in SWE's Environmental Training Program (ETP);

- verify SWE's compliance with the project's environmental requirements;

- supervise the monitoring activities, materials, and schedules;

- ensure that all reported noncompliances are resolved by SWE;

- review, approve, and distribute monitoring reports, correspondence, and scope of work and schedule changes;

- review work progress, schedules, and budgets;

- confer with the BLM Project Manager on a regular basis;

- serve as the contact between the agencies and SWE;

- coordinate with the BLM on reviewing and approving variance requests.

The CMC will be assisted by technical support staff as needed.

Additional responsibilities of the CMC will be to monitor and document SWE's compliance and/or noncompliance with the project's environmental requirements. Some examples of measures to be monitored include:

- limiting construction activities only to approved areas including the construction right-of-way (ROW), and temporary workspaces, off ROW yards, and access roads;

- methods and locations of topsoil segregation;

- specific waterbody crossing procedures;

- dewatering activities;

- treatment and reporting of spills;

- construction of aboveground facilities;

- observance of exclusion areas for cultural resources and sensitive species;

- stipulated presence of required Resource Inspectors (*i.e.*, paleontological, cultural, and biological monitors); and

- restoration requirements.

The CMC will provide interpretation and clarification to environmental inspection personnel in the field and SWE's CM regarding the project environmental requirements. The CMC will also review and approve variance requests, as appropriate to their authority level, for implementation of limited variations from mitigation measures previously agreed to by Overland Pass or stipulated by the BLM.

Before the start of construction, the CMC will become familiar with SWE's environmental compliance/inspection management program and participate in SWE's environmental training program. The CMC will become familiar with the roles and responsibilities of SWE's field team, the organizational structure of the construction sequence, environmental reporting responsibilities, and the chain of communication on the spreads. SWE will provide the CMC with the documentation necessary for them to understand the project mitigation measures. The documentation will include, but not be limited to, the EA, the BLM Right-of-way grant and other applicable permits, and the POD.

The CMC will maintain routine contact with SWE's CM. However, the CMC will not communicate directly with the construction contractor personnel for the purposes of directing construction activities or to ensure compliance. Construction activities will be inspected on a by the CMC as needed and environmentally sensitive areas will be regularly inspected to ensure protection of the resource. The level of monitoring coverage of specific portions of each construction spread will be determined based on the construction activity occurring at the time of inspection, and any noncompliance or problem areas documented during previous inspections by the CMC or SWE's CM.

The CMC will communicate with SWE's CM on a regular basis. This approach will allow the CM and the CMC to exchange information on the status of construction and to discuss any significant construction events scheduled over the next two or three days. The CMC may inspect the Project with the CM or independently. All contact will be through SWE's CM. However, the CMC will have the authority to order the halt of a serious noncompliance activity that is damaging a sensitive environmental resource.

The CMC will record daily observations including digital photo documentation at each location visited. This process will ensure consistent and accurate reporting of site conditions at the time of inspection. Each activity monitored will be assigned a compliance level and documented in a daily report (see section 4.1).

4.0 REPORTING AND DOCUMENTATION

SWE's CIs will compile the daily reports for submission to CM for compliation. The CMC will receive the daily reports from the CM for review as well as relying on field observations in order to assign compliance levels for activities monitored in the daily reports. The CMC will submit weekly reports to the BLM Project Manager and SWE's CM.

4.1 Daily Reports

The CMC will complete one or more daily report(s) documenting the project-related activities he/she inspected. The CMC will document the wind turbine generator number or location of linear feature (i.e., access road, electric line); the landowner; the presence of threatened or endangered species, waterbodies, wetlands, and biologically and culturally sensitive sites; and include a brief description of the activities observed. When appropriate, relevant digital photographs will be taken and included in the report.

Each separate activity monitored and documented in a daily report will be assigned a compliance level. The compliance levels for the Project are described below.

Acceptable – An acceptable report will be issued when the activities observed are in compliance with the project environmental requirements.

Incident – An incident report will be issued when an event occurs that would not be considered acceptable but is accidental or unforeseeable and the response to the event is in compliance with the project environmental requirements. An example of an incident is when a fuel leak is observed and the project personnel respond by stopping, containing, and cleaning up the spill in accordance with the project environmental requirements.

Minor Problem – A minor problem report will be issued when there is a minor deviation from the project environmental requirements. An example of a minor problem would be if a small amount of soil or slash is observed off the ROW but has no effect on sensitive resources. If the minor problem is not corrected within an established timeframe or multiple occurrences of a similar nature continue, the situation will be elevated to a noncompliance. The CMC will inform SWE's CM about a minor problem before issuing the minor problem report.

Noncompliance – A noncompliance report will be issued when an activity is observed that violates the project environmental requirements and places resources at unnecessary risk. Examples of noncompliance issues include the failure to install or maintain required erosion control devices; activities conducted outside the approved ROW limits or approved temporary use areas and access roads; and lack of required biological, paleontological, or cultural resources monitors. The CMC will inform SWE's CM about a noncompliance before issuing the noncompliance report.

Serious Noncompliance – A serious noncompliance report will be issued when an activity causes harm or poses a serious threat to environmental resources. An example of a serious noncompliance would be the placement of construction materials within an exclusion zone for a sensitive resource. A serious noncompliance report requires that the CMC and the BLM Project Manager participate in a conference call with SWE's CM and assigned SWE representative to discuss the noncompliance, the proper corrective actions, and follow-up enforcement actions that should be imposed.

Other – The CMC reporting system will also contain one additional category, "other," to be used as necessary to document an activity that does not fall within any of the compliance levels discussed above. An example of an activity that would be documented in the daily report as "other" would be a Level 1 variance approved in the field by the CMC (see section 5.1).

The weekly report and relevant photo documentation will be distributed to the BLM Project Manager and SWE's CM by Wednesday of the following week.

5.0 VARIANCES

During construction, unforeseen or unavoidable site conditions can result in the need for changes from approved mitigation measures and construction procedures. Additionally, the need for extra workspaces or access roads outside of the previously approved construction work area may arise. Changes to previously approved mitigation measures, construction procedures, and construction work areas will be handled in the form of variance requests to be submitted by SWE and reviewed and approved or denied by the BLM for federal land or where federal oversight or jurisdiction exists with the delegation of some authority to the CMC. The variance process can also be a good mechanism to clarify discrepancies discovered in project materials and/or to distribute information to the entire project team. A system of three variance levels (Levels 1, 2, and 3) will be used to categorize and process variance requests.

The three variance levels, review and distribution process, and decision-making authority granted to the CMC by the BLM for the Project are discussed in Appendix XX of the Right of Way Grant.

6.0 STOP WORK AUTHORITY

The BLM has the authority to issue an immediate temporary suspension of an activity if it is determined to be a deviation from the project environmental requirements. This authority may be delegated to the CMC and SWE's CM. When a verbal immediate temporary suspension is issued in the field, it will be followed up with a written notification of the immediate temporary suspension from the BLM authorized officer as soon as practicable, but normally within 24-hours. BLM must issue a written order allowing construction to resume once an immediate temporary suspension has been issued and the violation or issue has been resolved satisfactorily.

7.0 TRAINING

The BLM Project Manager or the CMC will participate in SWE's ETP to present an overview of the compliance monitoring program. The discussion will focus on the daily activities of the CMC and their interactions with SWE's inspection and construction personnel.

During training sessions, documentation of compliance issues and construction progress will be described. A clear and concise explanation will be presented with respect to the variance request decision authority that the CMC will have in the field. Procedures that may be required to address variance requests will also be presented, as well as the timeframe required for decisions to be made prior to implementation. A clear distinction will be made between the types of decisions that a CM can make under various circumstances versus the level of authority that the CMC will have in reviewing variance requests.

In addition to the above training, BLM will conduct a preconstruction conference prior to any Notice to Proceed for construction of the project that will be attended by the CMC and SWE representative(s). The purpose of this program will be threefold: 1) provide an overview of the CMC's roles, responsibilities, and communication protocols, 2) to allow review of the ROW Grant, and POD requirements, and, 3) to review the reporting procedures and obtain hands-on experience with the reporting system.

8.0 EQUIPMENT

The CMC will supply all equipment required to meet his/her role in the compliance monitoring program.

Appendix F
Variance Plan

Shell Wind Energy
Sand Hills Wind Farm Project

Variance Procedures

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Summary of Variance Procedures		
Significance Level	**Potential Use**	**Approval**
Level I	Minor field adjustments	Compliance Monitoring Contractor
Level 2	Modify POD	Compliance Monitoring Contractor w/concurrence of BLM Project Manager
Level 3	Amend right-of-way	BLM Authorized Officer

1.0 Introduction

Shell Wind Energy Inc. (SWE) is proposing to construct, operate, maintain, and decommission the 50 megawatt (MW) Sand Hills Wind Energy Project (Project) in south eastern Wyoming within the Bureau of Land Management, Rawlins Field Office (BLM RFO) jurisdiction.

The Project includes the following:

- 50 wind turbine generators (WTG), each with a two MW rating, and the associated turbine pads;
- 25 miles of on-Project access roads;
- 25 miles of buried gathering electric cables and communications cable leading from the WTGs to the substation(s);
- 4.6 miles of overhead transmission line;
- One substation and one combination substation/switchyard;
- A maintenance and operations yard with a building; and
- One equipment and staging area.

For a description of which project components are located on public lands and which are located on private lands, please see Table 2-4 of the Environmental Assessment (EA).

2.0 Need for Variance Procedures

A critical part of construction is ensuring that projects are constructed in compliance with the environmental conditions and requirements contained in the BLM right-of-way (ROW) grant, which includes the Plan of Development (POD); other federal, state, and local permits; and project construction drawings and staking plans. Infrequently, minor changes or deviations from stipulations/mitigation provided in these documents are necessary to accommodate or mitigate unexpected on-site circumstances. These deviations may be necessary to facilitate construction or provide for more effective protection of environmental resources. Experience with other projects has shown that, project construction has been interrupted, pending agency approval and these interruptions can be extremely costly in construction delays and possibly meeting construction windows; therefore the variance process was created

When changes from Project requirements are identified, SWE's Compliance Manager (CM) may wish to file variance requests for approval of these changes. Additionally, the BLM may pursue similar or other types of alterations. Requests may vary in significance from minor changes (i.e., slightly shifting the location of an access road) to more complex requests (i.e., approval to use other existing or newly constructed access roads).

These variance procedures apply only to activities taking place on BLM lands.

3.0 Variances During Construction

A third party Compliance Monitoring Contractor (CMC), funded by SWE, will serve as the environmental compliance monitor during the construction phase of the Project. The CMC will be authorized to address proposed/needed deviations from grant stipulations and the approved POD. The CMC is empowered by the BLM to approve Level 1 variances in the field and after consulting with the BLM Project Manager to approved Level 2 variances so as to expedite construction while protecting resource values.

The BLM, CMC and the CM will use the following variance procedures to seek BLM approval of a requested change or deviation. These procedures provide for the BLM CM to consult with the BLM Project Manager to expedite a solution to the deviation, while protecting resource values.

The CM and FPM will work together when variations, adjustments, or deviations may be necessary to facilitate construction or provide for more effective protection of environmental resources. A system using three variance levels (Level 1, 2, and 3) will categorize variance requests, according to their significance. Variance requests rank from those which do not require an amendment to the POD, to those requiring an amendment to the POD, and those requiring an amendment to the BLM ROW grant(s). Level 1 and 2 variances may be used to modify or amend the POD.

The CMC may approve Level 1 variances and the BLM Project Manager may approve Level 2 variances. This approach to managing variances will expedite construction while protecting resource values. Level 3 variances will require an amendment to the BLM ROW grant. In this case, a Standard Form 299 will be required. The CMC will consult with the BLM Project Manager, or designated BLM representative, to determine if a variance will require amendment to the POD or the BLM ROW grant. Classifying a proposed change as a Level 1, 2, or 3 is significant (to construction progress) because each level requires an increasingly higher level approval authority, and potentially, additional time is required for approval of a ROW amendment.

If a variance is requested by the BLM, a BLM representative can initiate a variance request in consultation with the CMC and the CM. The request needs to be in writing using the Variance Request Form. The Variance Request Form developed for this process is found at the end of this document. Supporting attachments, such as an alignment sheet or other project drawings, or photos, and cultural and/or biological clearances (including surveys for invasive weeds if necessary) will be required to process a variance request. The request, and the CMs input to the request, would be documented in the CMC weekly report.

4.0 Level 1: Variances Accomplished Through Field Resolution

A Level 1 variance is a minor field adjustment within the approved BLM ROW grant that conforms to the POD. These variances can be handled in the field by the CMC in coordination with the CM. Such adjustments would be documented on the Variance Request Form. The CMC would inform the CM and the BLM Project Manager of these minor changes by including them in his/her weekly progress reports.

Examples of minor field adjustments include, but are not limited to, the following:

- Relocation of erosion control devices (note – this may also require a modification to the Stormwater Pollution Prevention Plan (SWPPP);
- Locating temporary fences inside authorized work areas;
- Constructing ditch plugs and wildlife escape ramps in cable trenches, if needed;
- Permitting waterbars to be extended, if applicable, off the area designated for a cable trench or the transmission line, and into native vegetation "one dozer length" (this includes providing permission for construction equipment to work outside designated work areas);
- Allowing rubber-tired vehicles to use additional designated access roads (in addition to those approved in BLM approval documents) where improvements to the road would not be necessary (note: not intended for authorizing additional haul roads for equipment and materials); and

- Temporarily (for not more than seven days) placing turbine parts or other assemblies outside areas designated in the POD but within the authorized Project area. This does not include any surface disturbance associated with temporary storage.

Level 1 Variance Approval or Denial

A CMC can approve or deny Level 1 variance requests in the field after consulting with the BLM Project Manager. Level 1 variance requests may be approved if the results of implementing the changes are not significant. If a Level 1 variance request is approved in the field by the CMC, signatures on the Variance Request Form will also be required from the CM. A Level 1 variance request can be implemented in the field as soon as it is approved and signed by the CMC. The CMC will document the approved variance in the daily reports.

If the Level 1 variance is denied, the CMC will inform the CM within 24 hours. The CM may choose to resubmit the request as a Level 2 variance, or to discontinue pursuit of the request.

Level 1 Variance Distribution

The CMC will give/send the approved Level 1 variance request to the CM, who will then distribute the variance on the construction side of the Project. The CMC will provide the BLM Project Manager copies of approved Level 1 Variances daily. The CMC will generate a report at the end of each week identifying all Level 1 variances approved during the previous week.

5.0 Level 2: Variances Beyond Field Resolution, Not Requiring an Amendment to the BLM ROW Grant(s)

This type of variance involves a deviation which exceeds the field decision authority of the CMC. Level 2 variances require approval by the BLM Project Manager with concurrence of BLM RFO specialists. These alterations generally involve project changes that would affect an area outside of the previously approved work area, but within the corridor previously surveyed for cultural resources, wetlands, and sensitive species. Such variance requests typically require review of supplemental documents, correspondence, and records to be provided with the request. Examples include, but are not limited to the following:

- Shifting extra workspace outside the approved construction corridor a short distance but within the previously surveyed corridor where overall disturbance type and acreage remains approximately the same, and no cultural, paleontological, biological resources, or invasive weed infestations could be affected;
- Use of additional extra workspace outside of the previously approved work areas (within or outside the Project or off-Project ROW);
- Shifting temporary workspace to previously disturbed areas;
- Permitting Project work to be completed in raptor areas during the construction closure window;
- Moving proposed culvert location(s) to better accommodate natural drainages (note: this may also require a modification to the SWPPP);
- Providing extra work space for topsoil and spoil material storage to prevent mixing of soils;
- Moving a range fence a specified number of feet laterally and permanently installing it to avoid proposed construction (note: this may also require an amendment to the Allotment Management Plan, if applicable.);

- Modifying seed mixes specified in the POD (due to unavailability; note, this may also require a modification to the Reclamation Plan); and
- Modification of an access road due to safety hazards.

