Environmental Assessment for the White Mountain Wind Energy Project

Sweetwater County, Wyoming

BLM

Wyoming High Desert District – Rock Springs Field Office

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February 2010

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ENVIRONMENTAL ASSESSMENT FOR THE WHITE MOUNTAIN WIND ENERGY PROJECT, SWEETWATER COUNTY, WYOMING

Bureau of Land Management
Wyoming High Desert District
Rock Springs Field Office
Rock Springs, Wyoming

In Cooperation With

Sweetwater County
City of Rock Springs
Sweetwater County Conservation District
The Wyoming Governor's Office
Wyoming Game and Fish Department
Wyoming State Historic Preservation Office
Wyoming Department of Environmental Quality - Industrial Siting Division
Wyoming Department of Environmental Quality - Water Quality Division
Wyoming Department of Agriculture

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LIST OF ACRONYMS AND ABBREVIATIONS

AML	Appropriate Management Level
ASTM	American Society for Testing and Materials
AUM	Animal unit months
AWEA	American Wind Energy Association
BLM	Bureau of Land Management
BMPs	Best management practices
BOP	Balance of Plant
CAAQS	Colorado Ambient Air Quality Standards
CBNG	Coal bed natural gas
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
CFR	*Code of Federal Regulations*
CO	Carbon monoxide
CO_2	Carbon dioxide
dBA	A-weighted decibels
DOC	U.S. Department of Commerce
DOE	U.S. Department of Energy
EA	Environmental assessment
EIS	Environmental impact statement
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FR	Federal Regulation
Ft	Foot or feet
GAO	General Accounting Office
GHG	Greenhouse Gases
GIS	Geographic Information System
Ha	Hectare
HSE	Health, Safety, and Environment
HUC	Hydrologic Unit Code
I-80	Interstate 80
IAA	Cumulative impact assessment areas
IEC	International Electrotechnical Commission
JEDI	Job and Economic Development Impact
kHz	Kilohertz
km	kilometer
KOPs	Key Observation Points
kV	Kilovolt
KWh	Kilowatt hours
LLC	Lloyd Levy Consulting, LLC
met	Meteorological tower
mi	Mile
mph	Miles per hour
MW	Megawatt
MWh	Megawatt hour
NAAQS	National Ambient Air Quality Standards
NEPA	*National Environmental Policy Act*
NHPA	*National Historic Preservation Act*
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxide
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
O&M	Operations and maintenance
OHV	Off-highway vehicle
PA	Programmatic Agreement
PAWG	Pinedale Anticline Working Group
PEIS	Programmatic environmental impact statement
PEMC	Palustrine seasonally flooded wetland
PFYC	Probable Fossil Yield Classification
PLS	Pure live seed
$PM_{2.5}$	Particulate matter <2.5 $\mu g/m^3$
PM_{10}	Particulate matter <10 $\mu g/m^3$
POD	Plan of Development
PSB	Passerine and small birds
PSD	Prevention of Significant Deterioration
PUSA	Palustrine unconsolidated bed, temporarily flooded
RFFA	Reasonably foreseeable future actions
RIP	Recovery and Implementation Program
RLB	Raptors and large birds
RMP	Resource Management Plan
ROD	Record of Decision
ROW	Right-of-way
RSFO	Rock Springs Field Office
RSGA	Rock Springs Grazing Association
RV	Recreational vehicle
SCADA	Supervisory control and data acquisition

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

SGIT	Sage-grouse Implementation Team
SHPO	State Historic Preservation Office
SO_2	Sulfur dioxide
SPCCP	Spill Prevention, Control, and Countermeasure Plan
SWPPP	Storm Water Pollution Prevention Plan
TCP	Traditional Cultural Properties
TEPC	Threatened, endangered, and proposed, and candidate
Teton	Teton Wind, LLC
TRC	TRC Environmental Corporation
TSP	Total suspended particulates
UGBMA	Upland Game Bird Management Area
$\mu g/m^3$	Micrograms per cubic meter of air
U.S.C.	*United States Code*
USDOC	U.S. Department of Commerce
USFWS	U.S. Fish and Wildlife Service
VMT	Vehicle-mile traveled
VOC	Volatile organic compounds
VRM	Visual Resource Management
WAAQS	Wyoming Ambient Air Quality Standards
WAQS&R	Wyoming Air Quality Standards and Regulations
WDEQ/AQD	Wyoming Department of Environmental Quality/Air Quality Division
WDEQ/WQD	Wyoming Department of Environmental Quality/Water Quality Division
WECC	Western Electricity Coordinating Council
WGFD	Wyoming Game and Fish Department
WHHMA	Wild Horse Herd Management Area
Wind Energy PEIS	Wind Energy Programmatic Environmental Impact Statement
WMWE	White Mountain Wind Energy
WNDD	Wyoming Natural Diversity Database
W.S.	Wyoming Statute
WYGISC	Wyoming Geographic Information System Center

1.0 INTRODUCTION

This environmental assessment (EA) has been prepared to analyze the potential environmental consequences of the proposed White Mountain Wind Energy (WMWE) Project as proposed by Teton Wind, LLC (Teton), a wholly owned subsidiary of Tasco Engineering, Lehi, Utah.

The project site is located on top of White Mountain, which is west-northwest of the city of Rock Springs, Sweetwater County, Wyoming, in portions of T19N-T20N, R105W-106W. The project area encompasses 13,165 acres of which 8,527 aces are private lands, 240 acres owned by the State of Wyoming, and 4,398 are public lands managed by the Bureau of Land Management (BLM).

In 2005, the Bureau of Land Management (BLM) prepared a programmatic environmental impact statement (PEIS) for wind energy development in the western U.S.--*Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States* (Wind Energy PEIS) (BLM 2005). This EA is tiered to the PEIS, and presents a site-specific analysis of potential impacts that could result from the implementation of the Proposed Action and incorporates the analysis conducted in that document. Additionally, it is BLM policy (IM 2009-043), consistent with the *Energy Policy Act of 2005*, to encourage development of wind energy in acceptable areas. Further, development of renewable domestic energy would help meet national security objectives.

Several agencies having jurisdiction by law and/or special expertise elected to become cooperating agencies. These agencies include Sweetwater County, the City of Rock Springs, Sweetwater County Conservation District, and a number of State of Wyoming agencies working under the direction of the Governor's Office. Besides the Governor's Office other state agencies participating as cooperators include Wyoming Game and Fish Department, State Historic Preservation Office, Department of Environmental Quality - Industrial Siting Division and Water Quality Division, and the Wyoming Department of Agriculture. Further, where applicable, this analysis may be used by those cooperating agencies having jurisdiction by law in their permitting requirements.

1.1 BACKGROUND

Recent national and regional forecasts project an increase in consumption of electrical energy continuing into the foreseeable future. Renewable energy, including wind generation, is expected to provide a larger component of the electrical supply in the future. Increased consumption requires development of new generation facilities to satisfy demand, as substantiated by the following sources.

- The Energy Information Administration, a statistical agency of the U.S. Department of Energy (DOE), states in the *Annual Energy Outlook 2009 with Projections to 2030* (DOE 2009) that total electricity demand is projected to grow by 1.1% per year from 2004 through 2030. Renewable sources of electricity are expected to grow at a higher rate of 2.2% annually, which represents an increase of over 270 billion kilowatt-hours (kWh) by 2030. Wind energy alone is anticipated to provide 124 billion kWh of electricity by 2030, compared to 26 billion kWh in 2006 (DOE 2008).
- The Western Electricity Coordinating Council (WECC) forecasts electricity demand in the western U.S. In the *10-Year Coordinated Plan Summary 2006-2015* (WECC 2006), the WECC states that capacity margins are declining, and from 2006 through 2015, annual energy use is projected to increase 2.2% (2.0% annual compound growth rate) (WECC 2006).
- Further substantiation of the need for energy development is provided through the Western Governors' Association goal of developing 30,000 megawatts (MW) of clean energy by 2015 from traditional and renewable energy sources and by the *Energy Policy Act of 2005*, which

encourages the development of renewable energy resources, including wind energy, as part of an overall strategy to develop a diverse portfolio of domestic energy supplies for the future.

Teton has applied for a development right-of-way (ROW) grant from the BLM, Rock Springs Field Office (RSFO) for authorization to use BLM-administered public lands for the construction, operation, maintenance, and termination of the proposed wind energy generation facility.

Teton's proposal consists of developing a commercial wind-powered electrical generating facility near Rock Springs, Wyoming (Figure 1.1). Approval of the proposed action could result in construction of up to 240 wind turbine generators with an anticipated total generating capacity of up to 360 MW. Construction of the project would occur in 4 phases. While the Proposed Action includes up to 240 wind turbine generators, it is possible that not all of the wind turbines would ultimately be installed due to the environmental or technical constraints or market conditions. This EA analyzes the potential impacts as if 240 wind turbine generators would be installed. Associated components would include an underground electrical system to collect energy from the turbines, access road system, operations and maintenance (O&M) building, and a substation. Other facilities required for construction include a mobile batch plant and equipment staging areas that would be located in the central portion of the project area (refer to Figure 2.2).

The WMWE Project would be located on top of White Mountain, which is about 1.3 mi west-northwest of the city of Rock Springs, Wyoming. A boundary has been defined and encompasses 13,165 acres owned by private entities (Rock Springs Grazing Association [RSGA] and Anadarko), the State of Wyoming, and public lands managed by the BLM.

Electrical power from the proposed project would be interconnected to an existing 230-kilovolt (kV) power transmission line once the substation is constructed.

The Wyoming Governor's office prepared a map of environmentally sensitive areas within Class 4+ wind areas of the State of Wyoming (Wyoming Game and Fish Department [WGFD] 2009b). Class IV winds are those that have been determined to be potentially economically viable for commercial wind energy development. The map represents known environmentally sensitive areas designated by various federal and state agencies. This geographic information system (GIS) data was overlaid with the Teton WMWE project boundary and results are illustrated in Figure 1.2.

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed action is to help fulfill future domestic demand for electrical power and state required renewable energy mandates for electrical power utilities. The need to meet future electrical power needs is well described documented in Section 1.1.

1.3 DECISIONS TO BE MADE

The decisions to be made include a determination of whether the impacts from the Proposed Action or alternatives are significant beyond those outlined in the PEIS, and if not, whether BLM should approve the application(s) and grant the necessary ROW(s) to allow Teton to develop the WMWE Project on public lands. If the effects present new significant impact (that exceed those outlined in the PEIS), BLM would proceed with a Notice of Intent to prepare an Environmental Impact Statement (EIS).

This analysis may be used by other state and local agencies that have permitting authority on the adjacent private or state lands.

1.4 CONFORMANCE WITH BLM LAND USE PLANS

The Record of Decision (ROD) for the Wind Energy PEIS (BLM 2005) amended area land use plans, including the Green River Resource

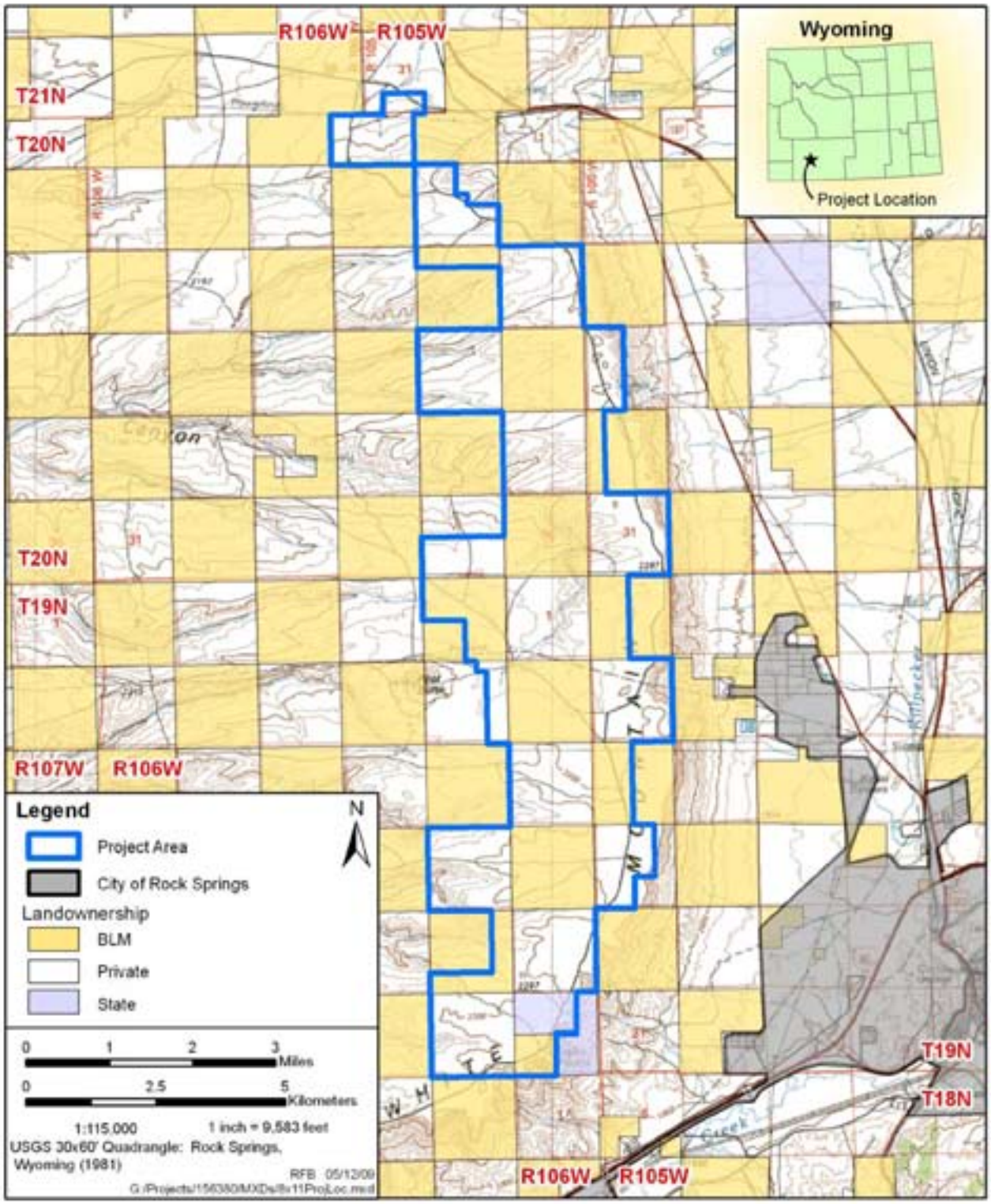

Figure 1.1 General Location Map.

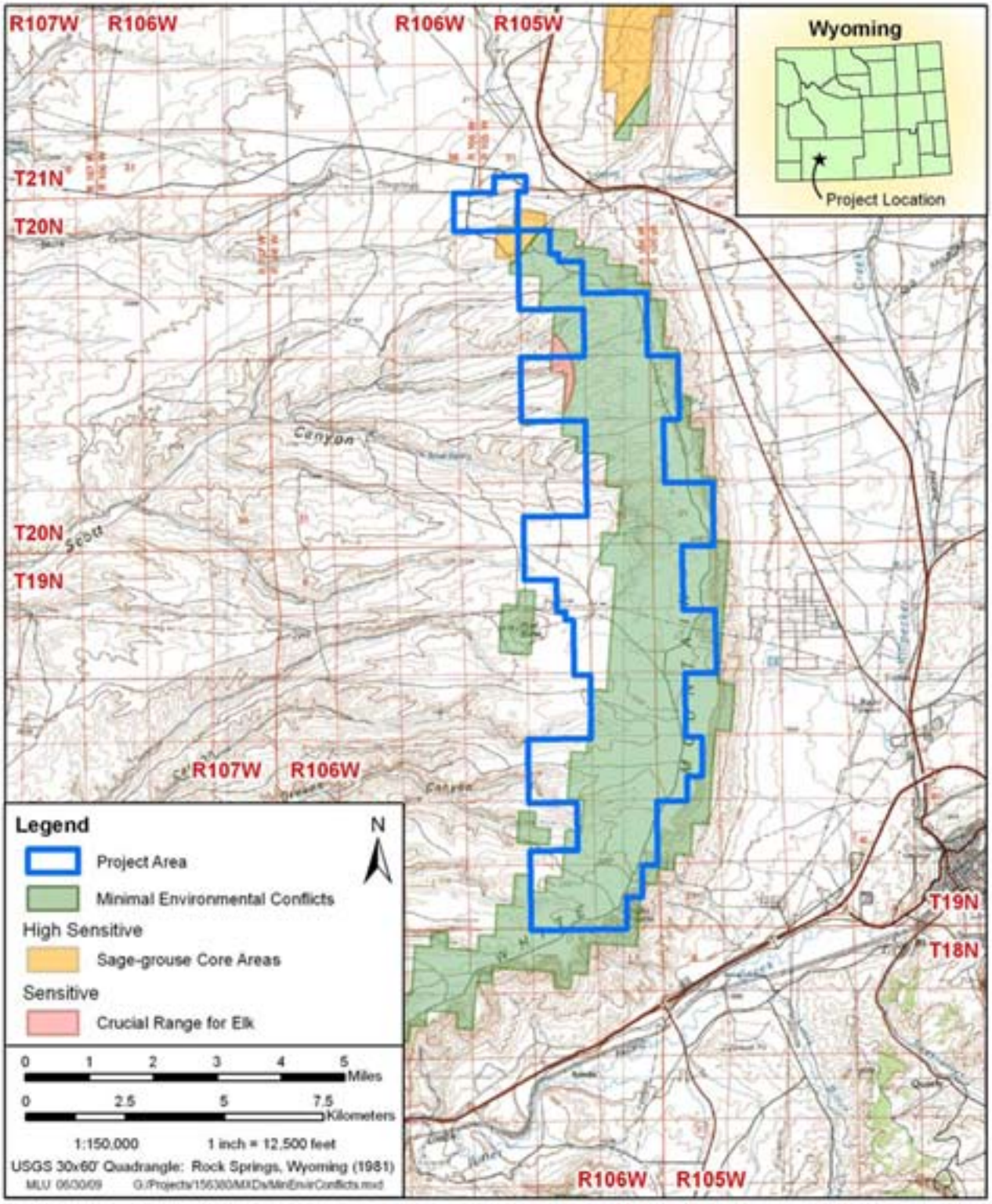

Figure 1.2 WMWE Project Area and Wyoming Class 4+ Winds, Areas of Environmental Conflict.

Management Plan (RMP). The decision implements a comprehensive wind energy development program to administer the development of wind energy resources on BLM-administered public lands. This decision excludes certain public lands from wind energy development (e.g., wilderness study areas, natural monuments, national conservation areas). The lands involved in this project do not contain any federally mandated exclusion areas. The decision established policies and best management practices (BMPs) for the administration of wind energy development activities and established minimum requirements for mitigation measures. BLM released updated wind energy policy for implementing the ROD and guidance for processing ROW applications for wind energy projects on public lands including BMPs (WO IM 2009-043).

The ROD for the Green River RMP (BLM 1997) provides management direction for resources contained within the RSFO area. The objectives applicable for this proposal include managing public land to support the goals and objectives of other resource programs and to respond to public demand for land use authorizations. Public lands will be made available for ROWs with the exception of defined exclusion and avoidance areas. The project proposal does not fall within any exclusion or avoidance areas (refer to Table 2 of BLM 1997).

1.5 RELATIONSHIP TO KEY STATUTES, REGULATIONS, OR OTHER PLANS

As required by the ROD for the Wind Energy PEIS, the analysis prepared for the WMWE Project is project-specific, tiered to the PEIS, and focuses on the critical site-specific issues of concern. Use Authorizations under the *Federal Land Policy and Management Act of 1976*, as amended (43 *United States Code* [U.S.C]. 1701 et seq.) (i.e., ROWs) for the wind project area and off-project access roads and collection systems would be processed in accordance with the *Federal Land Policy Management Act*, Title V (43 U.S.C. 1761), regulations at 43 *Code of Federal Regulations* (CFR) 2800, and applicable federal and state ROW processing instruction memorandums.

The *National Environmental Policy Act of 1969* (NEPA), as amended requires federal agencies to use a systematic interdisciplinary approach to ensure the integrated use of natural and social sciences in planning and decision-making.

Other authorities may contain procedural requirements that pertain to the treatment of elements of the environment when the BLM is considering an action such as the one proposed. These supplemental authorities are outlined in Table 1.1 and are noted as to whether individual authorities apply to this action.

1.6 REQUIRED PERMITS OR AUTHORIZATION

Teton would be required to obtain various permits from landowners and federal, state, and local governments prior to construction or storage of equipment use. Table 1.2 lists the authorizations, permits, reviews, and approvals anticipated to be necessary for the proposed project.

1.7 SCOPING AND ISSUES

BLM released a revised NEPA handbook (BLM 2008) in January 2008. Section 6.4 of the BLM *NEPA Handbook* (2008) formally defines an "issue" as a point of disagreement, debate, or dispute with a Proposed Action based on some anticipated environmental effect. An issue

- has a cause and effect relationship with the proposal or an alternative;
- is within the scope of the analysis;
- has not been decided by law, regulation, or previous decision; and
- is amendable to scientific analysis rather than conjecture.

The BLM RSFO resource specialists, in conjunction with representatives from cooperating agencies, reviewed Teton's proposed project and identified a number of potential issues. These issues were made part of the scoping notice sent to federal, state, and local agencies, interest groups, and interested individuals and a list of individuals

Table 1.1 Supplemental Authorities Considered.

Element	Authority	Manual Section	Discussed in EA	Rationale
Air Quality	The *Clean Air Act*, as amended (42 *United States Code* [U.S.C.] 7401 et seq.)	7300	Yes	Fugitive dust emissions and emissions from mobile sources and construction equipment
Cultural Resources	*National Historic Preservation Act*, as amended (16 U.S.C. 470)	8100	Yes	Eligible sites in area
Fish Habitat	*Magnuson-Stevens Act Provision: Essential Fish Habitat (EFH): Final Rule* (50 CFR 600; 67 Federal Regulations [FR] 2376, January 17, 2002)	n/a	No	No fish habitat or fish in project area
Forests and Rangelands	*Healthy Forests Restoration Act of 2003* (P.L. 108-148)	n/a	Yes	Rangeland occurs in project area
Migratory Birds	*Migratory Bird Treaty Act of 1918*, as amended (16 U.S.C. 703 et seq.) Executive Order 131186, "Responsibilities of Federal Agencies to Protect Migratory Birds" January 10, 2001	n/a	Yes	Migratory birds occur in project area
Native American Religious Concerns	*American Indian Religious Freedom Act of 1978* (42 U.S.C. 1996)	8100	Yes	Potential Native American issues exist in project area
Threatened or Endangered Species	*Endangered Species Act of 1983*, as amended (16 U.S.C. 1531)	6840	Yes	Colorado River water depletion
Paleontological Resources	*Federal Land Policy and Management Act of 1976* (43 U.S.C. 1701 et seq.); *National Environmental Policy Act of 1969* (42 U.S.C. 4321 et seq.)	8270	Yes	Potential vertebrate fossils may exist in project area
Wastes, Hazardous or Solid	*Resource Conservation and Recovery Act of 1976* (43 U.S.C. 6901 et seq.) *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, as amended (43 U.S.C. 9615)	9180 9183	No	No hazardous waste issues

Table 1.1 (Continued)

Element	Authority	Manual Section	Discussed in EA	Rationale
Water Quality Drinking-Ground	*Safe Drinking Water Act of 1977* (43 U.S.C. 300f et seq.)	7240	No	No surface water occurs in project area
	Clean Water Act of 1977 (33 U.S.C. 1251 et seq.)	9184	No	No surface water occurs in project area
Wild and Scenic Rivers	*Wild and Scenic Rivers Act*, as amended (16 U.S.C. 1271)	8014	No	No surface water or river streams occur in project area
Wilderness	*Federal Land Policy and Management Act of 1976* (43 U.S.C. 1701 et seq.); *Wilderness Act of 1964* (16 U.S.C. 1131 et seq.)	8500	No	No wilderness or wilderness study areas occur in project area
Environmental Justice	Executive Order 12898, "Environmental Justice" February 11, 1994	n/a	No	Project area does not include any settlements or dwellings
Floodplains	Executive Order 1198, as amended, Floodplain Management, 5/24/77	7260	No	No floodplains occur in project area
Wetlands-Riparian Zones	Executive Order 11990 Protection of Wetlands 5/24/77	6740	Yes	National Wetland Inventory (NWI) maps indicate wetlands in project area or waters of the U.S.
Department of Defense (DOD) Military Airspace	W.O. IM2009-04, 12/19/08	n/a	No	Final consultation with DOD 4/20/09, no military operations affected
Broadcast Signal Interference	Federal Communication Commission	n/a	No	Broadcast interference concerns resolved, 6/25/09
Aviation Hazards	Federal Aviation Administration (FAA), Aeronautical Study, 49 U.S.C. 44718	n/a	No	No aviations hazard determination, FAA, 3/26/09
Fluid Mineral Leases	*Federal Land Management Policy Act of 1976*, *Mineral Leasing Act of 1920*	2805 3150	No	Lessee's questions on ability to explore lease at a later time answered, 1/22/09

Table 1.2 Major Federal, State, and Local Permits, Approvals, and Authorizing Actions for the WMWE Project, Sweetwater County, Wyoming, 2009.[1]

Agency	Permit, Approval, or Action	Authority
Office of the President of the United States	Protection and enhancement of the cultural environment	Executive Order 11593
	Floodplains management	Executive Order 11988
	Protection of wetlands	Executive Order 11990
	Environmental justice	Executive Order 12898
	Indian sacred sites	Executive Order 13007
	Invasive species	Executive Order 13112
	Protection of migratory birds	Executive Order 13186
	Trails for America in the 21st century	Executive Order 13195
	Preserve America	Executive Order 13287
Bureau of Land Management (BLM)	Right-of-way grants	*U.S. Department of Interior/Department of Agriculture/Department of Transportation Public Law* 96-487 *Federal Regulations* (FR) 6-3-81
	Environmental assessment preparation	*National Environmental Policy Act* (NEPA), 40 *Code of Federal Regulations* (CFR) Parts 1500-1508; *Federal Land Policy and Management Act of 1976* (as amended), *Public Law* 94-579.
	Antiquities and cultural resource clearances on BLM-managed land	*Antiquities Act of 1906* (16 U.S.C. Section 431-433); *Archaeological Resources Public Protection Act of 1979* (16 U.S.C. Sections 470aa - 470*ll*); 43 CFR 3; *National Historic Preservation Act of 1966* (NHPA) and Advisory Council Regulations (36 CFR 800); *American Indian Religious Freedom Act of 1978,* as amended (42 U.S.C. 1996 et seq.)*; Native American Graves Protection and Repatriation of 1990,* as amended (25 U.S.C. 3001-3013); and implementing regulations
U.S. Army Corps of Engineers	Nationwide Permit 12 - Utilities	Section 404, *Clean Water Act of 1972* (40 CFR 122-123, 230)
U.S. Fish and Wildlife Service	Coordination, consultation, and impact review on federally listed threatened and endangered species and other federally protected species	*Fish and Wildlife Coordination Act* (16 U.S.C. Sec. 661 et seq.); Section 7 of the *Endangered Species Act of 1973*, as amended (16 U.S.C. et seq.); *Bald Eagle Protection Act*, as amended (16 U.S.C. 668-668dd); *Migratory Bird Treaty Act* (16 U.S.C. 704)
U.S. Environmental Protection Agency	Spill Prevention Control and Countermeasure Plans	40 CFR 112

Table 1.2 (Continued)

Agency	Permit, Approval, or Action	Authority
Wyoming Department of Environmental Quality/Industrial Siting Council	Issue industrial siting permit	*Wyoming Industrial Siting Act* (*Wyoming Statute* [W.S.] 35-12-101 through 119)
Wyoming Department of Environmental Quality/Water Quality Division (WDEQ/ WQD)	National Pollutant Discharge Elimination System permits for discharging waste water and storm water runoff	*Clean Water Act*, amended (33 U.S.C. Sections 1251-1376) WDEQ Rules and Regulations, Chapter 18. W*yoming Environmental Quality Act* (W.S. 35-11-301 through 35-11-311); Section 405 of the *Clean Water Act* (40 CFR 122-124)
WDEQ/Air Quality Division	Permit to operate a mobile concrete batch plant	*Clean Air Act*, as amended (42 U.S.C. 7401 seq. *Wyoming Environmental Quality Act*, Article 2, Air Quality, as amended (W.S. 35-11-201 through 35-11-212)
Wyoming Department of Transportation	Permits for oversize, overlength, and overweight loads	Chapters 17 and 20 of the Wyoming Highway Department Rules and Regulations
Wyoming State Engineer's Office	Permits to appropriate groundwater (use, storage, wells, dewatering)	W.S. 41-121 through 147 (Form U.W.5)
Wyoming State Historic Preservation Office	Cultural resource protection, programmatic agreements, consultation	Section 106 of NHPA and Advisory Council Regulations (36 CFR 800)
Sweetwater County [2]	County road crossing/access permits	Engineer's Department
	Small wastewater permits; mineral development permits	Planning and Zoning Department
	Hazardous material recordation and storage	Emergency Management Coordinator
	Conditional Use Permit	Planning Department
	Construction Permit	Planning Department
	Noxious weed control	Weed and Pest Department
	Sweetwater County Road Maintenance Agreement	Engineering and Community Development
	Engineered Drainage Plan	Engineering and Community Development
	Engineered Transportation Plan	Engineering and Community Development
	Engineered Site Plan	Engineering and Community Development
	Engineered As-built Drawings	Engineering and Community Development
	Fire Code Approval	Engineering and Community Development

[1] This list is intended to provide an overview of the key regulatory requirements that would govern project implementation. Additional approvals, permits, and authorizing actions may be necessary.