Variance requests may also be submitted for minor changes that would extend beyond the previously surveyed work area and corridor for sensitive resources. In these situations, additional cultural, biological, and invasive weed surveys would be required. Documentation of the surveys and other applicable correspondence would need to be submitted with the variance request. If sensitive biological resources are encountered during the additional surveys, documentation of consultation with applicable agencies must be provided with the variance request. All BLM approved stipulations, and the Terms and Conditions of the U.S. Fish and Wildlife Service's (USFWS) Biological Assessment/Opinion must be adhered to, in order for the variance to be approved.

To initiate a Level 2 variance request, the CM will determine the need for the variance. The request form, with attached supporting documents, will be submitted by the CM and discussed with the CMC. This package will be submitted to the CM for review. Following this review, the CMC will submit the request form and attachments to the BLM Project Manager. The BLM Project Manager, after consulting with BLM RFO specialists, will provide the CM written approval or denial (including an explanation) of the request by using the spaces provided on the form. The BLM Project Manager or BLM representative may request additional information, or a modification of the request, before the variance can be approved. In addition, the CM will be informed if an amendment to the BLM ROW grant will be required.

Level 2 Variance Approval or Denial and Distribution

The BLM Project Manager will review the variance request form and any attachments in consultation with the appropriate BLM RFO specialists. If additional information or a modification to the request is required, the CM will submit the requested information within 5 business days. The BLM Project Manager will provide SWE or their representative written approval of the request by using the spaces provided on the form within 5 business days from receipt of a complete request.

If a Level 2 variance is denied, the BLM Project Manager will provide the CM a written denial (including an explanation) of the request by using the spaces provided on the form within 5 business days from receipt of a complete request. The CM may choose to resubmit the request as a Level 3 variance, or to discontinue pursuit of the request.

Distribution of Level 2 variance requests are the same as stated above for Level 1 variance requests.

6.0 Level 3: Variances Requiring an Amendment to the BLM ROW Grant

A variance requiring an amendment to the BLM ROW grant requires completion of an application on a Standard Form 299 (SF 299), and a decision by the BLM Authorized Officer.

The CM will prepare the SF 299 with supporting documentation, to include but not limited to a POD, map (1:24,000 scale) and forward to BLM RFO. The BLM will process the amendment application pursuant to 43 CFR 2800. The BLM may request additional information, or a modification of the request, before the amendment can be approved. Approval of the amendment also requires issuance of a Notice to Proceed (NTP) addressing the amendment, if a NTP is a requirement of the original BLM ROW grant.

The BLM Project Manager will assist the CMC and the CM in determining whether a significant proposed change, outside the approved BLM ROW grant, will necessitate submittal of an amendment, or whether the change can be handled with a Variance Request Form.

Examples of a variance requiring an amendment to the BLM ROW grant are as follows:

- Relocation of Project components onto BLM land; or
- Expansion of the Project area from the one defined in the BLM ROW grant and POD.

Variance Request Form

Shell Wind Energy, Inc.
Sand Hills Wind Farm Project

Variance Request No.: ______________
Date Submitted: ______________
Date Approval Required: ______________
BLM Approval Reference No.: ______________

Location: _________________________
Alignment Sheet/
Construction Drawing/Station Number: _________________ Approval Agency: ________________

Current Land Use/Vegetative Cover: ____
Nearby Features (Washes, Wetland, Noxious Weed Area, Residence (distance): ____________________________

Variance Level [ ] Level 1 [ ] Level 2 [ ] Level 3
Variance requested in → [ ] Permit [ ] Plan/Procedure [ ] Specification
[ ] Mitigation Measure [ ] Drawing [ ] Other

Detailed Description of Variance: Attachments? [ ] Yes [ ] No Photos? [ ] Yes [ ] No

Variance Justification:

Additional Surveys Required			Surveyed Corridor Description	Additional Surveys Completed
Cultural Survey	[ ] Y	[ ] N		[ ] Y [ ] N
T & E	[ ] Y	[ ] N		[ ] Y [ ] N
Weeds	[ ] Y	[ ] N		[ ] Y [ ] N

Request prepared by:

Sign-off (as appropriate)	Name (Print)	Approval Signature	Date	Conditions Attached
Compliance Manager				[ ] Y [ ] N
Compliance Monitoring Contractor				[ ] Y [ ] N
BLM 1/				[ ] Y [ ] N

For use in approval only.

Variance Approval:______________ Variance Denied: ______________ Beyond Authority: _________________
Approval Number: ____________________________ Date: ____________________
Signature: ___________________________________ Stipulations: _________________________________

If the CMC is authorized (in the POD or other document included in the BLM ROW authorization documents) to act/sign on behalf of BLM; include the name of CMC with the signature.

Sand Hills Wind Farm Project Relating to WTG Number (if applicable) ; ____ Variance Conditions (refer below for individual requesting the condition and specific condition(s). Name: Title: Organization:
Conditions:
    Name: Title: Organization:
Conditions:
    Name: Title: Organization:
Conditions:

Appendix G
Weed Management Plan

Shell Wind Energy Sand Hills Wind Farm
Weed Management Plan

Updated September, 2010

Contents

1.0 Introduction

Shell WindEnergy Inc. (SWE) is proposing to construct, operate, maintain and decommission the 50 megawatt (MW) Sand Hills Wind Energy Project (Project) in southern Wyoming. The Project area comprises approximately 110 acres located within Townships 19 and 20 North, Ranges 75 and 76 West. The Project occurs in a mixed land ownership pattern with approximately 20% of the land being Bureau of Land Management (BLM) public land, and approximately 80% being private and State of Wyoming ownership. The Project includes the following:

- Up to 25 wind turbine generators (WTG), and the associated turbine pads;
- 25 miles of on-Project access roads;
- 25 miles of gathering electric cables and communications cable leading from the WTGs to the substation(s);
- 4.6 miles of overhead transmission line;
- One substation and one combination substation/switchyard;
- A maintenance and operations yard with a building; and
- One equipment and staging area.

This Weed Management Plan (WMP) will be updated as necessary and re-submitted with Pesticide Use Proposals (PUPs) for approval every three years upon completion of Project construction activities. The areas covered by this Plan are those lands administered by the BLM within the Project boundary, as identified in the *Sand Hills Facility Environmental Assessment* (BLM 2010). The objective is to treat noxious and invasive infestations of weeds that occur within the Project area and that have the potential to spread outside that Project area. SWE will be required to demonstrate compliance with Albany County's, the State of Wyoming, and private landowner regulations controlling and eradicating noxious and invasive weed species on private lands. Compliance is required within the disturbed areas of the Project, both during and for a minimum of five (5) years after the life of the operation on BLM lands. For analysis purposes, it is assumed that weed control measures on private lands will be similar to that occurring on public lands.

Compliance with the County's permit conditions for privately owned lands includes disturbed areas at the time of SWE's application and shall include, as a minimum, the proposed easements for new roads, transmission lines, buildings, and any other property that may be disturbed or accessed by SWE. SWE will coordinate with Albany County in the implementation of this Weed Management Plan.

2.0 Land Use Planning (Rawlins Resource Management Plan (RRMP))

BLM land use planning decisions for noxious weed prevention involves the following actions:

1) Work with federal, county, and city planning staff and zoning committees to include consideration of noxious weed management when developing or approving plans, permits, or leases.
2) Include noxious and invasive weed risk factors and prevention considerations in all environmental analyses for projects, permits, and alternative development.
3) Specific RRMP guidance for Weeds, Surface Disturbance, Vehicle Transportation, Lands, and Early Detection are contained, where applicable, in the following.

3.0 Definitions

<u>Designated noxious weed</u>: These are weeds, seeds, or other plant parts that are considered detrimental, destructive, injurious or poisonous, either by virtue of their direct effect or as carriers of diseases or parasites that exist within this state, and are on the designated list. The designated list is a list of weeds and pests that are designated by joint resolution of the board and the Wyoming Weed and Pest Council. The Wyoming Weed and Pest Control Act (Act) provides information on the State of Wyoming Weed and Pest Districts, and the Wyoming designated and prohibited noxious weed species list. The Act currently includes 25 weed species and can be accessed at www.wyoweed.org/documents.html. Per the Act, weed control is the responsibility of the landowner or the owner of a

right-of-way (ROW) or easement.

Invasive weed: Means a species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. Invasive weeds include not only noxious weeds, but also other plants that are not native to this country.

4.0 Purpose and Need

SWE is committed to inventory, monitoring, and treatment of weeds associated with this Project. The purpose of this WMP is to prescribe methods to control existing and treat new weed infestations, prevent introduction and spread of infestations during construction, monitor and treat infestations after completion of construction activities, and control expansion of existing noxious weed populations from within the Project area, over the life of the Project. Additionally, the purpose of this WMP is to manage weeds and control common weeds where growth could cause a fire hazard, or hinder successful reclamation of disturbed areas.

5.0 Education

A significant part of the WMP is to educate people working on the Project, or using public land in the Project area. This will be accomplished by the following:

1) Develop education and awareness programs to involve visitors and users of public land in the Project area.
2) Provide Project field personnel training in the identification of weed species known to occur in the area, and in preventative measures they are expected to follow. Special emphasis training will be provided to construction personnel.
3) All Project personnel (including maintenance and operations) will be trained to recognize weed populations. A designated specialist will be trained to document weed population.
4) Weed identification handbooks will be made available to all Project field personnel.

6.0 Invasive Weed Inventory

Pre-construction weed inventory and mapping by a designated specialist or weed management contractor who has knowledge in weed identification will take place on all pre-determined areas of disturbance on BLM lands and on potentially undisturbed areas designated for Project use on BLM land. All populations will be identified and carried forward in the inventory. Locations of weed populations will be collected with GPS units, and the populations plotted on topographical maps and Project drawings.

Inventories will be conducted in accordance with protocols detailed in the North American Invasive Plant Mapping Standards (NAWMA). A Project/New Site Monitoring Form (attached) provides for information which can be directly input into the BLM Rawlins Field Office (RFO) GIS geodatabase. An Excel file will be provided by RFO for inventory reporting and treatment tracking. Weed locations will be in a shapefile and in UTM Zone 13, NAD 83.

This WMP will then be updated and re-submitted to the BLM RFO Authorized Officer's representative – Weed Management Specialist (WMS). SWE will be responsible for employing a Weed Management Contractor to implement weed control procedures.

Surveys (as well as monitoring, and treatment if necessary) will continue throughout the life of the Project.

7.0 Weed Management

7.1 Personnel

To implement or monitor this WMP, the designated Weed Management Contractor is required to possess the following qualifications:

a) Training or experience in native plant taxonomy/identification.
b) Training or experience in field ecology and plant community mapping.
c) Knowledge of researching information from the Internet.
d) Training in noxious and invasive weed management.
e) Experience in coordination with agency personnel and private landowners.

Field personnel applying herbicide must possess a valid State of Wyoming commercial applicator's license and approved Pesticide Use Proposal(s) (PUP) prior to the application of herbicides on public land.

7.2 Equipment

Implementation of this WMP could require the following equipment (not all inclusive):

a) GPS Unit;
b) Backpack sprayer;
c) Truck mounted sprayer;
d) Four wheel-drive truck and trailer;
e) All-terrain transport;
f) Tractor and disc, drag, or mower; and
g) Shovel.

7.3 Coordination

Upon completion of the weed inventory survey, SWE will provide its specialist or weed management contractor's updated WMP plan to the RFO WMS, State Land Office representative, and private landowner(s), respectively, addressing specific treatment methods. Their comments will be incorporated into the treatment method(s) for approval on their property. This coordination will continue throughout the life of the Project and as the WMP is updated regularly as needed.

7.4 Methods

Any weed population (one or more plants) that occurs on the Project will be treated using a single or a combination of treatment methods. Use of herbicide or biological control agents on BLM lands requires assessment of potential impacts with an additional environmental document beyond the Project Environmental Assessment (EA). Surveys (as well as monitoring, and treatment if necessary) will continue throughout the life of the Project

7.5 Prevention

The most effective invasive weed management strategy is prevention. SWE will implement the first part of a preventative program by pre-construction mapping of all invasive weeds using clean equipment. There may be pre-construction mechanical removal or herbicide treatment of existing weed populations, to be jointly determined and mutually agreed upon between SWE and BLM Weed Specialist, upon completion of the initial weed survey. Prevention methods described in Section 8.2 will also be followed.

7.6 Mechanical Treatment

Mechanical methods include, but are not limited to, the use of equipment to mow, drag, or disc weed populations or otherwise remove them by hand pulling or using shovels. Farm tillage equipment may be used to "till" weed populations as necessary for control and eradication depending upon the site. All equipment used in removing weeds must be cleaned as stated in Section 8.2 prior to further use on the Project. Hand labor may be used to remove small populations of weeds. Mowing will not take place in stands of sagebrush or when it will prevent native species from setting seed. Mechanical control methods would be utilized prior to or during flowering to prevent seed production. Soil disturbance during weed control will be minimized.

7.7 Herbicide Treatment

The BLM has developed specific requirements for herbicide use on BLM lands. These guidelines require submittal of a Pesticide Use Proposal (PUP, attached; Instructions, also attached), Pesticide Application Records (PAR, attached), and an annual Pesticide Use Report (PUR, attached). RFO WMS maintains a list of currently approved herbicides and adjuvants. Herbicides proposed for use must be submitted on a PUP. The application for, and approval of the PUP must be routed through the RFO WMS. Coordination with the RFO, State Land Office, and private landowners is required prior to application of herbicides. The applicable land managing agency or private landowner needs to approve pesticide use on their lands. Herbicides will be applied by a State of Wyoming certified commercial applicator.

Herbicide applications will be conducted prior to seed maturation unless agreed to by the RFO WMS. Herbicide treatment methods will be species specific and be in accordance with area specific conditions (i.e., proximity to water, riparian areas, sensitive species, agricultural areas, and time of year). The treatment specifics will be detailed in a follow-up addendum to this plan when pre-construction inventories are completed. The plan will also be updated, if necessary, when PUPs are applied for (a minimum of every three years).

SWE's Weed Management Contractor(s) will comply with the BLM ROW grant and all attached Terms and Conditions, and must have a copy with them while monitoring/treating weeds on the Project. The BLM ROW Grant incorporates the Plan of Development (POD), Hazardous Materials Management Plan, the Spill Prevention, Containment, and Countermeasures Plan, Reclamation Plan, and other applicable Plans.

7.8 Biological Control

Biological control agents may be available for some noxious species. However, use of singular agents alone may not be feasible due to the amount of time for biological agents to affect control, and a possibly more condensed timeframe required for Project mobilization. The use of any biological control agents on BLM lands requires prior approval from the RFO WMS.

8.0 Timing of Management

8.1 Pre-construction

Pre-construction inventories present a risk for spreading invasive weeds on the BLM lands since vehicles may arrive on the Project without first being cleaned. Vehicles should be cleaned before entering BLM lands during all inventories as a prevention measure. Weed infestations generated by these actions or other Project related activities on BLM lands will be discovered during pre-construction weed inventories that would occur after the ROW grant is approved.

Inventories will be in accordance Section 6.0 above. Additional locations of weeds identified during pre-construction surveys will be incorporated into this plan. Upon completion of mapping, reports will be submitted as addressed in Section 9.2 below.

After weed inventories have been completed, pre-construction treatment methods of invasive weed populations will be determined and discussed with the BLM RFO, State Land Office, and private landowners. The WMP will then be updated with specific treatment plans and submitted to the RFO WMS. Infestations may be treated with herbicides prior to moving construction equipment or materials for the Project onto BLM lands. Coordination will take place with the Albany County Weed and Pest District and owners of off-Project private roads before treating weeds along County and privately owned roads.