[2] All engineered plans or as-built drawings would be certified by a Wyoming Licensed Professional Engineer.

and groups that submitted comments are provided in Section 5.0, Consultation and Coordination. The BLM released in scoping notice for the WMWE project on November 20, 2008 (Appendix A). The BLM held an Open House on December 11, 2008, in Rock Springs, Wyoming, to solicit input and information on the proposed project and issues to be analyzed in the EA. Although some of the issues identified below may not meet the requirements under Section 6.4.1, Identifying Issues for Analysis of the BLM *NEPA Handbook* (2008), BLM felt it is warranted to document and consider all issues identified because this is the first wind energy development proposed for the RSFO area. Therefore, the issues presented in Table 1.3 will be considered in this analysis.

Table 1.3 Issues.

Issue	Environmental Effect
Air Quality/Health	Fugitive dust from construction, O&M, decommissioning
	Criteria pollutant and HAP emissions from combustion sources and construction activities
	Health effects to those sensitive to dust
	Benefit of nonpolluting energy production
Paleontology/Geologic Resources	Vertebrate fossils
	Geologic features
Soils/Vegetation/Reclamation	Erosion
	Drainage (i.e., disruption of surface water flows and effect on plants/animals)
	Vegetation loss
	Invasive species
	Timing and ensuring success of reclamation
	Minimize disturbance during construction and operation
Wildlife Resources	Crucial winter range for pronghorn antelope
	Crucial winter range, parturition, and yearlong range for elk
	Yearlong habitat for mule deer
	Key/core habitat for greater sage-grouse
	Pygmy rabbit habitat
	State- and BLM-sensitive species and candidate species and associated habitats
	Raptor nesting and hunting habitat
	Mortality to raptors, migrating passerine birds, and bats
	Low-level flights for census counts
	Increased competition for available forage
	Monitoring program for migratory birds, raptors, greater sage-grouse, prairie dogs, and bats
	Sighting turbines away from cliff faces and draws
	Habitat fragmentation for affected species
	Consideration of U.S. Fish and Wildlife Service's (USFWS's) *Voluntary Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines* (USFWS 2003)
	Local bird migration pathways
	Bird perching (tubular supports, power lines)
	Seasonal concentration of birds
	Post-construction monitoring for mortality
	Storm water practices to prevent attracting birds
	Turbine lighting

Table 1.3 (Continued)

Issue	Environmental Effect
Wildlife Resources (continued)	Habitat mitigation (off-site)
	Potential effects of noise on species
	Potential effects of winter road maintenance (i.e., berms) on big game
	Potential conflicts of construction/operations with hunting activity
Wild Horses	Gathering wild horses to comply with appropriate management levels/court order requirements
	Low-level flights for census counts/gathering
	Increased competition for available forage
Cultural/Native American Resources	Historic roads and trails (i.e., Cherokee Trail North, Rock Springs to Lander Stage Road, Old Bryan Road, Overland Trail, New Fork Wagon Road, Green River to South Pass City Road, Bryan to South Pass City Road, Lincoln Highway)
	Native American concerns
	Natural Historic Trails
	Eligible or listed historic/prehistoric sites
	History of Pilot Butte
	Traditional and rural landscape
Socioeconomics	Employment (job creation or displacement)
	Taxation
	State and national energy needs
	Effects on the communities at large--little or no benefit but subject to impacts of the proposal
	Property values
	Traffic and transportation requirements
	Vandalism
	Existing abuse of the local area environment vs. a well-managed project
	Recognizing landowners' desire to develop their lands
	Balancing socioeconomics with environmental concerns
Viewshed and Recreation	Viewing wild horses
	Turbines on the community views (turbine simulation)
	Consistency in turbine layout and size
	Turbine lighting
	BLM Class III and IV visual resource
	Sweetwater County scenic overlay
	Recreation (i.e., scenic wild horse loop tour, hunting, hiking, sight-seeing, etc.)
	Recreational activities in proximity of the project area (i.e., face of White Mountain)
	Pilot Butte

Table 1.3 (Continued)

Issue	Environmental Effect
Grazing/Rangeland	Loss of vegetation
	Vegetation quality due to dust
	Loss of Animal Unit Months (AUMs) and grazing
	Increased competition for available forage
Transportation	Transportation planning
	Surface disturbance required to transport/construct turbines and associated facilities
	Winter and year round maintenance of County Road 4-53
	Meeting international fire code standards
	Public access to area due to winter maintenance
	Increased on- and off-road traffic (number of vehicles)
	New access
Decommissioning	Reclamation
	Retrofitting with newer turbine technology
Project Development/Design Features	Phasing of development
	Reliability of wind energy vs. other forms of energy production
	Benefit of renewable/green energy
	Design features to protect wildlife
	Location of the development
	Assure conveyance of terms, conditions, and stipulation to subsequent owner
	Potential conflicts with existing ROWs
	Project maintenance
	Proper disposal of waste/debris
	Buried collection lines
	Adoption of best management practices as defined in the Wind Energy PEIS
Project Development/Public Safety	Debris (i.e., ice) throw
	Blade or tower failure
	Meeting international fire code standards
	Noise
	Shadow flicker
	Setbacks
	Night lighting
Other	Acquire all required permits
	Buffers for ephemeral channels

2.0 THE PROPOSED ACTION AND ALTERNATIVES

2.1 DESCRIPTION OF PROPOSED ACTION

2.1.1 Introduction

The WMWE Project is a proposed 360-MW electrical generating facility consisting of *up to* 240 wind turbines (assuming use of 1.5-MW generators). The annual energy output from this facility would be approximately 1,000,000 megawatt hours (MWh) annually. It should be emphasized that 240 wind turbines is the maximum number of wind turbines that could be installed in the project area, and it is likely that fewer would actually be constructed due to various technical (e.g., unfavorable geotechnical testing matters or broadcast signal interference) or environmental constraints (e.g., active raptor nests) that cannot be fully identified at this time. However, for the purpose of this analysis, it is assumed that all 240 wind turbines would be constructed. It is also possible that a slightly larger wind turbine by Teton (e.g., 2.0-3.0 MW) could be selected. The final turbine selection process would depend on numerous factors, such as availability and economics. However, a larger wind turbine would require a different layout, and fewer wind turbines would be installed because of the increased spacing requirements between individual wind turbines and turbine strings. Even though there would be fewer turbines with the larger capacity turbines, the overall dimensions of the wind turbine would be in the overall range of the wind turbine illustrated in Figure 2.1. As a result, the environmental analysis for the larger capacity turbine would be identical to the environmental analysis for the proposed 1.5-MW wind turbine except with larger capacity turbines there would be less disturbance.

While wind energy has traditionally been considered an unreliable power resource, advancement over the past 10 years have allowed power companies to now treat wind energy as a schedulable resource to assist in meeting power requirements. According to Teton, advancements in meteorology monitoring and modeling and computer tracking have allowed many wind resources to be scheduled on a monthly, weekly, and daily basis. Wind energy is also considered a clean renewable form of energy that uses a free type of fuel, produces no greenhouse gases or other pollutants from the generators, has limited environmental impacts compared to other forms of power production, obtains fewer tax subsidies compared with other forms of energy production, promotes stable and cost-efficient energy production, diversifies local economies, and provides jobs to the local economy (DOE 2008).

The project site is located on top of White Mountain, which is west-northwest of the city of Rock Springs, Sweetwater County, Wyoming, in portions of T19N-T20N, R105W-106W. The anticipated layout of the project is shown in Figure 2.2. The ROW application has been assigned an identification number of WYW167597 by the BLM. Sweetwater County has already issued a conditional use permit for 36 turbines on private land but not a construction permit although Teton is seeking to modify some locations. Any modification of locations would require a new conditional use permit. Table 2.1 provides the acres and percentage of landownership within the project area, and Table 2.2 presents the acres of potential disturbance for the entire project. Teton would obtain additional conditional use and construction permit(s) for the remaining turbines located on private lands from Sweetwater County prior to each phase of development of the Proposed Action. Table 2.3 presents the acres of potential disturbance on BLM-administered land under the Proposed Action.

The project would consist of up to 240 wind turbines. “Wind turbine” is the collective term for the equipment that captures the kinetic energy in the wind and converts it to electrical energy. The major components include the blades and hub (collectively called the rotor), the nacelle, and the tower. Inside the nacelle are the gearbox, generator, and various other components critical for operation of the wind turbine. Depending on the specific turbine manufacturer, the transformer would be located either in the nacelle or on the ground next to the tower. Figures 2.1 and 2.3 are general schematics of typical wind turbines.

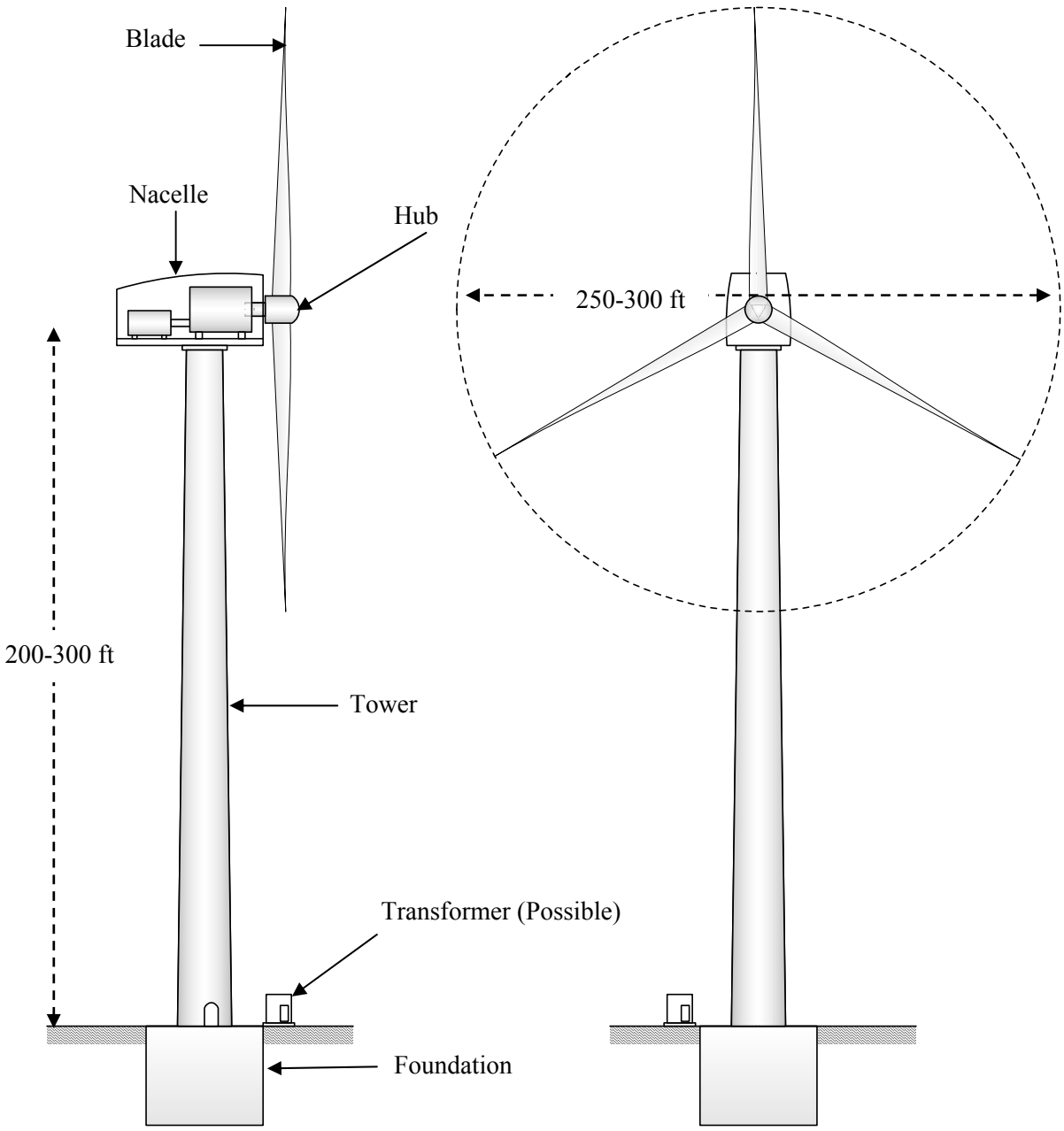

Figure 2.1 Typical Wind Turbine Components.

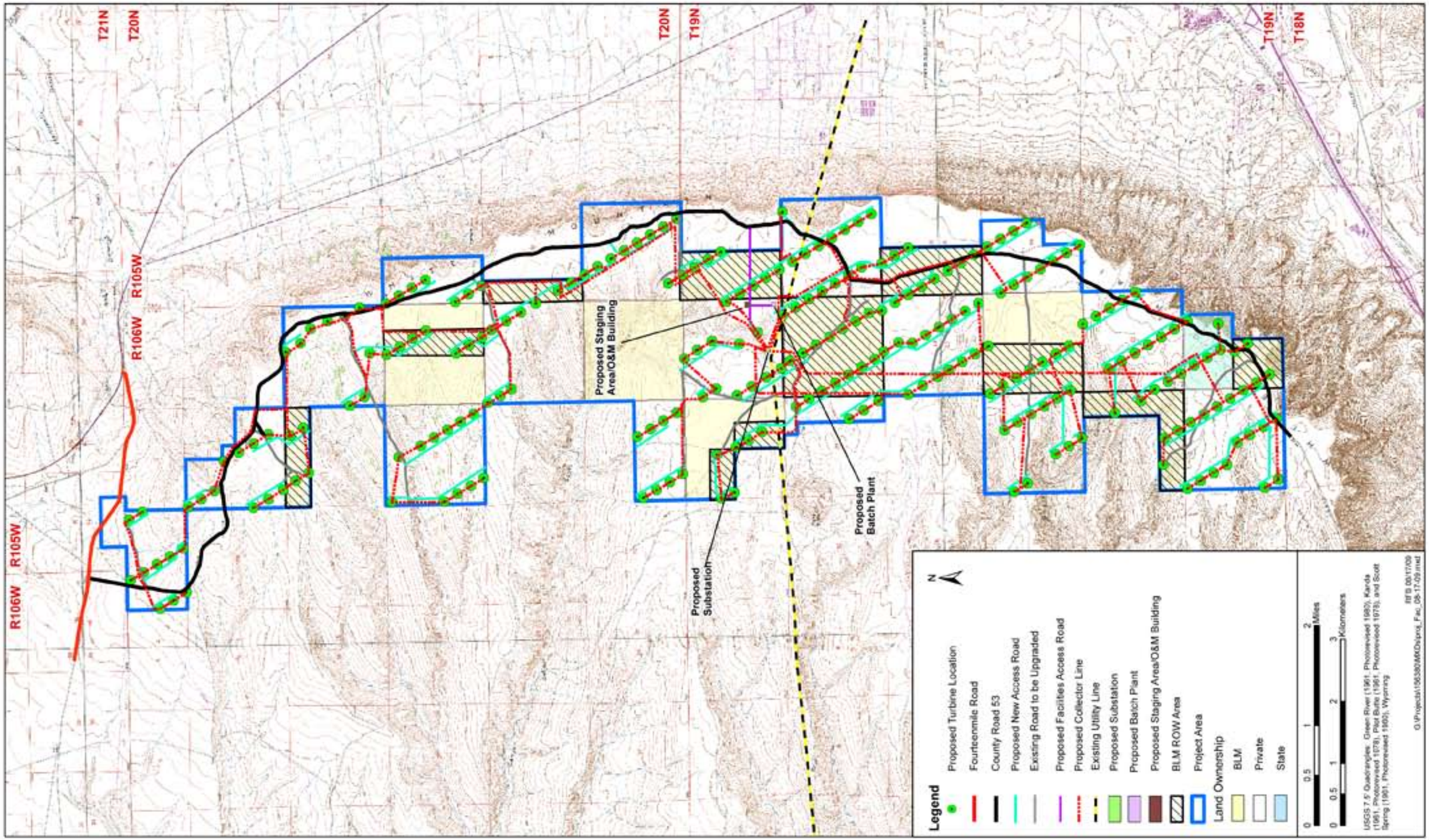

Figure 2.2 Layout of the White Mountain Wind Energy Project.

Table 2.1 Landownership Within the WMWE Project Area.

Landowner	Acres	Percentage
Bureau of Land Management	4,398[1]	33.4
State of Wyoming	240	1.8
Private landowner	8,527	64.8
Total	13,165	100.0

[1] BLM development ROW is 2,640 acres.

Table 2.2 Estimated Acres of Surface Disturbance Within the WMWE Project Area (Proposed Action).

	Proposed Action	
Disturbance Type	Initial Disturbance (acres)	Life-of-project Disturbance (acres)
Corridor access roads[1]	317.5	152.8
Staging area and O&M building	2.0	0.8
Substation and transmission line	11.0	0.3
Turbine pads[2]	176.3	35.3
Collector line trenches[3]	356.8	0.0
Concrete batch plant	2.0	0.0
Total	865.6	189.2

[1] Initial disturbance: 48.5 mi x 54 ft = 317.5 acres; life-of-project disturbance: 48.5 mi x 26 ft = 152.8 acres.
[2] Initial disturbance: 160 ft x 200 ft x 240 turbines = 176.3 acres; life-of-project disturbance: 80 ft x 80 ft x 240 turbines = 35.3 acres.
[3] Initial disturbance: 64.0 mi x 46 ft = 356.8 acres; life-of-project disturbance: 0.0 acres, all temporary construction-related disturbances would be reclaimed immediately.

Table 2.3 Estimated Acres of Surface Disturbance on BLM-administered Land Within the WMWE Project Area.

	Disturbance on BLM-administered Lands	
	Initial Disturbance (acres)	Life-of-project Disturbance (acres)
Corridor access roads[1]	78.5	37.8
Staging area and O&M building	0.0	0.0
Substation and transmission line	0.0	0.0
Turbine pads[2]	51.4	10.3
Collector line trenches[3]	106.5	0.0
Concrete batch plant	0.0	0.0
Total	236.4	48.1

[1] Initial disturbance: 12.0 mi x 54 ft = 78.5 acres; life-of-project disturbance: 12.0 mi x 26 ft = 37.8 acres.
[2] Initial disturbance: 160 ft x 200 ft x 70 turbines = 51.4 acres; life-of-project disturbance: 80 ft x 80 ft x 70 turbines = 10.3 acres.
[3] Initial disturbance: 19.1 mi x 46 ft = 106.5 acres; life-of-project disturbance: 0.0 acres, all temporary construction-related disturbances would be reclaimed immediately.

During the design phase of this project, Teton undertook numerous studies and evaluations to assist in the siting of the project components to minimize potential impacts to the environment and existing man-made facilities in the general project area. Some of these studies and evaluations include a communication interference study and an obstruction evaluation and airport airspace analysis. Results of these studies and evaluations have been considered. In cases where turbines conflict with broadcast signals, with other existing facilities (transmission power lines), with unfavorable geotechnical testing results, or with other resource issues (active raptor nest), those turbines would either be moved or eliminated.

The wind turbines that would be used in the WMWE Project would be placed in locations that would provide the best balance of energy capture, safe construction, and minimum impacts to the environment. The environmental impacts of the project would be closely monitored during the construction, O&M, and decommissioning of the project. The environmental impacts, mitigation measures, and monitoring activities are presented in the Plan of Development (POD) (TRC Environmental Corporation [TRC] 2009a).

Wind turbines operate autonomously with computer control based on wind speed and direction data. When the anemometer on a wind turbine senses winds within the operational range of the turbine and power sensors find the electrical grid available to accept power, the wind turbine turns itself on and begins to generate power. It continues to generate electricity until the wind speed is above or below the turbine operational range, the grid is no longer available, or the turbine detects a fault with one of its components. If a fault occurs, the turbine shuts itself down and, depending on the nature of the fault, either waits for the condition to clear itself or signals for maintenance.

Wind turbines are connected through an underground electrical collection system to a central substation, where the power is raised to the voltage of the electrical grid (Figure 2.4). The turbines and towers sit atop large concrete and steel foundations. Access roads interlink each turbine site (Figure 2.5). A permanent O&M building and substation, as well as a temporary construction trailer pad, material storage area, and batch plant site, would be built on land owned by the RSGA within the central portion of the project

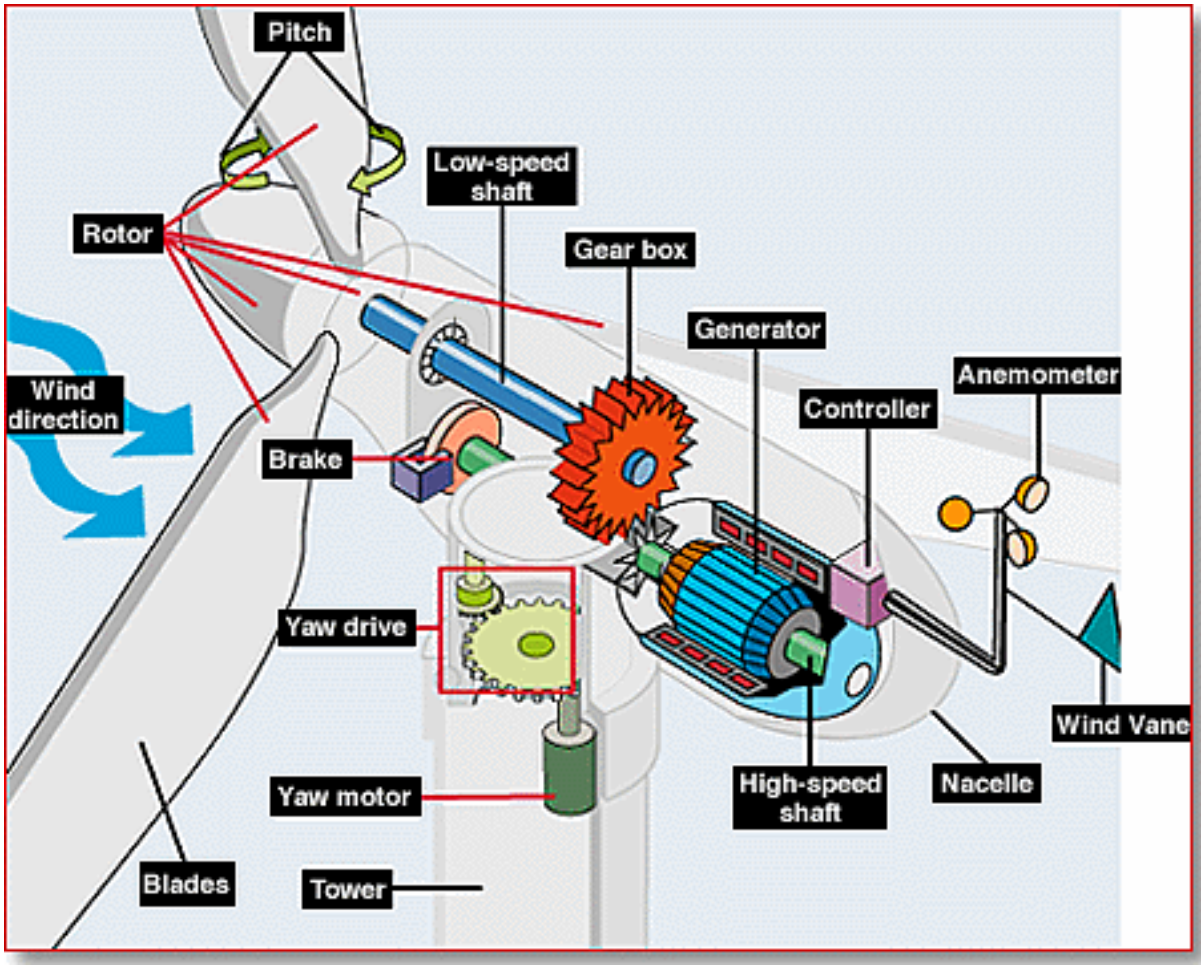

Figure 2.3 General Wind Turbine Nacelle Components (Adapted from DOE [2004]).

area (Section 1, T19N, R106W) near the existing 230-kV line. If required, other temporary work areas related to this project (such as the crane assembly area) would be located on previously disturbed land within the ROW grant area or on privately owned lands.

2.1.2 Health, Safety, and Environmental Commitment and Policy

Teton and its employees, partners, and contractors are concerned with health, safety, and the environment. They would develop and implement a Health, Safety, and Environment (HSE) Plan for each phase of this project.

To avoid, reduce, or mitigate potential environmental impacts associated with construction of the WMWE Project, Teton has evaluated potential environmental consequences of this project and developed specific design features that would be implemented during each phase of the project.

2.1.3 Adaptive Management Strategy

Adaptive management is a core environmental management principle of this project. It has guided planning for the design, development, management, and operation of the WMWE Project. It is intended to improve decisions

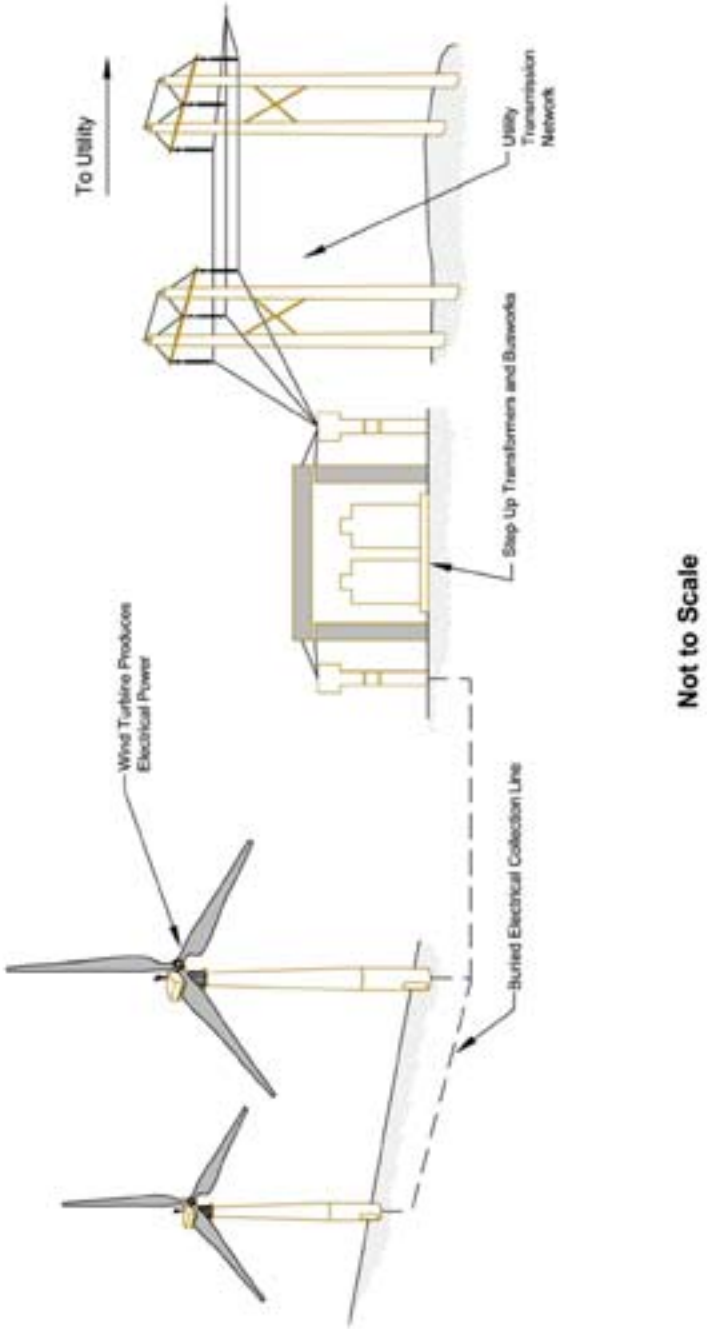

Figure 2.4 Typical Electrical System Components.