8.2 **During-construction**

To ensure protection of this Project from introduction of invasive weeds and to ensure weed control, the following items will be implemented:

a) Gravel and mineral materials transported to the Project will be certified weed free by Albany County.
b) At the entrance into the Project site, all construction equipment and vehicles including materials trucks/tractor and semi trailers will be cleaned of propagative parts and other plant and soil residue by high-pressure power washing. This will entail washing at least the parts of the equipment that are either in contact with soil or where soil has become lodged (including but not limited to blades, buckets, crawler tracks, tires, undercarriage). Washing includes removing all soil, visible seeds, and other propagative parts and residue.
c) Wash station equipment will be of a type similar to the commercially produced “Little Red Hen” (http://www.littleredhen-montana.com/). This type of equipment washer recycles the water, captures and confines the weed seed and residue, and bags the residue. The bags are then removed to an approved disposal site.
d) The extent of vegetation or soil disturbance will be limited to the minimum required to safely perform construction activities as designed. This will be established in the BLM ROW Grant, flagged/marked on-the-ground, and enforced by the Compliance Monitoring Contractor.
e) Disturbed areas not needed as work areas/road surfaces will be reclaimed/re-seeded within six months of initial disturbance.
f) Certified weed free seed will be used during reclamation or rehabilitation of disturbed areas on the Project.
g) Hay, straw, or other material used as mulch on the Project will be certified weed free.
h) Road ditches and the parts of roads that are not part of the road driving surface or required for maintenance purposes will be revegetated.

8.3 Post-construction

Weed inventory/monitoring will continue post-construction and will follow the guidelines presented above Section 6

To ensure protecting this Project from spread of weeds during maintenance and operations, roads used during maintenance and operations will be surveyed for weeds as stated in the Monitoring Section below.

9.0 Monitoring and Record Keeping

SWE will collect and maintain all records pertaining to the control and management of weeds on the Project. This includes, but is not limited to the following: inventories, treatments, monitoring, and re-infestation trends as relating to frequency of re-occurrence in specific areas, and the rate of spread of existing infestations. SWE will provide these reports to BLM Authorized Officer, State Land Office, and private land owners.

9.1 Monitoring

This section provides for monitoring BLM roads and all other BLM lands within the Project areas for invasive weeds. Monitoring by SWE will commence the first growing season after the project is initiated and yearly thereafter, in order to track vegetation trends and weed presence/absence. Refer to the Rawlins Reclamation policy for specific guidance on monitoring protocols.

Weed inspections and monitoring will take place annually for the life of the Project. The intent of post-construction inspections is not only to identify new infestations, but also to maintain control of weeds before seed is set and dispersed.

9.2 Report Submittal

There are three types of reports to be submitted annually—the Annual Report, Pesticide Application Records (attached), and the Pesticide Use Report (attached).

9.3 **Annual Report**

SWE will submit an annual report to the BLM RFO Authorized Officer's representative, to the State Land Office, and to private landowners. Weed inventory information is a part of the annual reporting requirements for the Project. Included are the percent cover of invasive weeds, and the species present, as well as listing the following: Weed Treatment Contractor, Contractor license number and expiration date, Date(s) treated, and the Methods of treatments applied (chemical, biological, mechanical).

9.4 **Pesticide Application Records (PAR, attached)**

These records are to be filled out within 24 hours of each application of herbicide, and completed forms submitted to the RFO WMS at the end of each month. These forms include information such as the date and time of herbicide application, herbicides and adjuvants used, rates applied, weather conditions, site conditions, and monitoring comments on the site.

9.5 Pesticide Use Report (PUR, attached)

A summary report of all application activity, the Pesticide Use Report, will be required at the end of the treatment season, submitted with the final months' PARs. A PUR can be submitted with each month's PARs summarizing each month's herbicide usage (preferred BLM method), in lieu of submitting one annual summary at the end of the season. This report lists herbicide usage by trade names, rates, and acres treated.

10.0 Federal Laws, Regulations, and Policies Effecting BLM Weed Control

1) Federal Land Policy and Management Act of 1976, as amended.
2) Public Rangelands Improvement Act of 1978.
3) Carlson-Foley Act of 1968.
4) Federal Noxious Weed Act of 1974, as amended by Sec. 15 - Management of Undesirable Plants on Federal Lands, 1990.
5) Final Environmental Impact Statement for Vegetation Treatments on BLM Lands in 17 Western States, 2007.
6) Wyoming Weed and Pest Control Act 1973.
7) Executive Order 13112 (Invasive Species), signed on February 3, 1999.
8) Departmental Manual 517.
9) Departmental Manual 609.
10) BLM Manual 9011 and Handbook H-9011-1.
11) BLM Manual 9014.
13) BLM Manual 9015.

11.0 Attachments

All attachments are available electronically:

Project Monitoring Record
Pesticide Use Proposal
Pesticide Use Proposal Instructions

Pesticide Application Record
Pesticide Use Report

Project/New Site Monitoring Form

Date/time_______________________
Name(s)____

Location (Patch # or T, R, Sec., Part--if new patch)	____ ____
Other Landmarks	Road #________ Description________________________
Land Use	☐ ROW ☐Mining ☐ Well pad ☐ Vacant ☐ Range ☐ Recreation ☐Timber ☐Wildlife ☐ Pasture ☐ Crop ☐ Wetland ☐Other________________________________
Weed (s)	☐ Halogeton ☐Musk Thistle ☐Canada Thistle ☐Bull Thistle ☐ Hoary Cress ☐ Perennial Pepperweed ☐Leafy Spurge ☐ Houndstongue ☐ Black Henbane ☐ Russian Knapweed ☐ Spotted Knapweed ☐ Diffuse Knapweed ☐ Saltcedar ☐ Other________________________________
Patch: Size	☐ <0.1 A ☐ 0.1 – 1 A ☐ 1 – 5 A ☐ > 5 A
Density	☐ Trace ☐ Low 1 to 5% ☐ Medium 5 – 25% ☐ High > 25%
Type	☐ Isolated ☐ Patchy ☐ Continuous ☐ Linear
Height	☐ <= 1' ☐ 1 – 2' ☐ 3 – 6' ☐ > 7'
Growth Stage—mark one	☐ Pre-Bud ☐ Bud ☐ Flowering ☐ Seeding ☐Senescence ☐ Other________
Site Condition	☐Vigorous ☐Insect Damage ☐Disease Damage ☐Herbicide Damage ☐Other_____ ____
Bio Agent Present	☐ N ☐ Y ____________________ Abundance ________________
Weather	
Cloud Cover	☐Clear ☐Partly Cloudy ☐Mostly Cloudy ☐Overcast
Precipitation	____
Wind mph / Direction	☐ 0-1/Calm ☐ 2-5 ☐ 5-10 ☐ >10 Direction________________
Temperature range	☐ 40's ☐ 50's ☐ 60's ☐ 70's ☐ 80's ☐ 90's ☐Other____________
Humidity	☐ Low ☐ Moderate ☐ High
Site	
Terrain	☐ Foothills ☐ Valley ☐ Mountain ☐ Water Edge ☐ Plain
Vegetation	☐ Rangeland ☐ Improved Pasture ☐ Riparian ☐ Disturbed ☐ Mixed Forest ☐ Coniferous ☐ Deciduous ☐ Other______________________________
Slope Percent	☐ 0 – 5% ☐ 6 – 20% ☐ 21 – 35% ☐ >35%
Aspect	☐ E ☐ NE ☐ N ☐ NW ☐ W ☐ SW ☐ S ☐ SE
Photos Taken	☐ N ☐ Y ____________________________________
Comments	____ ____ ____ ____ ____ ____ ____ ____ ____

UNITED STATE DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

PESTICIDE USE PROPOSAL

STATE:

COUNTY:

FIELD OFFICE:

DURATION OF PROPOSAL:

LOCATION:

Attach map(s) and/or a list of sites

ORIGINATOR – NAME:

ORIGINATOR – COMPANY:

ORIGINATOR – CONTACT INFORMATION:
Include address and phone number

DATE:

PROPOSAL NUMBER:

EA REFERENCE NUMBER:

DECISION RECORD (DR) NUMBER:

I. APPLICATION INFORMATION – (Including mixtures and adjuvants):

1. TRADE NAME(S):
2. COMMON NAME(S):
3. EPA REGISTRATION NUMBER(S):
4. MANUFACTURER(S):
5. METHOD OF APPLICATION:
6. MAXIMUM RATE OF APPLICATION – AS STATED ON THE LABEL:
    a. Formulated Product:
    b. Pounds Active Ingredient or Acid Equivalent:
7. INTENDED RATE OF APPPLICATION:
    a. Formulated product:
    b. Pounds Active Ingredient or Acid Equivalent:
8. APPLICATION DATE(S):
9. NUMBER OF APPLICATIONS:

II. PEST [List specific pest(s) and reason(s) for the proposed application of the pesticide]:

III. DESIRED RESULTS OF THE APPLICATION – LINKED TO THE OBJECTIVES OF THE APPLICATION:

IV. APPLICATION SITE DESCRIPTION:

1. ESTIMATED NUMBER OF ACRES:
2. GENERAL DESCRIPTION (Describe land type or use, size, stage of growth of target species, soil characteristics, and any additional information that may be important in describing the area to be treated.)

V. SENSITIVE ASPECTS AND PRECAUTIONS (Describe sensitive areas – marsh, endangered, threatened, candidate, and sensitive species habitat – and distance to application site. List measures to be taken to avoid impact to these areas):

VI. NON-TARGET VEGETATION (Describe potential immediate and cumulative impacts to non-target pests in project area as a result of the pesticide application. Identify any planned mitigation measures that will be employed – BE GENERAL, SPECIFICS DISCUSSED IN THE EA):

VII. INTEGRATED PEST MANAGEMENT PRACTICES CONSIDERED IN THE OVERALL PROJECT:

VIII.SIGNATURES:

1. I will ensure that the pesticide(s) and pesticide products will be applied in accordance with product label restrictions and according to the information presented above, and according to BLM modifications (if any). I will also ensure that Pesticide Use Application Records and Pesticide Use Reports will be submitted to the BLM Rawlins Field Office Weed Coordinator monthly for the duration of this PUP.

   Originator Signature: ____ Date:_________

2. Applicator Company Name: ____ Date:_________
   a. Applicator Company Address: ___________________________

      City, State, Zip ____
   b. Phone Number: ____
   c. Applicator Printed Name: ______________________________________
   d. Applicator Signature: ______________________________
   e. Applicator License Number:____________________________________Exp. Date: ________
   f. Certifying Organization: _______________________________

3. Field Office Pesticide/Noxious

   Weed Coordinator: _________________________________ Date: _________

4. Field Office Manager: _________________________________ Date:_________

5. BLM State Pesticide

   Coordinator: _________________________________ Date:_________

6. Deputy State Director: _________________________________ Date:_________
   - o Concur or Approved
   - o Not Concur or Disapproved
   - o Concur or Approved With Modifications
     - Any changes (modifications) to this proposal by the state pesticide Coordinator will be listed below or in an attached memo to the manager requesting approval from the Deputy State Director

INSTRUCTIONS FOR PESTICIDE USE PROPOSAL (PUP) FORMS

The Pesticide Use Proposal (PUP) must be completed and signed through all channels listed in the following instructions. Each state varies in the length of time that the PUP is valid, usually three to five years unless there is a change in the PUP. If a change is made then a new PUP must be completed and signed. If a pesticide is new or if a new situation occurs, then it is likely that the PUP will be valid for only one year. It has to be renewed before that pesticide treatment area can be treated again. Montana and the Dakotas have an electronic format that now must be completed and routed through proper channels.

A pesticide use proposal (PUP) package contains the following:

1. A copy of the site-specific environmental assessment (EA) where each proposal was assessed.
2. Copies of labels of any chemicals and surfactants proposed for use.
3. Material Safety Data Sheets (MSDS) for any chemicals and surfactants proposed for use.
4. A properly and completely filled out proposal, including any specific attachments.

The PUP is a Department of Interior form and its purpose is to enable the bureaus of agencies in the Department of the Interior to pass <u>specific information</u> about pesticide use on lands administered in those bureaus or agencies back to the Department. The form is designed to provide the site-specific information about chemical use on Bureau of Land Management (BLM) lands as required for Chemical EIS (Environmental Impact Statement) efforts. One proposal may not cover all the general weed problems in one Field Office. A proposal that provides site-specific information is more likely to meet Department, Bureau, and State Office standards for pesticide use than a proposal that generalizes about weed situations and potential pesticide use.

The following are instructions on how to fill out each section of the PUP. The examples in this information concerning specific labels and products are examples only! Consult current labels for up-to-date information.

Proposal Number

The proposal number is one used to track each proposal. Typically, each office keeps a log. The office Pesticide Coordinator assigns a unique number based on year, state, office code, and the number if proposals issued in that office each year. This number needs to be written on both pages of the proposal. The State Pesticide Coordinator will not approve a proposal without a current proposal number.

EA Number

This number cites the number of the EA (Environmental Assessment) in which this pesticide application was specifically addressed. This number needs to be written on both pages of the proposal. The State Pesticide Coordinator will not approve a proposal without an EA number listed in this section of the proposal. The Record of Decision for the Vegetation Treatment in BLM Lands in 17 Western States Requires <u>site specific</u> analysis for all pesticide use. If you are using an Administrative Determination (AD), each proposal must have a unique AD number.

Duration of Proposal

The Wyoming State Pesticide Coordinator will approve proposals for up to three years. If more than one year's approval is desired, state the years in which the herbicide will be reapplied.

Location

Refers to the specific site (township, range, section, and portion of a section where the application will take place.) More than one site is possible per PUP; list the exact locations and the estimated acreage of each site to be sprayed on a separate page. Label the page with the proposal number and the reference number and attach the sheet to the PUP. In oil and gas fields, rather than listing the location of each pad, provide a location of the field and include a map. Estimate the number of acres to be sprayed in each field. Maps of the location(s) of each application are not necessary in other submitted proposals; however, they do provide a good framework for impact analysis, especially cumulative impact analysis across space.

Originators Printed Name

The originator is the person who first asks for approval to do a chemical treatment. It may be a Bureau employee, such as a rangeland management specialist, who will apply the chemical in an allotment that they manage. It may also be someone from outside the Bureau, such as a county weed supervisor or oil and gas company representative. It is always best if someone within the BLM provides guidance to our customers as they supply information required by the BLM and the Department of Interior.

Originators Company

If the project is initiated by BLM employees, the originator's company is not applicable. In all other cases, state the company or firm who holds the BLM permit, such as Joe's Well Service, Jane's Petroleum Corp., Fred's Cattle Company, etc. This space is <u>not</u> intended to document an originator's contractor.

Originators Contact Information

Provide address and phone number in case of questions and for returning copies of approved forms.

I. Application Information (include mixtures and adjuvants)

Mixtures of pesticides can be approved if at least one of the labels states that the mixture is compatible and if the mixture, or one of the chemicals in the mixture, is labeled to control the specific pest listed on the proposal.

If a mix is proposed, it must be used and reported as a mix. If any of the chemicals proposed as a mix might be used individually, fill out a separate PUP for each chemical as well. For example: Escort + 2,4-D can be approved as a mix, but a separate PUP must be filled out to use Escort by itself or 2,4-D by itself. A separate PUP must be filled out for each different 2,4-D that may be used.

1. Trade Name(s)

The trade name, also known as the brand name, is listed on the pesticide label. For example, tebuthiuron is the common name for the herbicide formulation Spike 20P which is commonly used for sagebrush control. "Spike" alone is not the trade name. The manufacturer also makes Spike 80W, Spike 5G, Spike 40P, and Spike Brush Pellets. Provide the information for any surfactants requested as well as for any chemicals. Only those adjuvants on the BLM list "Adjuvants Approved for Use" can be approved by the State Pesticide Coordinator.

2. Common Name(s)

The front page of every label has a section that identifies the pesticide's active ingredient. On the Spike 20P label, tebuthiuron is the common name. It is followed by the chemical name N-[5-(1,1-dimethylethly)-1,3,4-thidiazol-2-yl]-N,N'-dimethylurea. While chemical names <u>are not</u> a PUP requirement, common names are required for each PUP.

Only those active ingredients on the BLM list "Herbicides Approved for Use" can be approved by the State Pesticide Coordinator.

3. EPA Registration Number

All pesticides are registered with the Environmental Protection Agency (EPA). The registration number is one of the best ways a specific product can be identified. All pesticide labels have an EPA registration number; it is typically listed on the front page of a label. As with most other information on pesticide labels, EPA registration numbers can change. If you are using older stocks of a pesticide material, include both the old and the most recent labels in your proposal package.

4. Manufacturer(s)

The manufacturer is the company that produces the pesticide. The manufacturer's name is always listed on the front of the pesticide label.

5. Method of Application

There are numerous types of pesticide application equipment, including hand sprayers, small motorized sprayers, generators, foggers, fumigators, dusters, wiper applicators, etc. If you will be using a sprayer attached to a type of aircraft, please state you will be using aircraft. Certain pesticides sprayed by aircraft require Washington Office approval because of the increased potential drift problems.

6. Maximum Rate of Application

The maximum rate of application refers to the maximum amount of pesticide in measurable amounts (as stated on label) and inactive ingredients that a label states can be used for specific target pest species listed as a pest on the proposal. The maximum amount of active ingredient is a ratio calculation. When calculating the rates of application, do not round numbers up. Rounding up may result in stating a number on your proposal that exceeds the label or BLM maximum. Refer to the EIS in your area for maximum rates.

Typically, labels have several different species lists with different rates of application. For example, if a proposal states you will be using Escort™ herbicide to control common mullein, the maximum rate of application is one-half ounce per acre. The Escort™ label also states that four ounces of product may be used to control Kudzu. But this information is irrelevant for this proposal, since the target species is common mullein. Another example: if the target species on a proposal to use Banvel™ is bull thistle, the maximum rate of application use unit on label on pasture, rangeland and non-cropland areas is three pints. Bull thistle, a biennial, is in the list of biennials that Banvel™ will control. The maximum amount of product that may be used for biennials on the label is three pints for those that are bolting.

Pounds of Active Ingredient per Acre

Active ingredient (a.i.) is typically expressed as either pounds per acre (the labeled rate), pounds per gallon (liquid formulations) or as a percentage of active ingredient per pound of a dry formulation. Because of public concern over chemical use, there is a trend among the chemical companies to manufacture pesticides that require low rates in order to reduce releasing pesticides into the environment. In the ingredients section on a label of a liquid pesticide formulation, there is a statement about how many pounds per gallon of active ingredient may be found in that formulation. For example, the Banvel™ label states that this product contains four pounds per gallon of active ingredient. If the target species in the proposal to use Banvel™ is bull thistle, and the maximum rate of application use unit is three pints, then the maximum amount of active ingredient per acre is the amount of active ingredient contained in three pints of formulated Banvel™.

7. Intended Rate of Application

Pesticide labels state a range of rates including the maximum amount of material that may be applied. Often, depending on the soil type, organic matter, the amount of soil moisture present, air temperature and humidity at the time of application, it is more cost-effective and environmentally sound to use less than that maximum amount of pesticides to control the pest. In this section, state the amount of pesticide you actually intend to apply per acre. You may use rates up to this rate, but not exceed it without modifying the PUP or submitting a new one. End of Month/Year reports require reporting the amount of active ingredient that has been applied per acre.

8. Application Date(s)

List anticipated time of application.

9. Number of Applications

Total number of times the proposed chemical/mix will be applied during the term of the proposal. Can also be written as application times per year, as in “1 per year”

II. Pest (List specific target pest(s) and reason for application.)

When deciding which herbicide to use, it is critical to identify the target pest(s) so that the most useful and cost-effective application may be chosen. If target pests are not identified, the proposal will not be approved by the State Pesticide Coordinator. Pesticides are rigorously tested and their labels list a number of species that the product is known to control. If the specific target pest(s) are not listed on the label, attach documentation from a recent source stating that the product proposed is know to control the specific target species. For example, if you desire to control the target species of showy milkweed with Banvel™, you will note that the Banvel™ label lists several milkweeds, but now showy milkweed. *The Montana, Utah, Wyoming*

Weed Control Handbook does list dicamba or Banvel with four pounds of active ingredient per gallon as known treatment for showy milkweed. Documentation must be attached for species not listed on the label, for approval of the proposal be the State Pesticide Coordinator. Documentation must also be supplied for mixtures if the mixture is not listed on the label as one that controls the specific target pest(s).

The Western Society of Weed Science has published the *Weeds of the West* by Tom D. Whitson, Larry C. Burrill, Steven A. Dewey, David W. Cudney, B.E. Nelson, Richard D. Lee and Robert Parker that lists standardized common plant names. Chemical companies are also using the standardized names more often now when printing labels. Use the standardized common names of plant pest species or their scientific names in this section of the PUP. List the specific reason for this pesticide application.

III. Desired Results of Application

List the anticipated results of the treatment, species that will be controlled or removed, or enhanced, etc.

IV. Site Description

1. Estimate the number of acres to be treated chemically at each specific site. (This will be included on an attached sheet when one pup covers more than one site.) The size of the acreage to be treated determines who the final authorizing official will be. This section of the PUP must be completed for approval by the State Pesticide Coordinator.

2. Describe the land uses in the treatment area, the stage of growth of the target pest species, the slope and soil type and other factors that relate to specific information found on the pesticide label.

V. Sensitive Aspects and Precautions

Describe any sensitive areas, including wetlands and riparian areas, endangered, threatened, candidate and sensitive habitat, and distance to the treatment site. List measures to be taken to avoid impact to any sensitive areas. If an Administrative Determination is used and documented in the EA Number section of the proposal, this section of the PUP must be filled out before the State Pesticide Coordinator will approve the PUP.

VI. Non-target Vegetation

Since pesticides are not selective at a species level, there will be some loss of species that are considered desirable. Describe the associated and cumulative impacts and mitigations associated with the loss of non-target vegetation on the site of the pesticide application. If the natural plant community is not what the site is being managed for, also list the key management species, or state that you are managing for bare ground. If an Administrative Determination is used and documented in the EA Number section of the proposal, this section of the PUP must be filled out before the State Pesticide Coordinator will approve the PUP.

VII. Integrated Pest Management

In accordance with *Vegetation Treatments on BLM Lands in 17 Western States* (2007), land managers must take an integrated vegetation management approach. The techniques proposed for use in an integrated management program include: Preventive actions, biological control such as prescribed burning, cultural control, such as changing grazing time, numbers, or type of grazing animal, manual practices, such as hand pulling or mowing, chemical control, and restoration practices. Vegetation management priorities: preventive, non-chemical, combination of preventive, non-chemical and chemical, then sole chemical use in that order. Because of these priorities, please document what is being done besides this chemical application to manage undesirable species in the project area. If an Administrative Determination is used and documented in the EA Number section of the proposal, this section of the PUP must be filled out before the State Pesticide Coordinator will approve the PUP.

VIII. Signatures

1. Originators Signature

Signature of person named on page 1. This person will ensure that Pesticide application records and use reports are submitted to the field office monthly.

2. Certified Pesticide Applicator Information

This is the printed company name, address, phone number, applicator name, signature, license number, expiration date, and certifying organization of the person who will oversee the pesticide application on the ground. This person must be currently certified by the Bureau or must have a current state certification. There may be cases where a customer plans to contract out this pesticide application and does not know who the applicator will be at the time the proposal is submitted. A BLM Certified Applicator may then sign and require that the customer send a copy of the chosen applicators state certification to the BLM office's Pesticide\Weed coordinator (There is a separate form for this—just request it). This must be done before the pesticide application takes place. The State Office Pesticide Coordinator keeps a list of currently certified BLM employees and will not approve a proposal if the Certified Applicators signature is missing or if signed by someone whose certification has expired.

3. BLM Field Office Pesticide\Weed Coordinator's Signature

This is the signature of the person in the Field Office who has been assigned the duty of reviewing that office's proposals before they are forwarded to the State Office. This person should also keep a file of copies of State Certification and is responsible for submitting Annual Pesticide Use Reports to the District Office.

4. Field Manager's Signature

The Field Manager or acting-manager must sign this proposal. The State Pesticide Coordinator will not approve any proposal that does not have a manager's signature.

5. State Pesticide Coordinator's Signature

The State Pesticide Coordinator must also be certified by BLM. The State Pesticide Coordinator will forward any proposal to the Washington Office, which cannot be approved at the State Office, if the proposal contains all the information required to meet state approval and is first signed by the Deputy State Director for Lands and Renewable Resources. (The Washington Office sends guidance to the field offices yearly which states the types of proposals that require Washington Office approval.) The EA, labels, material safety data sheets, and any attachments will not be returned. They will be kept on file in the State office with a copy of the original PUP so that the State Office can answer as many information requests as possible without asking the Field Office to re-supply that information.

6. Deputy State Director's Approval

The Deputy State Director will sign and check the appropriate box: approved as is, with modifications, or not approved.

Pesticide Application/Treatment Record

Date/time____ **Landowner**____________________

Applicator(s)____

Location (Patch # or T, R, Sec., Part--if new patch) ____

____

Other Landmarks: Road #________ Description____

☐Roadside ROW ☐Outside ROW ☐ Utility ROW ☐ Well pad ☐ Rangeland
☐Other____

Weed (s):
☐ Halogeton ☐Canada Thistle ☐ Perennial Pepperweed ☐Leafy Spurge
☐ Hoary Cress ☐ Russian Knapweed ☐ Russian Olive ☐ Saltcedar
☐ Cheatgrass ☐ Other____

Patch:
Size: ☐ <0.1 A ☐ 0.1 – 1 A ☐ 1 – 5 A ☐ > 5 A
Density: ☐ Trace ☐ Low 1 to 5% ☐ Medium 5 – 25% ☐ High > 25%
Type: ☐ Isolated ☐ Patchy ☐ Continuous ☐ Linear
Height: ☐ <= 1’ ☐ 1 – 2’ ☐ 3 – 6’ ☐ > 7’

Growth Stage—mark one: ☐ Pre-Bud ☐ Bud ☐ Flowering ☐ Seeding ☐Senescence ☐ Other________

Pesticide (s):
________________________________ ▯▯▯ ▯▯▯. #____________________
________________________________ ▯▯▯ ▯▯▯. #____________________

Rate per Acre ____

Total Amount Used __________________________ ☐Ounces ☐Pints ☐Quarts ☐Other______

Surfactant: ☐ N ☐ Y _________oz/tank Total Used__________ Name ____________

Equipment Used: ☐ Backpack ☐ ATV ☐ Truck ☐ Other_____________________________

Weather
Cloud Cover: ☐Clear ☐Partly Cloudy ☐Mostly Cloudy ☐Overcast
Precipitation: ____
Wind mph / Direction: ☐ 0-1/Calm ☐ 2-5 ☐ 5-10 ☐ >10 Direction______________________
Temperature range: ☐ 40's ☐ 50's ☐ 60's ☐ 70's ☐ 80's ☐ 90's ☐Other___________
Humidity: ☐ Low ☐ Moderate ☐ High

Photos Taken: ☐ N ☐ Y ____

Comments
____
____
____
____

This is available in an electronic format--Excel file.

Pesticide Use Report

Reporting Period:

Company:

PUP Number(s)

Chemical(s)/Surfactant	Use Rate (lbs A.I./Acre)	Acres Treated	Method (**A**ir/**G**round)	Total Active Ingredient
				0
				0
				0
				0
				0
				0
				0
				0
				0
				0
				0
				0
				0
				0
				0
				0
				0
				0

Appendix H
Best Management Practices

APPENDIX H

Project Best Management Practices

The following documents guide the development of wind energy projects and prescribe measures with which such developments must comply:

- U.S. Bureau of Land Management (BLM) *Final Programmatic EIS on Wind Energy Development on BLM-Administered Land in the Western United States* [1]
- *Record of Decision and Approved Rawlins Resource Management Plan*[2] (Rawlin's RMP)
- *BLM 9113 Manual*[3] and the *Surface Operating Standards for Oil and Gas Exploration and Development*[4] (United States Department of the Interior and United States Department of Agriculture. 2007) (the Gold Book).
- Western Area Power Administration *Standard Construction Project Practices and Mitigation*

In accordance with BLM IM 2009-043, the Sand Hills EA is tiered to the analysis in the BLM's *Final Programmatic EIS on Wind Energy Development on BLM-Administered Land in the Western United States*. The BLM's Record of Decision (ROD) for *Implementation of a Wind Energy Development Program and Associated Land Use Plan Amendments*[5] establishes policies and best management practices for wind energy development activities on BLM land and establishes minimum requirements for mitigation measures that have been incorporated into the Project. BLM's land use plans establish goals and objectives for management of the BLM-administered lands. For the proposed Project, the relevant land use plan is the BLM's Rawlins RMP. The Proposed Action is in conformance with the goals and objectives of the Rawlins RMP. RMPs are developed to allocate appropriate resource and land uses for public lands. The Rawlins RMP establishes practices to manage and protect public lands and resources. Additionally, the BLM's guidance manuals include measures relevant to construction and maintenance (*BLM 9113 Manual* and the Gold Book).

Shell WindEnergy (SWE) submitted an interconnection request in April 2003 to the Department of Energy, Western Area Power Administration (Western) to interconnect the proposed Project with Western's existing Happy Jack-Miracle Mile 115-kilovolt transmission line. Western, a power marketing administration within DOE, is evaluating an interconnection request from SWE for the Project. SWE would adhere to Western's *Standard Construction Project Practices and Mitigation* in developing the Sand Hills Project.

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[1] U.S. Bureau of Land Management. 2005. *Final Programmatic EIS on Wind Energy Development on BLM-Administered Land in the Western United States.* June.

[2] U.S. Bureau of Land Management. 2008. *Record of Decision and Approved Rawlins Resource Management Plan for Public Lands Administered by the Bureau of Land Management Rawlins Field Office, Rawlins, Wyoming.* December.

[3] U.S. Bureau of Land Management. 1985. *BLM 9113 Manual*. Available at http://www.oilandgasbmps.org/docs/GEN96-9113.pdf

[4] United States Department of the Interior and United States Department of Agriculture. 2007. *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development*. BLM/WO/ST-06/021+3071/REV 07. Bureau of Land Management. Denver, Colorado. 84 pp.

[5] U.S. Department of the Interior Bureau of Land Management. 2005 *Record of Decision (ROD) Implementation of a Wind Energy Development Program and Associated Land Use Plan Amendments.* December.

In accordance with these guiding documents, this appendix contains the following sets of measures applicable to the Sand Hills Energy Project:

- Appendix A-1. Bureau of Land Management Wind Energy Development Program Best Management Practices
- Appendix A-2. Site-specific Environmental Protection Measures
- Appendix A-3. Western Area Power Administration Standard Construction Project Practices and Mitigation

Appendix H-1
BLM Wind Energy Development Program
Best Management Practices

BLM Wind Energy Development Program Best Management Practices

BLM WIND ENERGY DEVELOPMENT PROGRAM
POLICIES AND BEST MANAGEMENT PRACTICES (BMPS)[1]

A.2 Best Management Practices (BMPs)

The BMPs will be adopted as required elements of project-specific PODs and/or as ROW authorization stipulations. They are categorized by development activity: site monitoring and testing, development of the POD, construction, operation, and decommissioning. The BMPs for development of the POD identify required elements of the POD needed to address potential impacts associated with subsequent phases of development.