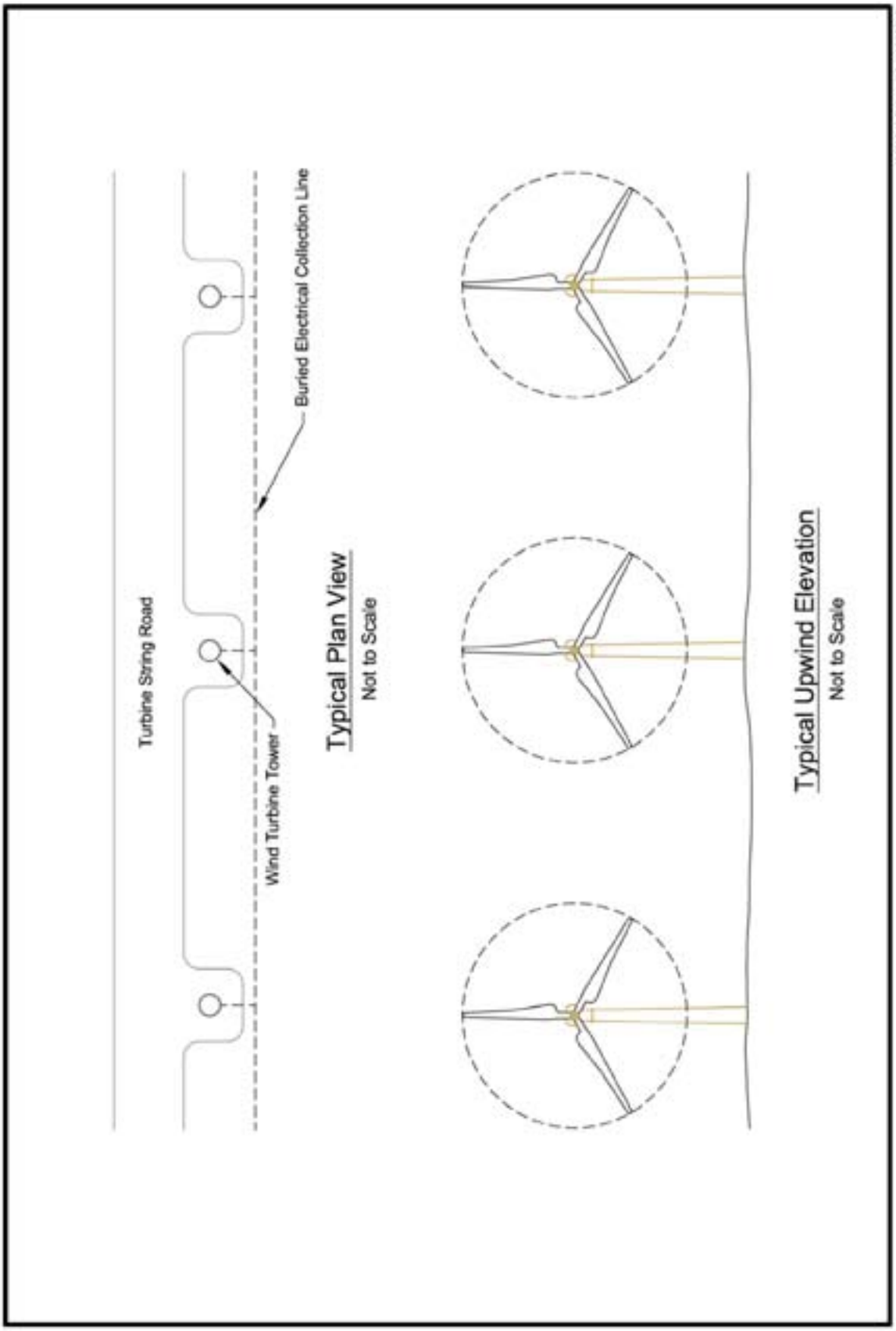

Figure 2.5 Typical Turbine String Road and Electrical Collection System Layout.

regarding the planning, design, development, management, and operation of large engineering projects in relationship to their setting.

Adaptive management is based on the premise that ecosystems are complex and inherently unpredictable over time. It approaches the uncertainties of ecosystem responses by evaluating and optimizing management actions using a systematic method from which "learning over time" is a critical tool. For the WMWE Project, learning and adapting are based on a rigorous process of long-term monitoring and incorporation of best available science to determine impacts to the environment.

2.1.4 Communication Plan

For the portion of the project located on BLM-administered land, the BLM would play an active role during the development and construction of the WMWE Project. The State of Wyoming, Sweetwater County, and private landowners would play a similar role for the portion of the project affecting state and private lands. Teton would coordinate the project design using the adaptive management approach endorsed by the BLM and other affected land interests. BLM representatives, as well as appropriate state and Sweetwater County agencies and private landowners, would be consulted at critical development stages of the project, including transportation, construction, commissioning, reclamation, and decommissioning.

Teton expects that the BLM Authorized Officer, or assigned staff, and/or officials from Sweetwater County would be present at the project site during construction as appropriate and would observe construction activities to confirm these activities with this plan. The Teton construction project manager would communicate directly with the BLM Authorized Officer and officials from Sweetwater County on-site to keep the BLM and county apprised of the construction progress and the results of environmental mitigation measures and monitoring efforts. This collaboration would continue as necessary to explore and evaluate alternative mitigation measures. Any deviations from the POD requested by Teton would be reviewed by the BLM Authorized Officer and Sweetwater County, and written approval would be obtained before such changes are made.

The BLM and Sweetwater County would also receive monthly reports during the construction, operation, and decommissioning of the project that contain the anticipated upcoming activities and results of recent environmental monitoring. These reports are intended to maintain constant communication and keep the BLM and Sweetwater County informed on mitigation results.

Teton would maintain open communications with the landowners, livestock operators, and state and local governments, including agencies of the State of Wyoming, Sweetwater County, and the cities of Rock Springs and Green River. Informational updates would be provided to these local governments regarding activities that could impact their jurisdictions, including schedules for construction and truck traffic. If necessary, meetings or other mechanisms for coordination would be used to discuss relevant issues, project status, scheduling, or other concerns.

Teton would request that each government entity appoint a contact person to whom project updates would be sent. These government agencies would be given as much advanced notice as possible for major project activities, as well as any changes to these schedules.

2.1.5 Project Schedule

The WMWE Project (up to 240 turbines) would be constructed in four phases over a 3- to 4-year period. The proposed schedule for each construction phase is discussed in detail in Section 2.2.3.10. Teton expects that all construction operations would occur during daylight hours, 5 days a week. Once in operation, Teton expects that each phase of the project would have an approximate 20-year life of operation (24-year total). It is possible that Teton would evaluate repowering the project as the life of the project comes to an end as opposed to decommissioning the project. However, repowering is not considered part of the current project and would be

discussed with the BLM, landowners, and state and local agencies in the future. Teton expects decommissioning to also be completed in phases and over a 3- to 4-year period. Revegetation operations would be completed as soon as practical following equipment removal.

2.2 CONSTRUCTION OF FACILITIES

The actions necessary to construct the WMWE Project are summarized below and include development of a HSE Plan, civil construction activities, project construction activities, general construction activities, structural construction activities, wind turbine tower erection, reclamation plan, potential environmental impacts, and mitigation and monitoring activities. Where helpful, photographs of similar activities from the construction of other wind energy projects have been added for illustration purposes. A list of typical construction equipment used to build a wind energy facility is presented in Table 2.4. Teton would provide licensed certifications for all appropriate project elements in accordance with federal, state, and county regulations.

2.2.1 Health, Safety, and Environmental Plan

The WMWE Project HSE Plan as outlined in the POD addresses HSE risks and requirements during the construction stage of the project. As the project moves into the operational stage, the components of the HSE Plan would be modified to adapt to O&M activities. Teton could coordinate the HSE Plan and modifications with all appropriate federal, state, and county agencies.

Components of the management system that would be addressed in the HSE Plan include, but are not limited to, risk management analysis, emergency response, HSE planning and procedures, implementation, monitoring and reporting results, setting performance targets, incident classification, investigation and reporting results, audits and inspections, as built certification, and HSE management review.

Minimum contractor HSE requirements would be included in the HSE Plan. These requirements include personal protective equipment, housekeeping, maintaining a safe workplace, fire prevention, safe work practices, etc. Contractors are expected to comply with these requirements at a minimum, and contractor safety plans would be reviewed for compliance.

Development of the HSE Plan is a collaborative effort between Teton and the contractors. Contractor BMPs would be reviewed and incorporated into the HSE Plan as appropriate.

Also included in the HSE Plan is a risk register, which identifies potential hazards and the risks associated with them. Contractors are expected to address these risks and develop mitigation plans for incorporation into the register. The risk register is a document that would be used and updated on a continuous basis to identify and mitigate risks as they surface. It is conceivable that mitigation plans as developed may not prove to be sufficient as anticipated. In this case, the HSE Plan would be adjusted to provide a suitable solution to project risks.

Observation of HSE performance is key to avoiding incidents. Project personnel would be expected to regularly observe work practices and to provide positive reinforcement and guidance to fellow employees. Work practices that may be considered to place employees or the environment at risk would be identified, evaluated, and modified as necessary to eliminate or substantially reduce the risk.

2.2.2 Civil Construction Activities

2.2.2.1 Surveying and Staking

Construction surveying and staking are the first construction activities associated with the project. Field crews would use survey equipment and known reference points to locate points in the field that correspond to critical project design locations. When a critical point is found, it is marked with a survey stake (a wooden stake with a colored plastic flag that is driven into the ground 1 to 2 ft). The project site is accessed by a pickup truck or similar vehicle. Teams of two or more surveyors would walk across the site to perform surveying and staking.

Table 2.4 List of Typical Equipment Used for Construction of Wind Energy Facilities.

Equipment	Use
Tracked-bulldozer	Road and pad construction
Grader	Road and pad construction
Water trucks	Compaction, erosion, and dust control
Roller/compactor	Road and pad construction
Backhoe	Digging foundations and trenches for utilities
Trenching machine	Digging trenches for underground utilities
Truck- or track-mounted drill rig	Drilling geotechnical sample holes
Concrete trucks and pumps	Pouring tower and other structure foundations
Cranes	Tower and turbine erection
Dump trucks	Hauling road and pad material
Flatbed trucks	Hauling towers and other equipment
Pickup trucks	General use and hauling small equipment
Small hydraulic cranes and forklifts	Loading and unloading equipment
Fuel truck	Fueling of mobile equipment
Rough terrain forklifts	Lifting equipment

2.2.2.2 Geotechnical Sampling

The primary objective of the geotechnical sampling is to investigate the strength characteristics of the bedrock and to determine dynamic properties for the turbine foundation design. The investigation would consist of coring specific locations along the turbine alignment. Coring would be completed using moderate-sized geotechnical drilling equipment mounted to either a truck or tracked vehicle (Figures 2.6 and 2.7). The coring process would obtain samples of rock that would be logged. Core samples would be sent to a geotechnical laboratory for strength testing. Since the coring process leaves holes at the test site approximately 3 inches in diameter and up to 40 ft deep, each hole would be backfilled in accordance with applicable requirements. Test pits dug with a backhoe or similar equipment may also be utilized to evaluate whether the bedrock can be excavated.

Additional geotechnical investigations include several seismic refraction survey lines. The seismic refraction lines would be used to determine dynamic soil properties of the underlying bedrock and would also be used to confirm bedrock strength. The seismic refraction lines would be completed using an extremely low-energy source (a sledgehammer and plate). The seismic analysis would also include multichannel surface-wave analysis, which utilizes background vibrations such as vehicles to generate seismic noise.

2.2.2.3 Rock Removal

Bedrock at the site is generally composed of sandstone material, which does not require blasting to remove. Excavation would be completed using conventional earth-moving equipment and sound engineering practices. Methods and techniques would be utilized to

Figure 2.6 Typical Coring Truck and Support Vehicle.

Figure 2.7 Typical Coring Tracked Vehicle.

minimize overbreak beyond the limits indicated on the drawings and to preserve the rock beyond these limits in the soundest possible condition.

2.2.2.4 Topsoil Salvage Operations

Prior to the construction of any project-related equipment, structures, or facilities, all available vegetation and all available topsoil would be salvaged, based on an on-site evaluation, used for reclamation in other areas (live haul), if possible, and if not, then stockpiled for future reclamation operations. If less than 6 inches of topsoil are available, topsoil along with an appropriate quantity of other suitable subsoil (with BLM or landowner/county approval) would be salvaged so that a minimum of 6 inches of plant growth material would be available for use during revegetation operations. Topsoil and suitable subsoil would be stockpiled separately, and appropriate signs would be installed on each topsoil or subsoil pile. Care would be taken to avoid mixing topsoil and subsoil. Where possible, topsoil would be live-hauled to minimize topsoil stockpiling and encourage improved vegetation.

Topsoil salvage operations would apply to all construction activities except for the construction of any required overhead transmission power lines. Topsoil salvage operations are not required for the construction of overhead power lines because these activities would result in minimal disturbance from wheeled vehicles driving over the vegetation and soil. In addition, natural revegetation would occur more rapidly if the vegetation and soil is left in place.

2.2.2.5 Site Grading

There are three phases associated with the grading activities for the project. The first phase (road grading) is the construction of the roadways associated with the project. The roads would be constructed based on the lines and grades indicated on the detailed design drawings. At the same time the roads are being constructed, or very shortly after they are completed, the second phase (rough grading) associated with the turbine sites, substation, and O&M building would begin. Once the turbine sites, substation, and O&M building are completed, the third phase (final grading) activities would be completed with these facilities.

All surface areas disturbed by construction activities would be graded. The grading would be finished to the contours and elevations indicated on the drawings or match contours and elevations of the original undisturbed ground surface. The final grading would provide a smooth uniform surface and minimize the impact to existing water runoff patterns.

The overall goal of the detail design associated with grading activities is to achieve a cut and fill balance. Such a balance ensures that a minimum of material is required to be transported on or off the site. Any required material or excess material would be obtained or disposed of at a properly permitted facility.