A.2.1 Site Monitoring and Testing

- The area disturbed by installation of meteorological towers (i.e., footprint) shall be kept to a minimum.
- Existing roads shall be used to the maximum extent feasible. If new roads are necessary, they shall be designed and constructed to the appropriate standard.
- Meteorological towers shall not be located in sensitive habitats or in areas where ecological resources known to be sensitive to human activities (e.g., prairie grouse) are present. Installation of towers shall be scheduled to avoid disruption of wildlife reproductive activities or other important behaviors.
- Meteorological towers installed for site monitoring and testing shall be inspected periodically for structural integrity.

[1] Bureau of Land Management (BLM). 2005b. *Record of Decision (ROD) for Implementation of a Wind Energy Development Program and Associated Land Use Plan Amendments, Attachment A*. U.S. Department of the Interior. December 2005.

A.2.2 Plan of Development Preparation

General

- The BLM and operators shall contact appropriate agencies, property owners, and other stakeholders early in the planning process to identify potentially sensitive land uses and issues, rules that govern wind energy development locally, and land use concerns specific to the region.

- Available information describing the environmental and sociocultural conditions in the vicinity of the proposed project shall be collected and reviewed as needed to predict potential impacts of the project.

- The Federal Aviation Administration (FAA)-required notice of proposed construction shall be made as early as possible to identify any air safety measures that would be required.

- To plan for efficient use of the land, necessary infrastructure requirements shall be consolidated wherever possible, and current transmission and market access shall be evaluated carefully.

- The project shall be planned to utilize existing roads and utility corridors to the maximum extent feasible, and to minimize the number and length/size of new roads, lay-down areas, and borrow areas.

- A monitoring program shall be developed to ensure that environmental conditions are monitored during the construction, operation, and decommissioning phases. The monitoring program requirements, including adaptive management strategies, shall be established at the project level to ensure that potential adverse impacts of wind energy development are mitigated. The monitoring program shall identify the monitoring requirements for each environmental resource present at the site, establish metrics against which monitoring observations can be measured, identify potential mitigation measures, and establish protocols for incorporating monitoring observations and additional mitigation measures into standard operating procedures and BMPs.

- “Good housekeeping” procedures shall be developed to ensure that during operation the site will be kept clean of debris, garbage, fugitive trash or waste, and graffiti; to prohibit scrap heaps and dumps; and to minimize storage yards.

Wildlife and Other Ecological Resources

- Operators shall review existing information on species and habitats in the vicinity of the project area to identify potential concerns.

- Operators shall conduct surveys for federal and/or state-protected species and other species of concern (including special status plant and animal species) within the project area and design the project to avoid (if possible), minimize, or mitigate impacts to these resources.

- Operators shall identify important, sensitive, or unique habitats in the vicinity of the project and design the project to avoid (if possible), minimize, or mitigate impacts to these habitats (e.g., locate the turbines, roads, and ancillary facilities in the least environmentally sensitive areas; i.e., away from riparian habitats, streams, wetlands, drainages, or critical wildlife habitats).

- The BLM will prohibit the disturbance of any population of federal listed plant species.

- Operators shall evaluate avian and bat use of the project area and design the project to minimize or mitigate the potential for bird and bat strikes (e.g., development shall not occur in riparian habitats and wetlands). Scientifically rigorous avian and bat use surveys shall be conducted; the amount and extent of ecological baseline data required shall be determined on a project basis.

- Turbines shall be configured to avoid landscape features known to attract raptors, if site studies show that placing turbines there would pose a significant risk to raptors.

- Operators shall determine the presence of bat colonies and avoid placing turbines near known bat hibernation, breeding, and maternity/nursery colonies; in known migration corridors; or in known flight paths between colonies and feeding areas.

- Operators shall determine the presence of active raptor nests (i.e., raptor nests used during the breeding season). Measures to reduce raptor use at a project site (e.g., minimize road cuts, maintain either no vegetation or nonattractive plant species around the turbines) shall be considered.

- A habitat restoration plan shall be developed to avoid (if possible), minimize, or mitigate negative impacts on vulnerable wildlife while maintaining or enhancing habitat values for other species. The plan shall identify revegetation, soil stabilization, and erosion reduction measures that shall be implemented to ensure that all temporary use areas are restored. The plan shall require that restoration occur as soon as possible after completion of activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.

- Procedures shall be developed to mitigate potential impacts to special status species. Such measures could include avoidance, relocation of project facilities or lay-down areas, and/or relocation of biota.

- Facilities shall be designed to discourage their use as perching or nesting substrates by birds. For example, power lines and poles shall be configured to minimize raptor electrocutions and discourage raptor and raven nesting and perching.

Visual Resources

- The public shall be involved and informed about the visual site design elements of the proposed wind energy facilities. Possible approaches include conducting public forums for disseminating information, offering organized tours of operating wind developments, and using computer simulation and visualization techniques in public presentations.

- Turbine arrays and turbine design shall be integrated with the surrounding landscape. Design elements to be addressed include visual uniformity, use of tubular towers, proportion and color of turbines, nonreflective paints, and prohibition of commercial messages on turbines.

- Other site design elements shall be integrated with the surrounding landscape. Elements to address include minimizing the profile of the ancillary structures, burial of cables, prohibition of commercial symbols, and lighting. Regarding lighting, efforts shall be made to minimize the need for and amount of lighting on ancillary structures.

Roads

- An access road siting and management plan shall be prepared incorporating existing BLM standards regarding road design, construction, and maintenance such as those described in the BLM 9113 Manual (BLM 1985) and the *Surface Operating Standards for Oil and Gas Exploration and Development* (RMRCC 1989) (i.e., the Gold Book).

Ground Transportation

- A transportation plan shall be developed, particularly for the transport of turbine components, main assembly cranes, and other large pieces of equipment. The plan shall consider specific object sizes, weights, origin, destination, and unique handling requirements and shall evaluate alternative transportation approaches. In addition, the process to be used to comply with unique state requirements and to obtain all necessary permits shall be clearly identified.

- A traffic management plan shall be prepared for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan shall incorporate measures such as informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify any necessary changes in temporary lane configuration.

Noise

- Proponents of a wind energy development project shall take measurements to assess the existing background noise levels at a given site and compare them with the anticipated noise levels associated with the proposed project.

Noxious Weeds and Pesticides

- Operators shall develop a plan for control of noxious weeds and invasive species, which could occur as a result of new surface disturbance activities at the site. The plan shall address monitoring, education of personnel on weed identification, the manner in which weeds spread, and methods for treating infestations. The use of certified weed-free mulching shall be required. If trucks and construction equipment are arriving from locations with known invasive vegetation problems, a controlled inspection and cleaning area shall be established to visually inspect construction equipment arriving at the project area and to remove and collect seeds that may be adhering to tires and other equipment surfaces.

- If pesticides are used on the site, an integrated pest management plan shall be developed to ensure that applications would be conducted within the framework of BLM and DOI policies and entail only the use of EPA-registered pesticides. Pesticide use shall be limited to nonpersistent, immobile pesticides and shall only be applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.

Cultural/Historic Resources

- The BLM will consult with Indian Tribal governments early in the planning process to identify issues regarding the proposed wind energy development, including issues related to the presence of cultural properties, access rights, disruption to traditional cultural practices, and impacts to visual resources important to the Tribe(s).

- The presence of archaeological sites and historic properties in the area of potential effect shall be determined on the basis of a records search of recorded sites and properties in the area and/or, depending on the extent and reliability of existing information, an archaeological survey. Archaeological sites and historic properties present in the area of potential effect shall be reviewed to determine whether they meet the criteria of eligibility for listing on the *National Register of Historic Places* (NRHP).

- When any rights-of-way application includes remnants of a National Historic Trail, is located within the viewshed of a National Historic Trail's designated centerline, or includes or is within the viewshed of a trail eligible for listing on the NRHP, the operator shall evaluate the potential visual impacts to the trail associated with the proposed project and identify appropriate mitigation measures for inclusion as stipulations in the POD.

- If cultural resources are present at the site, or if areas with a high potential to contain cultural material have been identified, a cultural resources management plan (CRMP) shall be developed. This plan shall address mitigation activities to be taken for cultural resources found at the site. Avoidance of the area is always the preferred mitigation option. Other mitigation options include archaeological survey and excavation (as warranted) and monitoring. If an area exhibits a high potential, but no artifacts were observed during an archaeological survey, monitoring by a qualified archaeologist could be required during all excavation and earthmoving in the high-potential area. A report shall be prepared documenting these activities. The CRMP also shall (1) establish a monitoring program, (2) identify measures to prevent potential looting/vandalism or erosion impacts, and (3) address the education of workers and the public to make them aware of the consequences of unauthorized collection of artifacts and destruction of property on public land.

Paleontological Resources

- Operators shall determine whether paleontological resources exist in a project area on the basis of the sedimentary context of the area, a records search for past paleontological finds in the area, and/or, depending on the extent of existing information, a paleontological survey.

- If paleontological resources are present at the site, or if areas with a high potential to contain paleontological material have been identified, a paleontological resources management plan shall be developed. This plan shall include a mitigation plan for collection of the fossils; mitigation could include avoidance, removal of fossils, or monitoring. If an area exhibits a high potential but no fossils were observed during survey, monitoring by a qualified paleontologist could be required during all excavation and earthmoving in the sensitive area. A report shall be prepared documenting these activities. The paleontological resources management plan also shall (1) establish a monitoring program, (2) identify measures to prevent potential looting/vandalism or erosion impacts, and (3) address the education of workers and the public to make them aware of the consequences of unauthorized collection of fossils on public land.

Hazardous Materials and Waste Management

- Operators shall develop a hazardous materials management plan addressing storage, use, transportation, and disposal of each hazardous material anticipated to be used at the site. The plan shall identify all hazardous materials that would be used, stored, or transported at the site. It shall establish inspection procedures, storage requirements, storage quantity limits, inventory control, nonhazardous product substitutes, and disposition of excess materials. The plan shall also identify requirements for notices to federal and local emergency response authorities and include emergency response plans.

- Operators shall develop a waste management plan identifying the waste streams that are expected to be generated at the site and addressing hazardous waste determination procedures, waste storage locations, waste-specific management and disposal requirements, inspection procedures, and waste minimization procedures. This plan shall address all solid and liquid wastes that may be generated at the site.

- Operators shall develop a spill prevention and response plan identifying where hazardous materials and wastes are stored on site, spill prevention measures to be implemented, training requirements, appropriate spill response actions for each material or waste, the locations of spill response kits on site, a procedure for ensuring that the spill response kits are adequately stocked at all times, and procedures for making timely notifications to authorities.

Storm Water

- Operators shall develop a storm water management plan for the site to ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion.

Human Health and Safety

- A safety assessment shall be conducted to describe potential safety issues and the means that would be taken to mitigate them, including issues such as site access, construction, safe work practices, security, heavy equipment transportation, traffic management, emergency procedures, and fire control.

- A health and safety program shall be developed to protect both workers and the general public during construction, operation, and decommissioning of a wind energy project. Regarding occupational health and safety, the program shall identify all applicable federal and state occupational safety standards; establish safe work practices for each task (e.g., requirements for personal protective equipment and safety harnesses; Occupational Safety and Health Administration [OSHA] standard practices for safe use of explosives and blasting agents; and measures for reducing occupational electric and magnetic fields [EMF] exposures); establish fire safety evacuation procedures; and define safety performance standards (e.g., electrical system standards and lightning protection standards). The program shall include a training program to identify hazard training requirements for workers for each task and establish procedures for providing required training to all workers. Documentation of training and a mechanism for reporting serious accidents to appropriate agencies shall be established.

- Regarding public health and safety, the health and safety program shall establish a safety zone or setback for wind turbine generators from residences and occupied buildings, roads, rights-of-ways, and other public access areas that is sufficient to prevent accidents resulting from the operation of wind turbine generators. It shall identify requirements for temporary fencing around staging areas, storage yards, and excavations during construction or decommissioning activities. It shall also identify measures to be taken during the operation phase to limit public access to hazardous facilities (e.g., permanent fencing would be installed only around electrical substations, and turbine tower access doors would be locked).

- Operators shall consult with local planning authorities regarding increased traffic during the construction phase, including an assessment of the number of vehicles per day, their size, and type. Specific issues of concern (e.g., location of school bus routes and stops) shall be identified and addressed in the traffic management plan.

- If operation of the wind turbines is expected to cause significant adverse impacts to nearby residences and occupied buildings from shadow flicker, low-frequency sound, or EMF, site-specific recommendations for addressing these concerns shall be incorporated into the project design (e.g., establishing a sufficient setback from turbines).

- The project shall be planned to minimize electromagnetic interference (EMI) (e.g., impacts to radar, microwave, television, and radio transmissions) and comply with Federal Communications Commission [FCC] regulations. Signal strength studies shall be conducted when proposed locations have the potential to impact transmissions. Potential interference with public safety communication systems (e.g., radio traffic related to emergency activities) shall be avoided.

- The project shall be planned to comply with FAA regulations, including lighting regulations, and to avoid potential safety issues associated with proximity to airports, military bases or training areas, or landing strips.

- Operators shall develop a fire management strategy to implement measures to minimize the potential for a human-caused fire.

A.2.3 Construction

General

- All control and mitigation measures established for the project in the POD and the resource-specific management plans that are part of the POD shall be maintained and implemented throughout the construction phase, as appropriate.

- The area disturbed by construction and operation of a wind energy development project (i.e., footprint) shall be kept to a minimum.

- The number and size/length of roads, temporary fences, lay-down areas, and borrow areas shall be minimized.

- Topsoil from all excavations and construction activities shall be salvaged and reapplied during reclamation.

- All areas of disturbed soil shall be reclaimed using weed-free native grasses, forbs, and shrubs. Reclamation activities shall be undertaken as early as possible on disturbed areas.

- All electrical collector lines shall be buried in a manner that minimizes additional surface disturbance (e.g., along roads or other paths of surface disturbance). Overhead lines may be used in cases where burial of lines would result in further habitat disturbance.

- Operators shall identify unstable slopes and local factors that can induce slope instability (such as groundwater conditions, precipitation, earthquake activities, slope angles, and the dip angles of geologic strata). Operators also shall avoid creating excessive slopes during excavation and blasting operations. Special construction techniques shall be used where applicable in areas of steep slopes, erodible soil, and stream channel crossings.

- Erosion controls that comply with county, state, and federal standards shall be applied. Practices such as jute netting, silt fences, and check dams shall be applied near disturbed areas.

Wildlife

- Guy wires on permanent meteorological towers shall be avoided, however, may be necessary on temporary meteorological towers installed during site monitoring and testing.

- In accordance with the habitat restoration plan, restoration shall be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.

- All construction employees shall be instructed to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons. In addition, pets shall not be permitted on site during construction.

Visual Resources

- Operators shall reduce visual impacts during construction by minimizing areas of surface disturbance, controlling erosion, using dust suppression techniques, and restoring exposed soils as closely as possible to their original contour and vegetation.

Roads

- Existing roads shall be used, but only if in safe and environmentally sound locations. If new roads are necessary, they shall be designed and constructed to the appropriate standard and be no higher than necessary to accommodate their intended functions (e.g., traffic volume and weight of vehicles). Excessive grades on roads, road embankments, ditches, and drainages shall be avoided, especially in areas with erodible soils. Special construction techniques shall be used, where applicable. Abandoned roads and roads that are no longer needed shall be recontoured and revegetated.

- Access roads and on-site roads shall be surfaced with aggregate materials, wherever appropriate.

- Access roads shall be located to follow natural contours and minimize side hill cuts.

- Roads shall be located away from drainage bottoms and avoid wetlands, if practicable.

- Roads shall be designed so that changes to surface water runoff are avoided and erosion is not initiated.

- Access roads shall be located to minimize stream crossings. All structures crossing streams shall be located and constructed so that they do not decrease channel stability or increase water velocity. Operators shall obtain all applicable federal and state permits.

- Existing drainage systems shall not be altered, especially in sensitive areas such as erodible soils or steep slopes. Potential soil erosion shall be controlled at culvert outlets with appropriate structures. Catch basins, roadway ditches, and culverts shall be cleaned and maintained regularly.

Ground Transportation

- Project personnel and contractors shall be instructed and required to adhere to speed limits commensurate with road types, traffic volumes, vehicle types, and site-specific conditions, to ensure safe and efficient traffic flow and to reduce wildlife collisions and disturbance and airborne dust.

- Traffic shall be restricted to the roads developed for the project. Use of other unimproved roads shall be restricted to emergency situations.

- Signs shall be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimize impacts on local commuters, consideration shall be given to limiting construction vehicles traveling on public roadways during the morning and late afternoon commute time.

Air Emissions

- Dust abatement techniques shall be used on unpaved, unvegetated surfaces to minimize airborne dust.

- Speed limits (e.g., 25 mph [40 km/h]) shall be posted and enforced to reduce airborne fugitive dust.

- Construction materials and stockpiled soils shall be covered if they are a source of fugitive dust.

- Dust abatement techniques shall be used before and during surface clearing, excavation, or blasting activities.

Excavation and Blasting Activities

- Operators shall gain a clear understanding of the local hydrogeology. Areas of groundwater discharge and recharge and their potential relationships with surface water bodies shall be identified.

- Operators shall avoid creating hydrologic conduits between two aquifers during foundation excavation and other activities.

- Foundations and trenches shall be backfilled with originally excavated material as much as possible. Excess excavation materials shall be disposed of only in approved areas or, if suitable, stockpiled for use in reclamation activities.

- Borrow material shall be obtained only from authorized and permitted sites. Existing sites shall be used in preference to new sites.

- Explosives shall be used only within specified times and at specified distances from sensitive wildlife or streams and lakes, as established by the BLM or other federal and state agencies.

Noise

- Noisy construction activities (including blasting) shall be limited to the least noise-sensitive times of day (i.e., daytime only between 7 a.m. and 10 p.m.) and weekdays.

- All equipment shall have sound-control devices no less effective than those provided on the original equipment. All construction equipment used shall be adequately muffled and maintained.

- All stationary construction equipment (i.e., compressors and generators) shall be located as far as practicable from nearby residences.

- If blasting or other noisy activities are required during the construction period, nearby residents shall be notified in advance.

Cultural and Paleontological Resources

- Unexpected discovery of cultural or paleontological resources during construction shall be brought to the attention of the responsible BLM authorized officer immediately. Work shall be halted in the vicinity of the find to avoid further disturbance to the resources while they are being evaluated and appropriate mitigation measures are being developed.

Hazardous Materials and Waste Management

- Secondary containment shall be provided for all on-site hazardous materials and waste storage, including fuel. In particular, fuel storage (for construction vehicles and equipment) shall be a temporary activity occurring only for as long as is needed to support construction activities.

- Wastes shall be properly containerized and removed periodically for disposal at appropriate off-site permitted disposal facilities.

- In the event of an accidental release to the environment, the operator shall document the event, including a root cause analysis, appropriate corrective actions taken, and a characterization of the resulting environmental or health and safety impacts. Documentation of the event shall be provided to the BLM authorized officer and other federal and state agencies, as required.

- Any wastewater generated in association with temporary, portable sanitary facilities shall be periodically removed by a licensed hauler and introduced into an existing municipal sewage treatment facility. Temporary, portable sanitary facilities provided for construction crews shall be adequate to support expected on-site personnel and shall be removed at completion of construction activities.

Public Health and Safety

- Temporary fencing shall be installed around staging areas, storage yards, and excavations during construction to limit public access.

A.2.4 Operation

General

- All control and mitigation measures established for the project in the POD and the resource-specific management plans that are part of the POD shall be maintained and implemented throughout the operational phase, as appropriate. These control and mitigation measures shall be reviewed and revised, as needed, to address changing conditions or requirements at the site, throughout the operational phase. This adaptive management approach would help ensure that impacts from operations are kept to a minimum.

- Inoperative turbines shall be repaired, replaced, or removed in a timely manner. Requirements to do so shall be incorporated into the due diligence provisions of the rights-of-way authorization. Operators will be required to demonstrate due diligence in the repair, replacement, or removal of turbines; failure to do so could result in termination of the rights-of-way authorization.

Wildlife

- Employees, contractors, and site visitors shall be instructed to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons. In addition, any pets shall be controlled to avoid harassment and disturbance of wildlife.

- Observations of potential wildlife problems, including wildlife mortality, shall be reported to the BLM authorized officer immediately.

Ground Transportation

- Ongoing ground transportation planning shall be conducted to evaluate road use, minimize traffic volume, and ensure that roads are maintained adequately to minimize associated impacts.

Monitoring Program

- Site monitoring protocols defined in the POD shall be implemented. These will incorporate monitoring program observations and additional mitigation measures into standard operating procedures and BMPs to minimize future environmental impacts.

- Results of monitoring program efforts shall be provided to the BLM authorized officer.

Public Health and Safety

- Permanent fencing shall be installed and maintained around electrical substations, and turbine tower access doors shall be locked to limit public access.

- In the event an installed wind energy development project results in EMI, the operator shall work with the owner of the impacted communications system to resolve the problem. Additional warning information may also need to be conveyed to aircraft with onboard radar systems so that echoes from wind turbines can be quickly recognized.

A.2.5 Decommissioning

General

- Prior to the termination of the rights-of-way authorization, a decommissioning plan shall be developed and approved by the BLM. The decommissioning plan shall include a site reclamation plan and monitoring program.

- All management plans, BMPs, and stipulations developed for the construction phase shall be applied to similar activities during the decommissioning phase.

- All turbines and ancillary structures shall be removed from the site.

- Topsoil from all decommissioning activities shall be salvaged and reapplied during final reclamation.

- All areas of disturbed soil shall be reclaimed using weed-free native shrubs, grasses, and forbs.

- The vegetation cover, composition, and diversity shall be restored to values commensurate with the ecological setting.

Appendix H-2
Site-specific Best Management Practices

APPENDIX H-2

Site-Specific Environmental Protection Measures

General

- Shell Wind Energy (SWE) will conduct activities associated with the Sand Hills Wind Energy Facility (Project) in a manner that will avoid or minimize degradation of land, water quality, or landscape. In the construction, operation, maintenance, and decommissioning of the project, SWE will perform its activities in accordance and compliance with applicable air and water quality standards, related facility siting standards, and related permits associated with implementation, including but not limited to: NEPA; the Clean Air Act; the federal Endangered Species Act (ESA); state and federal historic preservation acts; Clean Water Act; and other established federal, state, and local regulations as required by law.
- SWE will schedule and conduct a construction kick-off meeting prior to commencing construction and surface-disturbing activities at the project site and on the transmission line corridor. The contractor or agents involved with construction or surface-disturbing activities associated with the project will also attend this conference to review the construction stipulations, including the Plan of Development (POD).
- Prior to construction, supervisory construction personnel will be instructed on the protection of cultural, paleontological, and ecological resources. Training materials and briefings shall include, but not be limited to, discussion of the federal ESA, the consequences of noncompliance with this act, identification and values of wildlife and natural plant communities, general behavior and sensitivity to human activities, penalties for violation of state and federal laws (including the Migratory Bird Treaty Act), hazardous substance spill prevention and containment measures, review of all required and recommended conservation measures, and reporting requirements.
- The construction contractor will maintain a copy of the authorization and POD, along with best management practices (BMPs), site-specific mitigation measures, and grant terms and conditions on the construction site at all times.
- SWE will survey and clearly mark the centerline and/or exterior limits of the right-of-way (ROW) on BLM lands, at 200-foot intervals or as determined by the authorized officer. No surface disturbance or construction activity will be allowed within buffer areas, which will be clearly marked as specified by the authorized officer. Any deviation from this requirement will have the prior written approval of the authorized officer. SWE will set centerline stakes to identify the location of the proposed road as directed by the authorized officer. Markers will be used to limit access within work and travel areas to restrict construction access from unnecessarily impacting important cultural and environmentally sensitive areas.

- If disturbance must occur outside of the flagged areas, a BLM-approved biologist must survey the area to be impacted prior to disturbance. If sensitive wildlife or plants are found within the area to be disturbed, the BLM authorized officer must be notified immediately and prior to disturbance an appropriate course of action will be taken to ensure proper protection.
- Clearing, grading, and other disturbance of soil and vegetation will be limited to the minimum area required for construction. In most areas, clearing or grading of the transmission line corridor will be significantly less than the proposed temporary work area limits to reduce potential impacts to existing resources. In addition, efforts will be made to overlap ROW disturbance with previous disturbance areas.
- The holder shall construct, operate, and maintain the facilities, improvements, and structures within the ROW in strict conformity with the POD. Any relocation, additional construction, or use that is not in accord with the approved POD shall not be initiated without the prior written approval of the authorized officer. Noncompliance with the above will be grounds for an immediate temporary suspension of activities if it constitutes a threat to public health and safety or the environment. The company will be notified of the necessary correction immediately and will be allowed to commence operations as soon as the problem is corrected.
- Structures and/or ground wire will be marked with highly visible devices where required by governmental agencies (e.g., Federal Aviation Administration).
- All design, material, construction, operation, maintenance, and termination practices will be in accordance with safe and proven engineering practices.
- Work will be done in compliance with Occupational Safety and Health Administration (OSHA) regulations. Project personnel will be instructed in health and safety procedures and participate in regular safety meetings during construction. Adaptive management will be used to continuously monitor the safety of workers and the public during construction of the project with a goal of zero injuries or accidents.
- The general contractor will be responsible for implementing the Emergency Response Plan.
- The holder shall designate a representative who shall have the authority to act upon and to implement instructions from the authorized officer. The holder's representative shall be available for communication with the authorized officer when construction or other surface disturbing activities are underway.

Air Quality

- SWE will meet federal, state, and local emission standards for air quality.
- Concrete batch plant storage piles will be covered or watered to minimize fugitive dust.
- Dust control and suppression will be provided throughout the construction period to protect surface soils from wind erosion and minimize fugitive dust from construction

activities. Dust control will be accomplished by watering or by the application of a dust suppressant approved by the BLM.

- A maximum speed limit of 15 mph during construction will be established within the ROW to reduce the generation of fugitive dust and protect wildlife.
- Open bodied trucks transporting materials likely to become airborne, when in motion, will be covered and other stockpiles enclosed.
- Earthen and other materials, which may become airborne, will be promptly removed from paved roads.
- No burning of debris resulting from construction clearing will be allowed at the construction site.

Cultural Resources

- Impacts to NRHP-eligible cultural resources sites will be avoided or minimized through project design and layout. SWE will adjust work space boundaries to achieve this goal.
- Where eligible sites cannot be avoided, sites will be mitigated in accordance with the Programmatic Agreement for cultural resources and following the treatment plan developed to implement the programmatic agreement.
- All NRHP-eligible sites will be protected with a 100-foot buffer. The buffer area will be staked and flagged by a qualified archaeologist.
- Any cultural resource (historic or prehistoric site or object) discovered by the holder, or any person working on his behalf, shall be immediately reported to the authorized officer. The holder shall suspend all operations within 300 feet of such discovery until written authorization to proceed is issued by the authorized officer. After initial investigation by an archeologist, the buffer may be reduced to 100 feet. Discoveries will be handled as agreed upon in the programmatic agreement.
- All parties will be required to adhere to the Programmatic Agreement among the BLM, SHPO, WAPA, and SWE, regarding the project.

Fire Management

- SWE will implement a Fire Safety Plan which includes measures for prevention and suppression of fire in the project area. Project personnel will be instructed as to individual responsibility in implementation of the plan.
- The appropriate Interagency Fire Center will be notified immediately of the location and status of any escaped fire or 911 will be called. The BLM will be notified of the incident.
- Operation of internal and external combustion engines on federally managed lands will follow 36 CFR 261.52, which requires such engines to be equipped with a qualified spark arrester that is maintained and not modified.

- When welding, grinding, cutting or conducting other similar, spark-producing work, an area will be chosen that is large enough to contain the sparks and is naturally free of flammable vegetation, or the flammable vegetation will be removed in a manner compliant with the permitted activity. If adequate clearance cannot be made, and area will be wet that was large enough to contain all sparks prior to the activity and periodically throughout the activity to reduce the risk of wildfire ignition. Regardless of clearance, readiness to respond to an ignition at all times will be maintained. In addition, a shovel will be kept per person and at least one fire extinguisher will be on hand during this activity.
- Construction equipment and vehicles will be equipped with approved exhaust mufflers or spark arrestors to prevent accidental wildfires. Construction crews will carry at least one fire extinguisher and shovel to minimize the potential for the spread of wildfires and will comply with the conditions of the applicable Wildland Fire Prevention/Mitigation Clearance for prevention and suppression of fires.
- Fire suppression actions will be initiated in the work area to prevent fire spread to or on federally administered lands. If a fire spreads beyond the capability of workers with the stipulated tools, all will cease fire suppression action and leave the area immediately via pre-identified escape routes.

Hazardous and Solid Wastes

- A Hazardous Materials Management Plan will be implemented to address transportation storage, use, and disposal of hazardous materials expected to be used on the project site during construction and operation.
- Hazardous materials usage, storage, and disposal will comply with applicable local, state, and federal environmental laws and regulations.
- Hazardous materials will be stored in a manner that provides secondary containment. Where space allows, transfer of hazardous materials will also occur within secondary containment. Personnel will be trained in the proper handling, use, storage, and cleanup of hazardous chemicals used on site.
- Hazardous materials spill mitigation, clean-up, and disposal procedures will be in place, including EPA spill notification quantities and contact information.

Land Use

- Fences would be repaired following road construction, and cattle guards or gates would be installed, as appropriate, to provide continuing access during project construction and/or operation.
- Gates on established roads on public lands will be left as found or as designated by the BLM authorized officer. Free and unrestricted public access to and upon the project area will be permitted; however, specific areas designated as “restricted” by the SWE or BLM authorized officer will be closed, and may be locked, for the protection of the public, wildlife, cultural sites, livestock, or facilities under construction within the

ROW. The Compliance Inspection Contractor will have a key to all locked areas, should access be required by BLM personnel.

Noxious Weeds and Invasive Species

Per the Rawlins Resource Management Plan (Appendix 31):

- Minimize the amount of surface disturbance when possible to reduce the area for noxious and invasive weed establishment. Reestablish vegetation on all disturbed soil from construction, reconstruction, and maintenance activities, except road travel ways.
- Accomplish reseeding during the first available window of opportunity.
- Require certified noxious weed-free seed or testing at a suitable laboratory before allowing the use of the seed for any reclamation or rehabilitation project.
- Require certified noxious weed-free straw or hay for use as mulch.
- Require power- or high-pressure cleaning of construction equipment prior to moving into relatively noxious weed-free areas and/or leaving known noxious weed-infested areas. This practice currently is used on multistate and multicounty projects.
- Inspect gravel pits and fill sources to ensure the material comes from noxious weed-free sources.
- Monitor the construction site for noxious weed-control needs until vegetation is reestablished.
- Retain reclamation bonds for noxious weed control until the site is returned to the desired vegetative condition.
- Remove noxious weed seed sources from adjacent sites or from the access route that may contaminate the construction site.