2.2.2.6 Road Base Construction

The road base (aggregate) would be placed on graded turbine access roads and turbine areas in 6- to 12-inch (maximum) deep compacted layers. The depth of a compacted layer would be based on the compaction standard required in the engineering drawings. Geotextile may be required for separation between the road subgrade and the aggregate, except where otherwise specifically noted.

Aggregate materials would be made from crushing the excavated rock from the foundation holes to the extent possible. Any additional aggregate materials would be from private sources located off-site. Since the access roads would need to be built before any foundations are excavated, initial quantities of aggregate would need to be imported from an off-site commercial source.

2.2.2.7 Excavation

Excavation involves the removal of earth and rock to allow for the construction of roads and foundations. Excavation for structures would be completed to the designated lines and elevations indicated on the detail design drawings. Machine excavation would be controlled to prevent

undercutting the subgrade elevations indicated on the drawings.

Excavated materials that meet the specified requirements may be used for the fills, embankments, and backfills. Vertical faces of excavations would not be undercut to provide for extended footings.

Excavated materials would be either crushed for road aggregate or placed back into the center of the foundation hole, although most rock material would be used as road aggregate. The road material would be crushed at the location where it was excavated. Crushing operations would be conducted using small portable rock crushing equipment with manufacturer provided or approved dust control equipment. Remaining excess excavated materials, if any, would be used on-site for road maintenance and would not be hauled off-site unless absolutely required and approved by the BLM Authorized Officer.

2.2.2.8 Compaction

During construction of roads and foundation structures, it is critical that the earth under them is solid. To achieve this, the earth is compacted. Compaction associated with the WMWE Project would meet the following standards.

- For roads, the requirements outlined in the BLM Road Standards (Manual Section 9113) would be adhered to. The manual indicates that the top 12 inches of subgrades of all roads that are to be surfaced would be compacted to 95% of the maximum density as determined by AASHTO T-99.
- Rock fill would be compacted in 8-inch uncompacted thickness to 70% relative density as determined by American Society for Testing and Materials (ASTM) D4253 and D4254. Compaction would be performed with vibrating mechanical compactors.

2.2.2.9 Erosion Control

A Storm Water Pollution Prevention Plan (SWPPP), which includes erosion control measures, would be prepared and implemented for the project area. The SWPPP would be based on the 1992 Environmental Protection Agency (EPA) document entitled *Storm Water Management for Construction Activities-Developing Pollution Prevention Plans and Best Management Practices* (EPA 1992). The SWPPP would be developed with the civil design of the project. Teton would continue to implement the SWPPP and county drainage and road maintenance agreement and would monitor the project area for erosion or soil instability and take appropriate action should problems become evident.

Teton would not conduct any construction, O&M, or decommissioning activities when soils in the work area are too wet to adequately support construction equipment. If construction equipment creates ruts greater than 4 inches deep, support would be deemed inadequate and activities would be discontinued until soil conditions improve or appropriate remediation action is taken to ensure operations could continue without deep rutting.

2.2.3 Project Construction Plan

This section contains a general description of the construction steps for each phase of the major components of the project as outlined in the associated POD. This plan discusses the general activities and design approaches as currently understood and anticipated. Teton would remain in contact with the BLM as the project designs are finalized and specifics on construction are available.

In general, the design approach for the WMWE Project would have two primary objectives. The first is the concept of minimizing the overall environmental impact of the project while maintaining cost effectiveness and safety standards. This would include minimizing the amount of cut and fill required for the roads and foundations and using as much excavated soil and rock as possible on project roads.

The second design objective is the concept of "adaptive management," in which the project design would be done to complement the natural

characteristics of the site. Adaptive management would also be employed during construction by allowing for some specifics to be modified, adapting to actual site conditions (subsequent to BLM approval).

In accordance with the approved engineering grading and drainage plans, prior to the start of construction, Teton would review and document the general condition of the site, including soil characteristics, the type and levels of vegetation, and areas of disturbance. When construction is completed, Teton would complete revegetation and reclamation operations to return the areas not needed during operations to near preconstruction condition as detailed in Section 2.4.8. This includes returning land contour and drainage, replacement and preparation of topsoil, seeding, and weed control as necessary in order to restore the area to conditions similar to those that existed prior to construction.

Teton understands that portions of the land in the WMWE Project area are public lands managed by the federal and state government, and as such, the public has a right to expect access to the area. Public access would only be temporarily limited during construction of the WMWE Project to those specific areas where construction activities could cause public safety concerns. These activities include, but may not be limited to, wind turbine erection, foundation excavation, electrical collection system trenching, and substation construction. Once these specific activities are completed, full public access would resume to its current state.

2.2.3.1 Roads and Turbine Pads

In order for equipment and personnel to reach the wind turbine locations, existing roads would be used whenever possible; although, some existing two-track roads would need to be upgraded and new roads would need to be constructed. The existing County Road 53 and Fourteenmile Road from Highway 191 to the top of the WMWE Project area are sufficient to allow for truck traffic during the project construction. Additionally, access roads running adjacent to each turbine site and the project substation, O&M and wareyard, batch plant would be required. All access roads would be designed, engineered, and constructed in accordance with BLM and county standards and would be located to minimize disturbance, to avoid sensitive resources (e.g., raptor nests, cultural resource sites, etc.), and to maximize transportation efficiency during construction and O&M activities. An example of a constructed access road at the Bridger Butte Wind Energy Project in southwest Wyoming is shown in Figure 2.8. During the life of the project, Teton would be responsible for maintenance on all project roads, including specific portions of County Road 53 and Fourteenmile Road located within the project area and those portions of Fourteenmile Road that are used to access the project area. These activities would be conducted in accordance with a Road and Maintenance Agreement between Teton and Sweetwater County.

Many of the trucks used to haul wind turbine components to the site would be extra-long (for blade transport) and heavy-load (for wind turbine nacelles). Figure 2.2 notes the access roadways, but the exact locations may vary slightly. However, the access roadways would be generally along each of the turbine strings.

The tentative location of each wind turbine site is illustrated on Figure 2.2. Construction zones would be built around each wind turbine site. Typical construction areas for each turbine would be approximately 160 x 200 ft (0.73 acre) in size with a life-of-project disturbance area of 80 x 80 ft (Figure 2.9). The area around each site would need to be clear of obstacles and level enough to allow for the wind turbine components to be delivered and for a crane to be set-up. Designers would work to minimize the amount of work area required at each site, and, where possible, only a minimal amount of vegetation would be removed to allow for component delivery. It is likely that, at most sites, the location for the crane would require the same amount of earthwork as the roads (described below), although these pads can then be removed and the site restored to a natural state once construction is complete.

Figure 2.8 Constructed Turbine Access Road.

To the greatest extent possible, the area of construction and operation of the project (often referred to as the project footprint) would be consolidated for efficient land use in order to minimize disturbance to the existing ecosystem.

When practical, existing roads would be improved rather than constructing new ones. It is not anticipated that County Road 53 would require any widening to allow equipment access. However, if necessary, Teton would work with Sweetwater County Road and Bridge Department and the Wyoming Department of Transportation to obtain the necessary approvals to improve this road and/or the turnoff from U.S. Highway 191. The cut and fill required for the access road would be balanced to minimize the amount of materials that would need to be brought onto or removed from the site.

The design of access and turbine string roads would utilize the flow of the natural contours; however, in order to maintain safety during construction and maintenance activities, the following design criteria would also be implemented:

- Sweetwater County or BLM design standards such as Manual 9113 (BLM 1985) or the design standards suitable for wind energy development approved by the BLM (indicated below);
- maximum access road slope of 10%;
- maximum road slope between turbines (turbine string road) between 7 and 10%;
- access roads would generally have a maximum width of 26 ft;
- turbine string roads would have a maximum width of 54 ft (required for crane movement on-site) or 26 ft with an extra track about 28 ft off the road for crane movement (refer to Figure 2.9);
- minimum turn radius (inside radius of road way) of 115 ft (based on transporting three turbine blades at a time) wherever possible or 76 ft (based on transporting one turbine blade at a time) where necessary;

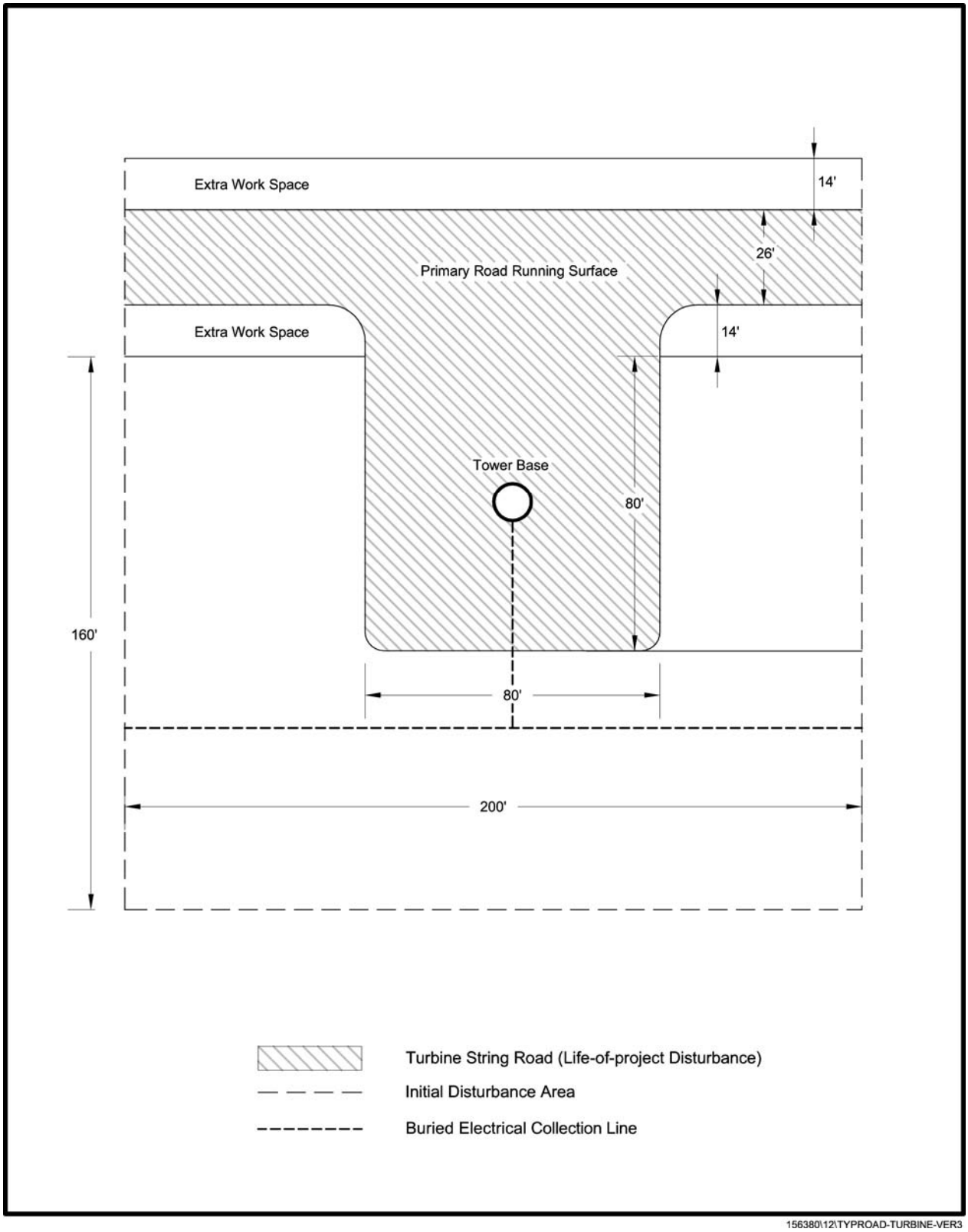

Figure 2.9 Typical Road and Turbine Construction Layout.

- road surfaces would be that of an all weather gravel road;
- design speed of 15 miles per hour (mph) maximum on the turbine string road and 25 mph on the site access road; and
- where necessary, culverts and road crossings of stream or wash crossings would be designed, installed, maintained, and monitored so as to accommodate and safely pass the 10-year storm event; and
- culverts installed where roadways exceed 5% slope would receive additional monitoring to ensure that they continue to function properly.

The access and turbine string roads would generally be constructed in the following sequence:

- stake centerline of access and turbine string roads;
- install temporary stabilization features such as silt fences, straw bales, and other controls at the limits of construction;
- clear and grub area associated with the access and turbine string road;
- separate and stockpile topsoil for later use;
- grade roads to slopes/design indicated on construction drawings;
- compact subgrade;
- install aggregate all weather road surface;
- install final stabilization/revegetation on disturbed areas associated with the roadway corridor; and
- remove temporary stabilization measures once final stabilization measures are established.

Once construction of the roads and turbine pads is complete, reclamation would be performed around the areas disturbed by the civil construction operations. Cut materials used during the road construction would be used to return contours to near preconstruction conditions. Any remaining cut materials would be distributed in previously disturbed areas in a manner that would not increase dust and erosion or change drainage conditions. Any exposed areas that are not covered by road materials would be revegetated using a seed mixture specified by the BLM or the landowner. Control of invasive nonnative species would continue on-site during the revegetation process and during the life of the project. Sterile nonnative plant species could be used in certain areas.

2.2.3.2 Electrical Collection System

Each wind turbine in the WMWE Project would be connected to an underground electrical cable to allow the generated energy to be sent to the project substation. These cables could be direct-buried (rather than placed in conduit) using cable specifically designed for this application. The voltage of this system would be 34.5 kV, but could potentially be from 12 kV to 46 kV.

If possible, the cables would be buried directly into the soil and materials found on-site. However, if those native materials are found to provide insufficient thermal conductivity (i.e., allow heat to dissipate from the cables), Teton may need to bring in engineered backfill, which would be a soil of a type sufficient to radiate the heat from the cables. The engineered backfill would only be used in the trenches with the cables and only to an amount sufficient to radiate the heat from the cables. The remaining depths of the cable trenches would be filled with native material.

In almost all areas, the cable would be run directly between the turbines. The cable would not be run in the center of the road to avoid unnecessary stress due to vehicle traffic, as well as the potential for cable damage during road maintenance. For areas near the substation where several runs of cable would all be in the same area, Teton may use both sides of the road for the cable trenches, where practical. Cables would be installed in a manner similar to that described below and then recontoured to a state similar to preconstruction and revegetated with BLM-approved seed.