Paleontology

- Turbine pads and towers, transmission lines and roadways within the Hanna formation, and in general the Qt4 and Qt5 units (see Section 3.4.3 of this EA), should have spot-checks completed during earth work and before final reclamation on cuts or excavations.
- The operator shall immediately notify the BLM authorized officer of any paleontological resources discovered as a result of operations under this authorization, protect the discovery from damage or looting, and suspend all activities in the vicinity of such discovery until notified to proceed by the authorized officer. The operator is not required to suspend operations if activities can avoid further impacts to a discovered locality or be continued elsewhere.
- The authorized officer will evaluate, or will have evaluated, such discoveries as soon as possible but not later than 10 working days after being notified. Appropriate measures to mitigate adverse effects to important paleontological resources will be determined by

the authorized officer after consulting with the operator. Approval for the project to proceed will be granted when recovery of the fossil material and field data is completed.

- The operator is responsible for the cost of any investigation necessary for the evaluation and mitigation of paleontological resources. The operator is not responsible for the cost of recovery outside of the approved area of disturbance, even if the paleontological locality continues outside that area.

Rights-of-way Use

- The project will be subject to valid prior existing ROWs, and its construction and operation will be coordinated with other ROW holders and adjacent non-federal landowners.

- Protection of Survey Monuments: The holder shall protect all survey monuments found within the ROW. Survey monuments include, but are not limited to, General Land Office and Bureau of Land Management Cadastral Survey Corners, reference corners, witness points, U.S. Coastal and Geodetic benchmarks and triangulation stations, military control monuments, and recognizable civil (both public and private) survey monuments. In the event of obliteration or disturbance of any of the above, the holder shall immediately report the incident, in writing, to the authorized officer and the respective installing authority if known. Where General Land Office or Bureau of Land Management ROW monuments or references are obliterated during operations, the holder shall secure the services of a registered Land surveyor or a Bureau cadastral surveyor to restore the disturbed monuments and references using surveying procedures found in the Manual of Surveying Instructions for the Survey of the Public Lands of the United States, latest edition. The holder shall record such survey in the appropriate county and send a copy to the authorized officer. If the Bureau cadastral surveyors or other Federal surveyors are used to restore the disturbed survey monument, the holder shall be responsible for the survey cost.

Soils

- A Stormwater Pollution Prevention Plan will be prepared and erosion control measures will be implemented in areas where surface disturbance and/or slope leave the soil open to wind and water erosion. Erosion control methods may include construction of water diversion structures and site-specific applications of mulch or other water flow dissipation materials as needed to control surface water runoff across disturbed areas.

- Damage to soils, including compaction, rutting, and soil displacement, will be repaired at the BLM authorized officer’s discretion.

- During construction, the first 4 to 6 inches of topsoil will be stockpiled for use during reclamation. If deep soils are available, the holder shall segregate 6 to 12 inches of topsoil and stockpile accordingly. Stockpiled topsoil shall be seeded to maintain soil integrity using the seed mix contained in this Appendix, unless changed by the authorized officer.

- After construction is complete, SWE will implement a reclamation plan to reclaim and revegetate areas temporarily disturbed during construction.
- Soils disturbed by construction activities will be restored in accordance with the reclamation plan and BLM, state, and local requirements. Final site restoration, including reseeding, will occur during the spring or fall following construction to further minimize the potential for erosion.
- Inspections will be conducted, to monitor the success and maintenance of erosion control measures. The monitoring program will identify problem areas and corrective measures to ensure vegetation cover and erosion control.

Transportation and Access

- Roads, including main access roads and roads connecting the turbines, will be constructed and maintained in accordance with the BLM standards found in the 9113 Manual prescribed for a collector-type road, unless otherwise approved by BLM.
- During wet road conditions, the BLM authorized officer will be notified if project activities create any ruts deeper than 4 inches on existing roads. Such ruts will be repaired at the BLM authorized officer's discretion.
- Water bars will be constructed on permanent access roads to divert runoff to natural drainages. Roadside drainage ditches will be constructed on access roads as needed to reduce water flow and velocity.
- Permanent roads and parking areas will be constructed to provide drainage and minimize erosion. Culverts shall be installed if necessary to maintain drainage. Areas to be used for permanent roads and parking will be surfaced with gravel.
- Existing roads will be used to minimize vehicular traffic through undisturbed areas, unless approved by the BLM authorized officer.
- SWE intends to minimize grading and road construction and will use overland paths rather than road construction to access transmission tower locations. Overland travel routes will not be cleared or graded, except as may be required by specific topographic or site constraints.

Vegetation Communities

- Areas temporarily disturbed by construction on BLM-administered lands will be re-vegetated in accordance with the Reclamation Plan. Seeding mixtures and techniques will be developed in consultation with the BLM. Re-vegetation on private lands will occur according to landowner specifications. When broadcast seeding is used, it will be followed by raking and/or harrowing to cover the seed.
- Clearing or grading crane paths and other overland access routes will be limited to the extent necessary to allow for safe and effective vehicle passage.

- Minimize disturbance to vegetation through application of BMPs, mitigation, as appropriate and practical (Appendices 13, 14, 15, and 19 of RMP), and reclamation practices (Appendix 36 of RMP).
- Noxious weed trends will be monitored in accordance with Table A17-1. Resource Monitoring Table (Appendix 17 of the RMP).

Vegetation - BLM Sensitive Plant Species

- SWE will avoid or minimize direct impacts to potentially affected special status plant populations in consultation with the BLM.
- If any sensitive plant species that could be affected or disturbed by the project are discovered during the course of construction, ground-disturbing activities that may affect the resource will cease, and the BLM authorized officer will be notified.

Water Resources

- A SWPPP that includes BMPs to ensure compliance with applicable regulations and to minimize the effects of stormwater runoff will be implemented. The construction or maintenance crew foreman will ensure compliance with SWPPP guidelines
- A Spill Prevention, Control, and Countermeasure Plan (SPCCP) will be implemented to ensure protection of surface and ground water resources, such as specific measures for restricting vehicle refueling or maintenance areas to 100 feet from any surface water, wetland, canals, or other drainage features.
- Concrete trucks will not be washed out on public lands. Concrete will not be disposed of in drains, inlets, stormwater drainages, or watercourses.

Wetlands and Riparian Zones

- Surface disturbing activities will be avoided in the following areas: (1) identified 100-year floodplains, (2) areas within 500 feet of perennial waters, springs, and wetland and riparian areas, and (3) areas within 100 feet of the inner gorge of ephemeral channels. Exceptions to this will be granted by the BLM based on an environmental analysis and site-specific engineering and mitigation plans. Only those actions within areas that cannot be avoided and that provide protection for the resource identified will be approved.
- Fuels, pesticides, and hazardous materials will be stored away from wetlands and riparian zones.
- Vehicles will not be refueled in or near wetlands and riparian zones.
- All instruction on the labels of herbicides will be followed and only herbicides approved for water or for near water will be used near wetlands and riparian zones.

- Proper functioning condition of wetland/riparian condition will be monitored in accordance with Table A17-1. Resource Monitoring Table (Appendix 17 of the RMP).

Wildlife

- To conserve wildlife habitat, clearing will be limited to the minimum necessary.
- Surface disturbing and disruptive activities located in potential mountain plover habitat are prohibited during the reproductive period of April 10 to July 10 for the protection of breeding and nesting mountain plover. One or more of the additional protection measures for occupied habitat (Appendix 16 of the RMP) will be applied as determined by the BLM.
- Wildlife habitat objectives will be considered in all reclamation activity.
- Surface disturbing and disruptive activities potentially disruptive to nesting raptors are prohibited within the following distances during the following time periods:
  - 1-mile buffer: Golden eagle, ferruginous hawk
  - Three-quarter-mile buffer: All others
  - February 1–July 15: Golden eagle, barn owl, red-tailed hawk, great-horned owl, other raptors
  - April 1–July 31: Osprey, merlin, sharp-shinned hawk, kestrel, prairie falcon, northern harrier, Swainson’s hawk, Cooper’s hawk
  - March 1–July 31: Short-eared owl, long-eared owl, ferruginous hawk, peregrine falcon, screech owl
  - April 15–September 15: Burrowing owl
  - April 1–August 31: Goshawk
- Turbine locations, roads, ancillary facilities, and other surface structures requiring a repeated human presence will not be allowed within 825 feet of active raptor nests (ferruginous hawks, 1,200 feet). Distance may vary depending on factors such as nest activity, species, natural topographic barriers, and line-of-sight distances.
- Surface disturbing and disruptive activities will be intensively managed on a case-by case basis through the use of appropriate BMPs (Appendix 1 and 15 of the RMP).
- Surface disturbing activities or occupancy are prohibited on and within one-quarter mile of the perimeter of an occupied greater sage-grouse or sharp-tailed grouse lek (Map 3-13).
  - Disruptive activities are prohibited between 6:00 p.m. and 9:00 a.m. from March 1 to May 20 on and within one-quarter mile of the perimeter of an occupied greater sage-grouse or sharp-tailed grouse lek.

- Nesting/early brood-rearing habitat: Avoid surface disturbing and disruptive activities, geophysical surveys, and organized recreational activities (events) that require a special use permit in suitable greater sage-grouse and sharp-tailed grouse nesting and early brood rearing habitat within 2 miles of the perimeter of an occupied greater sage-grouse lek, and within 1 mile of the perimeter of a sharp-tailed grouse lek, or in identified greater sage-grouse and sharp-tailed grouse nesting and early brood rearing habitat, from March 1 to July 15.
- Surface disturbing or disruptive activities within greater sage-grouse breeding or nesting habitat will require the use of BMPs designed to reduce both the direct loss of habitat and disturbance to the birds during the critical breeding and nesting seasons (Appendix 15).

- Guy wires on meteorological towers must be fitted with BLM-approved guy wire markers at sufficient spacing to ensure visibility, and appropriate fencing will be installed around guy wire anchors if determined necessary by the authorized officer.
- Night-time travel will be minimized so as to reduce the potential for vehicle collisions with wildlife.
- A litter control program will be implemented to reduce the attractiveness of project sites to opportunistic predators such as common ravens, coyotes, and kit fox. All domestic trash will be promptly placed in covered containers which will be removed from the work site on a regular basis for disposal at an authorized facility. A Waste Management Plan for non-hazardous wastes resulting from construction and operation will be implemented.
- Use of pesticides shall comply with applicable Federal and state laws. Pesticides shall be used only in accordance with their registered uses and within limitations imposed by the Secretary of the Interior. Prior to the use of pesticides, SWE shall obtain from the authorized officer written approval of a plan showing the type and quantity of material to be used, pest(s) to be controlled, method of application location of storage and disposal of containers and any other information deemed necessary by the authorized officer. Pesticides shall not be permanently stored on public lands.
- To protect birds and bats, an Adaptive Wildlife Management Plan will be used to collect and evaluate information from post-construction bird and bat fatality monitoring. SWE will provide the monitoring results to BLM and consult with BLM regarding potential management decisions regarding unanticipated impacts to wildlife.
- Special status wildlife will be monitored in accordance with Table A17-1. Resource Monitoring Table (Appendix 17 of the RMP).

Appendix H-3
Western Standard Construction Project Practices and Mitigation

Note: For activities that occur in Region 2, Forest Service Handbook Region 2 Issuance 2509.25 Watershed Conservation Practices Handbook will also be utilized. If a conflict exists between this and the directive listed below, the more restrictive practice will apply.

Western Standard Construction Project Practices and Mitigation

Other Mitigations will be developed through the MAP process.

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 on or off road. Such ruts shall be leveled, filled and graded, or otherwise eliminated as approved by Western or the Forest Service. 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 will be instructed on the protection of cultural and environmental resources. To assist in this effort, the construction contract will 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. Top soil will be saved and used for rehabilitation and restoration requirements.
VEG-3	On completion of the work, all work areas except access trails shall be scarified or left in a condition that will facilitate natural re-vegetation (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. Seeding and mulch requirements will be specified. Seed mix will be approved by Forest Service and mimic natural surroundings. All seed, mulch, hay approved for use will be certified weed-free.
GEN-3	Construction roads and trails not required for maintenance access shall be restored to the original contour, seeded, and be left in a state acceptable to the landowner. The surfaces of these construction roads and trails shall be scarified as needed to provide conditions that will facilitate natural re-vegetation, 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 re-graded, as required, so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural re-vegetation, provide for proper drainage, and prevent erosion.

GEN-5	Borrow pits shall be excavated so that water will 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.
WATER-1	Dewatering work for structure foundations or earthwork operations adjacent to, or encroaching on, streams or water courses will 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.
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 will 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 will install fence grounds on all fences that cross or are parallel to the proposed line and in which induced currents are a problem.
WATER-4	Minimize activities in riparian areas or span riparian areas. Avoid disturbance to riparian vegetation whenever practical.
	Minimize the crossing of riparian areas with Equipment and vehicles during construction and maintenance activities.
	Existing bridges or fords will be used to access the ROW on either side of riparian areas.
WILDLIFE-1	Western would design the transmission line in conformance with Suggested Practices for Protection of Raptors on Power lines (APLIC 1994) and Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006 (APLIC 2006).

Appendix I
Bureau of Land Management
Wildlife and Rare Plant Monitoring Protocols for
Sand Hills Wind Energy Farm

PURPOSE AND BACKGROUND

Monitoring for Wind Projects: A survey and monitoring program will be developed for each proposed wind energy development as part of Bureau of Land Management's (BLM) responsibilities under the National Environmental Policy Act, the Endangered Species Act (ESA) and the Migratory Bird Treaty Act (MBTA) to ensure that environmental conditions are documented prior to construction, and monitored during the construction, operation, and decommissioning phases. The program requirements, including adaptive management strategies, will be established at the project level to ensure potential adverse impacts of wind energy development are avoided, minimized, or mitigated. The program will identify the survey and monitoring requirements for wildlife and plant species potentially present at the site, establish baseline information against which monitoring observations can be measured, and identify potential minimization and mitigation measures.

Authority:
- Federal Land Policy and Management Act (FLPMA) of 1976
- Fish and Wildlife Coordination Act (16 U.S.C. 661-667)
- Migratory Bird Conservation Act (16 U.S.C. 715-715d, 715e, 715f-715r)
- National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347)
- Endangered Species Act of 1973 (16 U.S.C. 1531-1544)
- Executive Order 13186 (66 FR 3853).
- Fish and Wildlife Conservation Act (16.U.S.C. 2901-2911)
- Migratory Bird Treaty Act (16 U.S.C. 703-712)
- Bald and Golden Eagle Protection Act (16 U.S.C. 668)

The principal objectives of the monitoring are to:
1) Illuminate needs for further monitoring and potential mitigation measures, where appropriate.
2) Determine post-construction impacts to wildlife species from the development.

Bald and Golden Eagle Protection Act (WO-IM-2010-156)
Background: The BLM has always been subject to legal requirements for bald and golden eagle conservation and protection under the Bald and Golden Eagle Protection Act (Eagle Act) (as amended) and for the bald eagle (for the period that it was listed) under the ESA. However, in 2007 the Eagle Act's implementing regulations were supplemented with a definition of the term "disturb" (a form of take), and regulations governing incidental take permits in 2009. For the duration that the bald eagle was listed under the ESA (1973 – 2007), "take" or "likely take" of bald eagles was authorized through the ESA section 7(a)(2) consultation process. On September 11, 2009, the United States Fish and Wildlife Service (FWF) published "Eagle Permits; Take Necessary to Protect Interest in Particular Localities; Final Rules" (Rule) in the Federal Register, creating a regulatory mechanism by which individual and programmatic "take" of bald eagles and golden eagles could be permitted under the Eagle Act for authorized uses and activities on BLM administered lands. While the mechanism is now in place to issue take permits, the FWS is limiting take for golden eagles due to population concerns and the present lack of identified measures to reduce take from activities, except in special cases. At this time, Shell Wind Energy is coordinating development of an Avian Protection Plan with BLM and the USFWS to ensure compliance with Bald and Golden Eagle Protection Act.

Note: The BLM hereby notifies the applicant that compliance with the Eagle Act is a dynamic and adaptable process which may require the applicant to conduct further analysis and mitigation following assessment of operational impacts.*

Avian Protection Plans
An Avian Protection Plan (APP) is required for the Sand Hills Wind Farm (BLM WO-IM-2010-156). The APP would be developed by Shell in coordination with the BLM and the FWS. The BLM would not issue a notice to proceed for the project until Shell completes its obligation under applicable requirements of the Eagle Act, including completion of any required procedure for coordination with the FWS or any required permit. The APP would address wind turbine siting, operations, and monitoring requirements based upon highly detailed information on eagle use of the project area. This would include identification of flight patterns, hunting perches, roost sites and nests in and around the project area.

Bat Protection Plans
A Bat Protection Plan (BPP) would be developed in consultation with the FWS should bat fatality studies indicate substantial impacts to the species. Wind energy development has a potential to negatively impact BLM Sensitive Species bats (Townsend's big-eared bat, spotted bat, long-eared myotis, and the fringed myotis). The migratory tree-roosting species, migratory cave-dwelling species, the hoary bat, and the silver-haired bat currently compose the majority of bats reported killed at wind facilities in most regions of North America (NAS 2007; Johnson 2005; Kunz et al. 2007a; Arnett et al. 2008). Although these species are not currently classified as threatened or endangered, this pattern of higher collisions among certain species may change the status of the bats as more wind facilities are developed. These impacts combined with the cumulative impacts of white-nosed syndrome that is quickly spreading across the country have placed some bat species at much greater risk than was previously analyzed.

Migratory Birds
The BLM also has responsibilities under the MBTA to analyze and protect all migratory birds. Most birds killed at wind turbines are songbirds. Most of North America's birds are migratory songbirds and most of the migratory species migrate during the night (usually at altitudes above the rotor swept areas when weather conditions are favorable). Risk may be greatest during take-off and landing where wind facilities abut stopover sites. Songbirds are vulnerable to colliding with man-made structures such as buildings, communication towers, power lines, or wind turbines during poor weather conditions that force them to lower altitudes (Winkelman 1995; Gill et al. 1996; Erickson et al. 2001; Johnson et al. 2002; Robbins 2002; Kerlinger 2003; Manville 2009). Songbird collisions typically account for roughly three quarters of bird casualties at U.S. wind facilities (Erickson et al. 2001; Johnson et al. 2002) and result in spring and fall peaks of bird casualty rates at most wind facilities (Johnson et al. 2002; Erickson et al. 2004). Wyoming BLM Sensitive Species migratory birds that may be impacted by the project include: Baird's sparrow, sage sparrow, burrowing owl, ferruginous hawk, mountain plover, yellow-billed cuckoo, peregrine falcon, bald eagle, loggerhead shrike, long-billed curlew, sage thrasher, white-faced ibis, and Brewer's sparrow.

BLM Sensitive Species
BLM Sensitive Species are species designated internally in accordance with BLM Manual 6840. "Actions authorized by the BLM shall further the conservation and/or recovery of federally listed species and conservation of Bureau sensitive species. Bureau sensitive species will be managed consistent with species and habitat management objectives in land use and implementation plans to promote their conservation and to minimize the likelihood and need for listing under the ESA". BLM Manual 6840.2 Administration of Bureau Sensitive Species states:

> "In compliance with existing laws, including the BLM multiple use mission as specified in the FLPMA, the BLM shall designate Bureau sensitive species and implement measures to conserve these species and their habitats….to promote their conservation and reduce the likelihood and need for such species to be listed pursuant to the ESA."

Baseline Information Review

Existing information on species and habitats of greatest interest that are known or likely to occur in the vicinity of the site has been reviewed, mapped, and used in design of field surveys, to the extent practical. Sources for this information included the BLM, the Wyoming Game and Fish Department (WGFD), the Wyoming Natural Diversity Database (WYNDD) and the FWS.

Statistical Analysis of Baseline Data

Data Compilation and Storage

A database has been established to store, retrieve, and organize field observations. All wildlife survey information has been provided to the BLM as GIS shapefiles. All field data forms, field notebooks, and electronic data files will be retained for future reference by the BLM.

Protocol

The following survey protocols have been defined by the BLM for use on public lands where potential habitat exists for the Sand Hills Wind Farm.

Bald and Golden Eagle Monitoring

Any additional analysis or mitigation required for compliance with the Bald and Golden Eagle Act will be required by the BLM and coordinated with the FWS through development of an Avian Protection Plan (APP) in accordance with BLM WO-IM-2010-156.

Bat Monitoring

Carcass Surveys

Surveys would include 4 carcass surveys per year (as defined below) for 3 consecutive years beginning at the onset of project operation. At year 8 of operations (5th year after the initial 3-year study), and every 5-years thereafter, a 4-carcass survey study would be conducted. Shell and the BLM will jointly agree on additional carcass surveys depending on the 5-year survey results and review of Shell's annual mortality reports.

All bat fatalities located within areas surveyed will be recorded and a cause of death determined, based on field examination and/or necropsy results. Both the ability of searchers to locate carcasses (searcher efficiency) and the length of time carcasses remain onsite before being removed by scavengers (a site-specific carcass removal rate) can bias the number of carcasses located during standardized searches. Therefore, an estimate of the total number of fatalities will be made by adjusting for scavenging and searcher efficiency bias.

Survey frequency can be adjusted accordingly as new information is acquired based on the results of the carcass persistence surveys and searcher efficiency rates. A complete round of searches will be required on all meteorological towers/wind turbines unless otherwise determined by the BLM biologist.

The following dates will be used to define seasons: (1) spring migration (March 1 – May 15); (2) breeding season (May 16 – August 15); (3) fall migration (August 16 – October 31); and (4) winter (November 1 – December 15). Carcass searches are not required between approximately December 15 and March 15. Changes to these dates may be considered on a case by case basis due to weather conditions and access constraints.

- 120 m x 120 m plots should be established centered on the meteorological tower
- Transects will be set at 6 m apart in the area to be surveyed, and the observers will walk along each transect searching both sides out to 3 m for carcasses.
    - 20 transects = (start in 3 meters from edge)
- Conduct transects at one week intervals

Carcass Survey Data Collection

- Location
- Observer
- Date
- Start Time and End Time
- Environmental Condition
- Tower Number/ID
- Species
- Sex

- Estimated Carcass Age
- Direction from Tower
- Distance from Tower
- Map in 120/120 plot area/GPS Coordinates (UTMs, NAD83)
- The condition of each fatality will be recorded using the following condition categories:
    - Intact – carcass that is completely intact, is not badly decomposed, and shows no sign of being fed upon by a predator or scavenger.
    - Scavenged – entire carcass that shows signs of being fed upon by a predator or scavenger or a portion(s) of a carcass in one location (e.g., legs, skeletal remains, pieces of skin, or wings).
- Photograph
- Vegetation Type
- Comments

Shell is required to notify the BLM within 24 hours to report the casualties of any species. Casualties found will be labeled with a unique identification number, bagged, and frozen. A copy of the data sheet for each carcass will be maintained, bagged, and frozen with the carcass. This data sheet copy should remain with the carcass at all times. In addition, all signs of carcass presence should be removed after each survey effort. Casualties or fatalities found by maintenance personnel and others not conducting the formal searches will be documented using a wildlife incidental reporting system. When carcasses of animals are discovered by non-study personnel, a project biologist will be contacted to identify and collect the casualty. Monitoring reports will be made available to the Bureau of Land Management Rawlins Field Office RECO Biologist on a monthly basis.

Should bat species be incorporated into the development of the APP, carcass survey protocols will be reviewed at that time to ensure compliance with both FWS and BLM requirements.

Migratory Bird Surveys

Fixed-Point Count Surveys

The objective of the bird use surveys is to estimate the temporal and spatial use of the project area and vicinity by birds, especially raptors (e.g. accipiters, buteos, harriers, eagles, falcons, and owls) but also including passerines and other groups of birds. Bird use survey data will consist of counts of birds observed within circular plots around fixed observation points following standard methods (Reynolds et al. 1980). Point count surveys were conducted to develop baseline information for the NEPA analysis. One additional winter survey will occur prior to construction. The results of the survey will be submitted to the BLM prior to issuance of a notice to proceed. Should the results of the additional survey indicate usage other than previously identified, additional monitoring may be required.

Should migratory bird species be incorporated into the development of the APP, survey protocols will be reviewed at that time to ensure compliance with both FWS and BLM requirements.

A minimum of eight survey plots fixed on a point in the project area will be established in coordination with the BLM. The locations of survey plots fixed on a point in the proposed areas should ensure a variety of representative habitats and topography in the areas proposed for turbines will be sampled. All of the plots will be surveyed during each survey period. Fixed points will be micro-sited in the field in order to maximize view-sheds within the survey plot and to account for potential changes in land access. Efforts will be made to place the plots in areas containing maximum visibility. These survey points will be fixed for the entire study period to provide consistency and corroboration of data generated throughout the seasonal survey periods.

Plots will be surveyed for 20 minutes each survey day. All birds seen during each survey will be recorded and the estimated distance to each bird observed will be recorded to the nearest meter. An equal effort will be used for all plots. Perch locations and flight paths of large birds and other species of interest will be mapped on USGS 1:24,000 topographic maps and given corresponding observation numbers.

The behavior of each raptor/large bird observed and the habitat in which or over which the bird occurred will be recorded. Behavior categories recognized include perched (PER), soaring (SOR), flapping (FLA), flushed (FLU), circle soaring (CS), hunting (HU), gliding (GL), and other (OT, noted in comments). Vegetation types within, or over the area that observations are made will also be recorded. Flight tracks and vegetation types (at first observation) will be uniquely identified on the data sheet. The flight direction of observed birds will also be recorded on the data sheet map. Approximate flight height above ground level (HAGL) at first observation will be recorded to the nearest meter; the approximate lowest and highest flight heights observed will also be recorded. This will be important to develop an exposure risk for avian species by documenting which species fly within the rotor swept area. Any comments or unusual observations will be noted in the comments section. Locations of raptors, other large birds, and any species of interest seen will be recorded on the field maps, by observation number. The field maps will be prepared as portions of the USGS quadrangle, which include the survey plot.

Weather information, including temperature, wind speed, wind direction and cloud cover, will be recorded for each survey point. The date, start, and end time of observation period, plot number, species or best possible identification, number of individuals, sex and age class if possible, distance from plot center when first observed, closest distance, HAGL, activity, and vegetation type(s) will be recorded.

Bird use surveys will be scheduled to cover all daylight hours. During a set of surveys, each plot will be visited once. Each plot will be surveyed during a different time of day from the previous week to vary the time of day during which plots are surveyed and distribute observations over all daylight periods. The survey schedule will require flexibility in response to adverse weather conditions and logistics, which may cause delays and rescheduling of some surveys.

Carcass Surveys

All avian fatalities located within areas surveyed will be recorded and a cause of death determined, based on field examination and/or necropsy results. Both the ability of searchers to locate carcasses (searcher efficiency) and the length of time carcasses remain onsite before being removed by scavengers (a site-specific carcass removal rate) can bias the number of carcasses located during standardized searches. Therefore, an estimate of the total number of fatalities will be made by adjusting for scavenging and searcher efficiency bias. Survey frequency can be adjusted accordingly as new information is acquired based on the results of the carcass persistence surveys and searcher efficiency rates. A complete round of searches will be required on all meteorological towers/wind turbines unless otherwise determined by the BLM biologist.

The following dates will be used to define seasons: (1) spring migration (March 1 – May 15); (2) breeding season (May 16 – August 15); (3) fall migration (August 16 – October 31); and (4) winter (November 1 – December 15). Carcass searches are not required between approximately December 15 and March 15. Changes to these dates may be considered on a case by case basis due to weather conditions and access constraints.

- 120 m x 120 m plots should be established centered on the wind tower
- Transects will be set at 6 m apart in the area to be surveyed, and the observers will walk along each transect searching both sides out to 3 m for carcasses.
    - 20 transects = (start in 3 meters from edge)
- Conduct transects at one week intervals

Carcass Survey Data Collection
- Location
- Observer
- Date
- Start Time and End Time
- Environmental Condition
- Tower Number/ID
- Bird Diverters (presence and type)
- Species
- Sex
- Estimated Carcass Age
- Direction from Tower
- Distance from Tower
- Map in 120/120 plot area/GPS Coordinates (UTMs, NAD83)
- The condition of each fatality will be recorded using the following condition categories:
    - Intact – carcass that is completely intact, is not badly decomposed, and shows no sign of being fed upon by a predator or scavenger.
    - Scavenged – entire carcass that shows signs of being fed upon by a predator or scavenger or a portion(s) of a carcass in one location (e.g., legs, skeletal remains, pieces of skin, or wings).
    - Feather Spot – enough feathers to indicate mortality/scavenging
- Photograph
- Vegetation Type
- Comments

The proponent is required to notify U.S. Fish and Wildlife Service (USFWS) within 24 hours (or timeframe specified by agency) to report the casualties of any species of special management concern. Casualties found will be labeled with a unique identification number, bagged, and frozen. A copy of the data sheet for each carcass will be maintained, bagged, and frozen with the carcass. This data sheet copy should remain with the carcass at all times. In addition, all signs of carcass presence (i.e., feathers) should be removed after each survey effort.
Casualties or fatalities found by maintenance personnel and others not conducting the formal searches will be documented using a wildlife incidental reporting system. When carcasses of animals are discovered by non-study personnel, a project biologist will be contacted to identify and collect the casualty. Monitoring reports will be made available to the lead and local Bureau of Land Management Field Office on a monthly basis.

Mountain Plover
Mountain Plover density surveys will be conducted in accordance with USFWS Mountain Plover guidelines.

Swift Fox
One additional year of abundance surveys for swift fox will be conducted after construction of the project in coordination with BLM RECO Biologist (e.g., track plates, spotlighting). This survey will occur only on BLM lands in suitable habitat.

Raptor Surveys
Nest and Productivity Surveys
Raptor nest surveys would need to be completed within one year prior to surface disturbing activities, and continue for an additional two years after construction. Shell and the BLM will agree on additional nest surveys every 5 years depending on the 2-year survey results.

The objectives of the raptor surveys are to:
1) Identify the species and nest densities occurring within the Project area.
2) Record raptor nest locations to identify areas with a potential increased risk of disturbance or collisions for adults or young associated with nest sites.

Suitable raptor nesting habitat is primarily in cliffs, rock outcrops, and man-made structures such as power poles and in some habitats they are in tree tops (with the exception of ground nesting birds such as burrowing owls and some Ferruginous hawks). The survey area for raptor nests will be the proposed project area and a buffer (to be determined in the APP) surrounding the proposed project. Breeding and nesting surveys would be conducted in accordance with protocols established in the APP.

Rare Plant Mapping
Rare plant locations of Beaver Rim Phlox will be mapped using ground-truthing. This habitat information will be digitized into a geographic information system (GIS) format and would be used to guide development of mitigation measures should project construction potentially impact the species. Surveys would only be required within suitable habitat on BLM administered lands.
Wyoming Pocket Gopher

Should pocket gopher mounds be encountered prior to construction activities, trapping would be required if the mounds were not avoided by 75-meters. Trapping will be conducted in accordance with BLM protocols.

Endangered Species Act Consultation Requirements for the BLM
The BLM is required to conduct Section 7(a) consultation (or conferencing for proposed species) under the ESA; with the FWS if there is potential to impact any listed species (directly or indirectly) on all actions approved by the BLM.

Water Depletions
Consultation has been completed for water depletions from the Platte River Basin. Based on consultation with the USFWS, the Service and the Wyoming State Engineer's Office concluded that the proposed Federal Action will result in an existing depletion to the Platte River system above the Loup River confluence. Furthermore, the adverse effects of the project are consistent with those evaluated in the Tier 1 Programmatic Biological Opinion for the whooping crane, interior least tern, piping plover, pallid sturgeon, western prairie fringed orchid, and whooping crane critical habitat.

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