2.2.3.3 Wind Turbine Foundations

The wind turbine base foundation anchors the wind turbine structure (consisting of the tower, hub, blades, and nacelle) securely to the ground. For most projects, the construction of the wind turbine foundation constitutes the largest volume

impact of earth excavation, although some foundation designs allow for much of the excavated material to be backfilled in and around the foundation itself.

Two foundation designs are typically used for wind turbine installations in the U.S. The specific one for the project would be determined by the soil and geotechnical conditions and wind turbine requirements. The first foundation type is a "mat" foundation and is shown in Figure 2.10. The second foundation type is a "pier" foundation and is shown in Figure 2.11. Mat foundations are wide and shallow, and pier foundations are narrow and deep. There can be variations of these foundations. The exact foundation type depends on completion and results of the geotechnical investigation. Under known conditions, most foundations would be pier design.

At the top of both foundation types is the turbine base. The base consists of a metal ring and series of anchor bolt connections to mate the foundation to the bottom of the wind turbine tower. The turbine base is cast into the concrete reinforced structure that makes up the remainder of the foundation. The casting and the subsequent backfilling of the foundation are typically done prior to the delivery of the wind turbine tower to allow the lowest sections of the wind turbine tower to be placed upon delivery.

The BLM has indicated that all excavated materials from their lands should be used within the boundaries of their land. If Teton determines that some native materials would need to be removed from BLM-administered land, Teton would obtain approval from the BLM before undertaking any such activities.

Teton would perform an extensive geotechnical investigation prior to construction to determine the soil conditions at each site. While very unlikely, it is possible that when the foundation site is excavated, the soil conditions could be very different from expected and not conducive to wind turbine installation. In that case, the excavated soils would be placed back into the hole and compacted to a level as close to pre-excavation as possible. The surface of the site would be recontoured, retopsoiled, and revegetated using BLM-approved seed.

2.2.3.4 Wind Turbine Installation

The wind turbines themselves are the primary generation equipment in the project. Their installation requires specialized equipment and crews and careful planning. Once construction has fully begun, components would be delivered directly to their installation locations as they arrive at the project. Lower tower sections would be placed immediately on foundations, while the remaining components would be placed around the site in planned staging arrangements. Crane crews would erect the turbines soon after all components arrive to minimize the amount of time the equipment is on the ground. The only exception may be if components begin to arrive in the spring before the site is available for construction (e.g., snow on-site). In such an instance, some components may be temporarily stored near the O&M facility site until full project site access is available. Figure 2.12 provides an example of a wind turbine and crane.

2.2.3.5 Meteorological Tower Installation

Two temporary meteorological (met) towers have already been installed within the project area, Additional met towers may be installed later (for control means) prior to the construction of each phase of development. If additional met towers are required, Teton would obtain all required federal, state, and county permits before the structure would be installed. The permanent met towers would be self-supporting and unguyed to minimize impacts to avian species. These towers would be located within the specific phase of development, but specific location cannot be determined at this time. However, these towers would be located next to existing access roads and would result in minimal disturbance (less than 0.25 acre of disturbance) and would likely remain in place throughout the life of the project and would be removed during the decommissioning phase of the project.

Figure 2.10 Typical Mat Foundation Installation (During Construction).

Figure 2.11 Typical Pier Foundation Installation (Post-construction).

Figure 2.12 Typical Wind Turbine and Crane.

2.2.3.6 Substation

Teton is currently negotiating a power purchase agreement and interconnection grant for this project. These agreements would be in place prior to construction of the project.

The energy generated by the wind turbines would be delivered to the substation via the underground collection system. The location of the substation is illustrated on Figure 2.2. At the substation, voltage of the energy would be increased from the collection system level of 34.5 kV to the transmission line voltage of 230 kV. Also, capacitor banks and other equipment would be installed at the substation to provide the voltage support necessary to meet the interconnection requirements for the project. A small control building would be installed within the substation for electrical metering equipment and the supervisory control and data acquisition (SCADA) system for control of the wind turbines.

2.2.3.7 Overhead Collection Lines

The substation of the WMWE Project would be interconnected directly with the existing PacifiCorp 230-kV transmission line, and no overhead transmission lines would be required (refer to Figure 2.1).

However, in a few select locations where buried cable power collector lines cannot be installed due to topography or rock conditions, short segments of low-voltage overhead power line could be installed. These low-voltage power lines (less than 46 kV) would consist of a single pole configuration with an overhead line to allow power generated at the wind turbines to be transmitted to the substation where the voltage would be stepped up and fed into the existing PacifiCorp transmission line.

The overhead lines would follow the general route of the buried collector lines, and the collector lines

would return to a buried or underground configuration where it is technically feasible to do so. No additional roads would be required because the power lines would generally follow the planned access roads and construction crews would drive cross-country during construction of the power line, thereby minimizing surface disturbance. The only disturbance associated with the power lines would be as a result of the drilling of the holes for each individual power pole (less than 4 ft^2), and the amount of disturbance for the overhead power line would be far less than the comparable distance of buried collector line. The exact location of where these short segments of overhead power lines would be installed cannot be determined at this time. However, based on a preliminary evaluation of the project area, Teton believes that only approximately 2.0 mi of overhead power lines of the planned 64.0 mi of buried collector line may be needed.

The power lines would be designed, constructed, operated, and maintained in conformance with the National Electrical Safety Code and other applicable codes and standards. The power lines would also be designed in accordance with *Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 2006* (Avian Power Line Interaction Committee 2006).

2.2.3.8 Operations and Maintenance Site

The WMWE Project would require an O&M building for use during the life of the project. This site would include a building to house storage for small parts, offices for the project staff, computers and control equipment for the wind turbines, and shop facilities. This building would be pre-engineered, assembled, and finished on-site. The building would meet Sweetwater County Building Code Requirements. It would be located on private land in the south-central portion of the project area. The location of the O&M building is shown on Figure 2.2. A picture of the O&M building from the Colorado Green project near Lamar, Colorado, is shown in Figure 2.13. To minimize visual impacts, the O&M building would be painted a shale green color. The O&M building would utilize a septic system for waste water disposal. In addition, Teton would use motion detectors on exterior lighting at the O&M building and would not use high intensity (e.g., sodium vapor) lights.

2.2.3.9 Construction Schedule and Workforce Requirements

The exact schedule of construction would depend on the approval date for the project; weather; delivery schedules for the turbines, steel, concrete, and electrical components; and seasonal restrictions during which construction must be delayed for wildlife protection. The project would be developed in phases. In general, a typical schedule for one construction phase (e.g., 60 turbines) of the wind energy project is shown in Table 2.5. Typical construction operations would occur during daylight hours 5 days per week. It is anticipated that approximately 187 full- and part-time employees would be required during the construction phase.

2.2.4 General Construction Activities

2.2.4.1 Housekeeping

Good housekeeping is important for all construction sites, and wind energy projects are no different. Good housekeeping can drastically reduce the incidents of injuries on-site, as well as minimize the environmental impact. At the end of each work shift, debris would be removed from turbine sites and disposed of in a county-approved landfill. Materials still needed at the turbine site would be assembled and secured at the site, and those materials no longer needed would be returned to the construction staging area.

One designated area would be used for washing out concrete trucks. The washout area would include catchment with an impermeable liner. Washout water would be recycled in the batch plan or pumped into tank trucks and removed from the site. The location for disposal would be at an approved disposal facility.

Figure 2.13 Typical Wind Energy Facility O&M Building.

Table 2.5 Typical Construction Schedule for One Phase of Approximately 60 Turbines.

Activity	Amount of Time (Months)
Mobilization	1
Access roads, staging areas complete	3
Substation construction	3-6
Transmission construction	3-6
Foundations	3-6
Wind turbine generator erection	3-6
Commissioning	4-8
Acceptance testing	4-8

2.2.4.2 Traffic

Construction of the wind energy project would occur over a 4-year period utilizing various vehicles for installation of project components and for the delivery of equipment and personnel. The majority of the vehicles used during the construction would include pickup trucks, small flatbed trucks, water trucks, flatbed semis with a flatbed trailer, concrete delivery trucks, etc. Table 2.6 presents the estimated number of vehicle trips for component delivery. The single largest vehicle used for component delivery would be the blade truck (Figure 2.14). Table 2.7 presents information on the estimated number of vehicle trips that might occur during the construction phase of the Proposed Action.

Vehicle traffic would be confined within the site boundary for safety, fire control, and the control of invasive nonnative species. Signs on the public roads utilized by these trucks would be erected to warn the public of the increased construction traffic, and all signage would be coordinated through the Wyoming Department of Transportation and the Sweetwater County Road and Bridge Department. In addition, all vehicles would be washed down at a location approved by the BLM for the control of invasive nonnative species prior to entering the site.

2.2.4.3 Materials Receipt, Handling, and Storage

With the large number of items and materials arriving on-site, a plan has been developed for receipt, handling, and storage. A construction staging area would be developed at the site of the O&M building along the side of the substation 0.75 mi west of County Road 53 where most construction materials would be off-loaded and stored (refer to Figure 2.1). This temporary construction staging area would be approximately 2.0 acres in size. The staging area would be for deliveries taken before the site is available, either due to weather or road construction. Otherwise, wind turbine components would be taken directly to the site where they would be installed. Materials needed for the concrete batch plant, substation construction, and electrical collection system would be off-loaded near their use sites.

2.2.4.4 Fencing and Signage

Teton would post warning signs along the access roads, including County Road 53 and Fourteenmile Road. Signage would include speed limit signs and signs informing the public of construction activities and recommending the public proceed with caution and watch for large vehicles and equipment. The content and location of such signs would be coordinated with Wyoming Department of Transportation and Sweetwater County officials. The existing access roads (County Road 53 and Fourteenmile Road) would remain open at all times except when they are physically and temporarily blocked by the movement of project-related vehicles or equipment. Teton would coordinate with the BLM, landowners, appropriate agencies, and Sweetwater County officials prior to equipment or component deliveries.

For those areas where public safety risks may exist and site personnel would not be available to control public access (such as excavated foundation holes and electrical collection system trenches), temporary fences would be erected. Similarly, temporary fencing would be installed around any staging areas or other areas deemed hazardous or where issues with security or theft are of concern. Teton would coordinate the fencing/security with the appropriate entity (e.g., BLM Authorized Officer, landowner, county personnel). The project substation and O&M building would be permanently fenced for public safety.

The staging area would be temporarily fenced with chain-link fencing. Temporary fencing around unfinished turbine bases is designed to warn people of the potential danger rather than to prevent physical access; therefore, this fencing is typically a high visibility plastic mesh material. Excavations would be fenced with chain-link fencing or other livestock fencing to prevent livestock from entering or falling into the open excavations.

Table 2.6 Estimated Number Vehicle Loads for Component Delivery.

Component Type	Number of Components Required per Turbine	Number of Components per Truck Load	Number of Truck Loads per Turbine
Tower section	3	1	3
Turbine blades	3	1	3
Nacelle	1	1	1
Rotor hub	1	1	1
Foundation components	2.5	1	2.5
Foundation concrete (cubic yards)	70	10	7
Total truck loads (components per turbine)			17.5
Number of truck loads for component delivery (240 turbines)			4,200
Number of truck loads for component deliveries for the substation			50
Number of truck loads for component deliveries for the O&M building			20
Number of trips for delivery of all components			4,270

2.2.5 Structural Construction Activities

2.2.5.1 Concrete Supply

A batch plant would be set up on-site (refer to Figure 2.2) to provide for the significant amounts of concrete necessary for the base foundations of the wind turbines and substation equipment. Attempting to bring trucks onto the site with premixed concrete is not feasible given the distances to the nearest concrete batch plants and the time needed to reach the various construction areas. Attempting such deliveries also would pose a hazard to public safety and have a greater impact on the environment.

A batch plant capable of producing approximately 50 yd^3 of concrete per hour would be needed for this project. To operate such a plant, a total of 30 tons of sand, 45 tons of aggregate, 15 tons of cement, and 3,000 gallons of water would be needed per hour while mixing concrete at peak production. The gravel and cement would be trucked to and temporarily stored next to the batch plant. The gravel and cement would be obtained from private sources that would be properly permitted by the appropriate state and county agencies located off-site, and water would be stored in a temporary aboveground storage tank. Teton would minimize the size of material stockpiles by ensuring that the gravel and cement would be trucked to the site on as close to an on-time use schedule as possible. Teton would also comply with applicable dust control requirements of the Wyoming Department of Environmental Quality/Air Quality Division (WDEQ/AQD). Based on previous experience, Teton would use a total of 420 acre-ft of water for dust abatement and concrete production during the construction phase of the Proposed Action. All water would be secured from existing permitted water

Figure 2.14 Typical Wind Turbine Blade Delivery Truck (Photograph Obtained from Vestas).

Table 2.7 Estimated Number Vehicle Trips During Construction Operations.[1]

Activity	Number of Units	Vehicle Trips per Unit	Number of Vehicle Trips
Deliver components[2]			4,270
Road construction	49 mi	50	2,450
Batch plant construction and demo	1 plant	100	100
Turbine and foundation construction	240 turbines	80	19,200
Water Delivery[3]	111 acre-ft	41[4]	4,551
Substation construction	1 substation	500	500
Crane delivery and removal	1 crane	40	40
O&M building construction	1 building	250	250
Total number of vehicle trips			31,361

1 These vehicle trips would occur over a 4-year period.
2 Details on number of vehicle trips for component delivery are presented in Table 2.6.
3 Water for both dust abatement and for concrete mixing.
4 Assumes an 8,000-gallon water truck.

sources, and the water would be transported to the project area via water trucks.

2.2.5.2 Steel Placement

The construction of the numerous turbine foundations would require a considerable amount of steel reinforcement. Therefore, the staging area would also be used to store this rebar material until it is needed in the construction process. A fabrication area within the staging area would also be established to prefabricate sections of rebar before they are transported to the individual turbine base excavations.

2.2.5.3 Formwork

Depending on the type of turbine foundation selected, formwork may be necessary. Formwork with either timber or steel shuttering would be used to form a shape into which rebar is placed, and then the concrete is poured. The formwork shuttering is then removed when the concrete has cured. The shuttering may be re-used, but in the case of timber shuttering, it may be discarded at a proper disposal site when it is no longer fit for re-use.

2.2.6 Electrical Construction Activities

2.2.6.1 Buried Cable Placement

To protect all existing pipelines, cables, or other buried utilities and prior to the installation of any buried cables, Teton would properly locate and mark all existing pipelines, cables, or other buried utilities. Marking would prevent accidental or inadvertent disturbance or damage to these existing utility lines, and equipment traveling over these utility lines would not be heavy enough to damage any of these existing facilities.

There are two methods for the placement of the electrical collection system cable. The first is open trench placement, where a trench is dug using backhoe-type machines to the required depth of cable placement, the cable is placed in the trench, and the trench is then refilled. An example of an open trench is shown in Figure 2.15. If the geotechnical investigation shows that the soils present on-site would not conduct heat away from a buried cable properly, it would be necessary to install an engineered backfill material around the cable to improve heat dissipation. If such backfill is necessary, the open trench approach would be required. Until the geotechnical investigations are completed, it is not known which method would be used at the WMWE Project. As discussed in Section 2.2.2.7, excess materials excavated from the open trenches would be used for road fill or aggregate.

The second placement method is direct cable placement using a trenching or cable plowing machine. These types of machines cut an opening with a plow-type device just large enough for the cable, place the cable in the ground, and then refill the hole in a combined single pass with the cut material (Figure 2.16). While very efficient, these machines are hampered in areas where the soil conditions are very rocky.

The medium-voltage electrical collection system cable used for this project would be placed a minimum of 48 inches below grade, and the fiber optic communications cable used to control and communicate with the wind turbines would be placed a minimum of 18 inches below grade.

The final depths would be determined by the geotechnical conditions of the area and the manner in which the cable is installed. Direct buried cable would have warning tape placed over the top at a depth of 12 inches, which would act as a visual reminder of the cable's presence for future site work.

2.2.6.2 Grounding

Every wind turbine foundation would have a grounding mat cast in place when the base is constructed. This consists of a copper cable mat that discharges electric energy into the earth when the wind turbine is struck by lightning or experiences an equipment malfunction. The substation would also have a grounding grid laid below grade in trenches around the substation site to protect equipment and personnel in the case of electrical malfunction or lightning strike.

Figure 2.15 Typical Open Trench Placement of the Cable.

Figure 2.16 Typical Cable Plowing Machine in Operation.

Transmission poles also require grounding. The grounding crew would follow behind the pole assembly and erection crew installing the grounds. This crew would install the proper number of ground rods and measure the ground resistance. If the proper ground resistance is not initially achieved, they would install additional ground rods until the acceptable ground resistance is obtained.

2.2.6.3 Buswork and Electrical Line Connections

The majority of the electrical connection systems would be installed underground. However, some overhead electrical lines and buswork (rigid overhead meter conductors) connections would be made at the project substation. The electrical collection system would come into the substation underground then transition overhead into the 34.5-kV buswork. This buswork connects the wind turbines on different feeder lines (each feeder line connects 10 to 12 wind turbines) to a common bus. Any necessary voltage regulation devices would also connect to this buswork, which then connects to the low-voltage side of the substation transformer. On the high-voltage side of the transformer, an overhead connection would be made to the project transmission tie-line using a riser structure.

This buswork would be constructed using small overhead cranes, scissor-lifts, and other similar devices. These components would be bolted together on-site and placed on small foundations for support. All of this work would be performed within the fenced substation area. Figure 2.17 illustrates an example of buswork construction being performed.

2.2.6.4 Communications Systems Installation

Communications between the wind turbines and the substation would be achieved by installing underground fiber optic cables. These cables would be buried above the electrical collection system cables utilizing the same trenches in order to minimize the impact to the environment. Communications to the substation would also be achieved by using a buried fiber optic line to the O&M building.

Figure 2.17 Typical Construction of a Substation Buswork.

2.2.6.5 Aviation Marking and Lighting on Wind Turbines

Federal Aviation Administration (FAA) regulations require that an aeronautical study be conducted on structures taller than 200 ft. The purpose of the aeronautical study is to determine if the proposed structure poses a threat to air navigation in the area and to also determine marking and lighting requirements for the structure. The wind turbines proposed for this project would be taller than 200 ft, so an aeronautical study by FAA has been conducted. In accordance with FAA regulations, Teton submitted an individual Notice of Proposed Construction to the FAA for each of the 240 wind turbines for their review. The FAA has completed their review and determined that none of the 240 wind turbines exceed obstruction standards and would not be a hazard to air navigation with the following conditions: Teton would need to construct white turbines that meet marking requirement and night time flashing (L-864) and install synchronized red lights for select wind turbines.

Marking and lighting of each wind turbine complies with FAA guidance presented in FAA Advisory Circular, AC 70/7460-1K, *Obstruction Marking and Lighting* (FAA 2007). For the WMWE Project, the FAA approved white towers, nacelles, and blades and a medium intensity red strobe synchronized flashing warning light (L-864) on top of the nacelle of the turbines located at the end of each turbine "string" plus lighting on every third or fourth turbine. Figure 2.18 illustrates the FAA-approved lighting plan for each wind turbine within the WMWE Project. If Teton wants to change the location of any of the wind turbines, they are required by FAA to submit an alteration application and obtain formal approval from FAA prior to making any such change in tower location. In order to minimize potential impacts to avian species, flashing lights would be used on wind turbines or met towers requiring FAA pilot warning lights. This design feature complies with Gehring et al. (2009).

2.2.7 Wind Turbine Tower Erection

2.2.7.1 Turbine Component Delivery and Storage

As wind turbine components arrive at the WMWE Project site, they would be routed to the individual turbine sites where they would be installed. When trucks arrive at each site, a small crane mounted on rubber tires (rather than tracks) would remove the cargo. Each site would have a plan for the arrangement of major components before erection. These major components include the tower sections, nacelle, rotor hub, and blades (Figure 2.19). If the wind turbine foundation has had sufficient time to cure before the lowest tower section arrives, that section would be off-loaded directly onto the foundation. If turbine components arrive before the individual sites are ready, the major components would be off-loaded and temporarily stored at the staging area near the O&M building. These components would then be moved to the turbine site as soon as feasible.

While most of the major components would arrive in completed form, the rotor (consisting of the hub and blades) would need to be assembled. The rotor would be placed with the nose up, and a small crane would lift the blades so they can be attached to the rotor. Once these blades are attached and any hydraulic or electrical connections are made between the hub and blades, the completed rotor package would be lifted and connected to the turbine shaft located in the nacelle. A picture of a rotor being assembled is shown in Figure 2.20.

2.2.7.2 Crane Assembly and Movement

The crane used to lift the wind turbine components would arrive on-site disassembled, and the crane components would be taken to the crane assembly area, typically located at or near the first turbine site. Once the crane is assembled, the crane would be "walked" to the tower site, where the tower and turbine would be erected. After all of the large components of the wind turbines are erected, the crane would be "walked" to the next turbine site using the crane's tracked base (Figure 2.21). The requirements for walking the crane would set many of the design parameters for the turbine

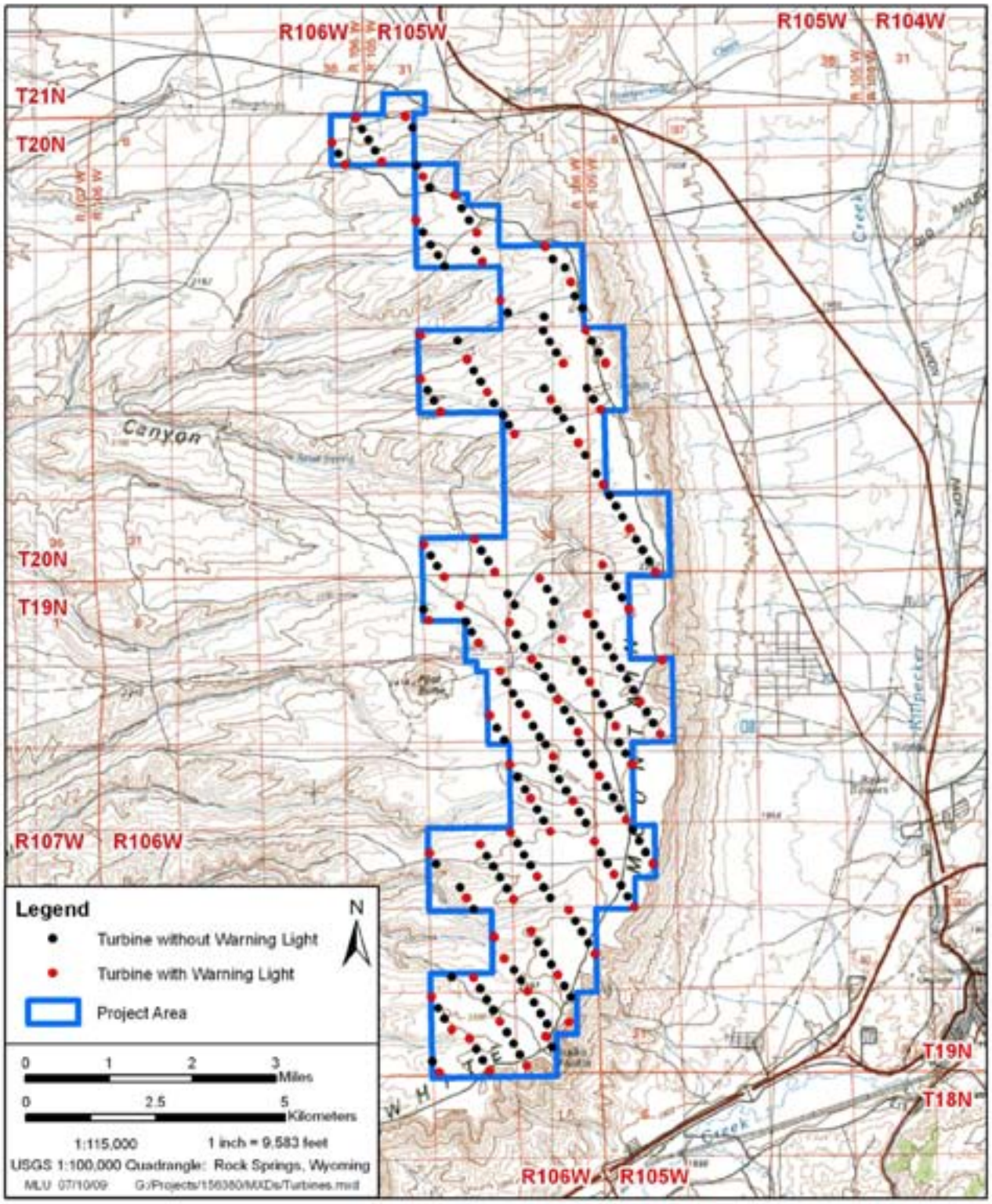

Figure 2.18 FAA-approved Wind Tower Lighting Layout.

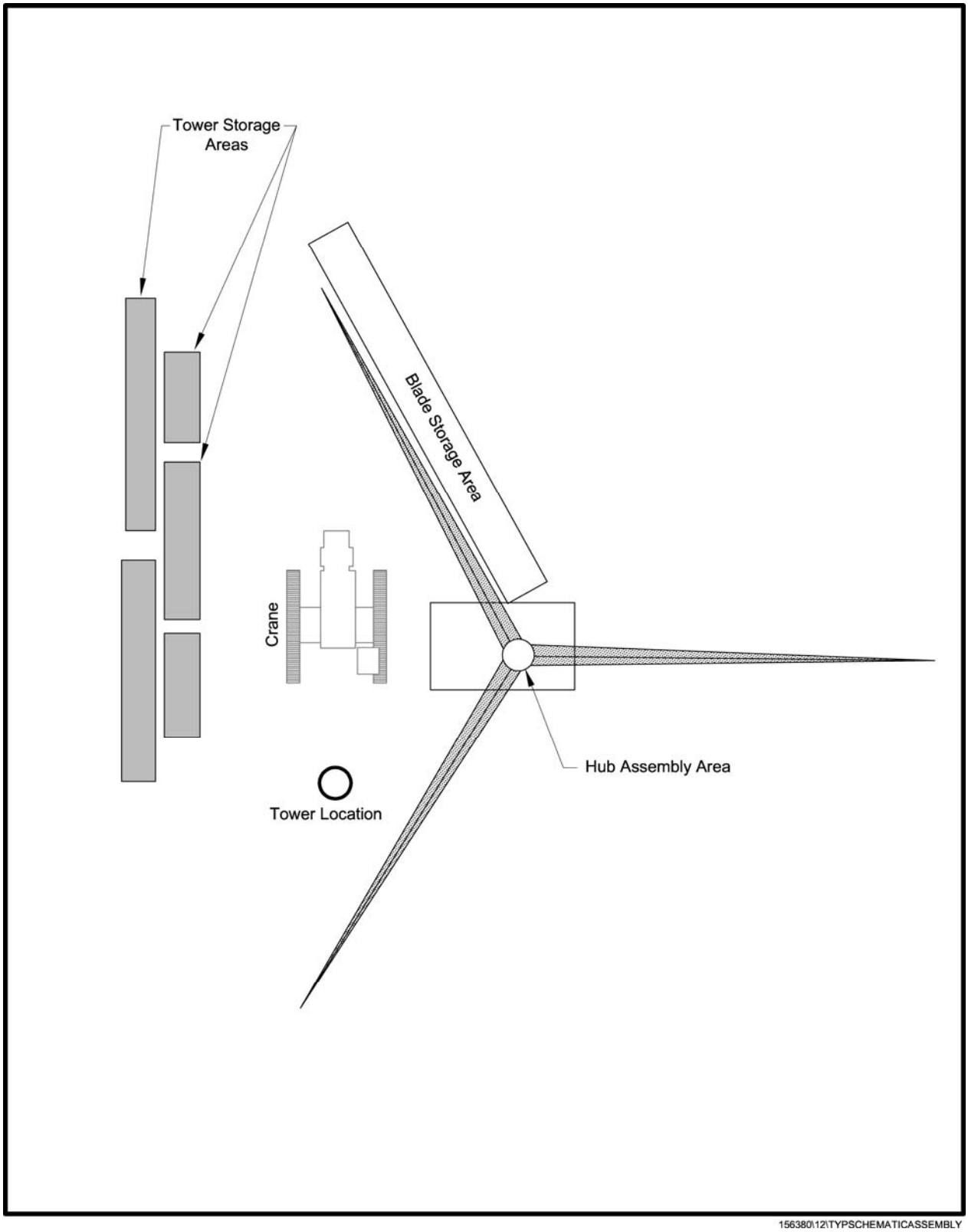

Figure 2.19 Typical Schematic of Turbine Assembly Area Plan.

Figure 2.20 Example of Rotor Assembly.

Figure 2.21 Typical Tracked Crane.

string road, including road width and slope. At locations where the road cannot be built within the tolerances for the crane, the crane would have to be disassembled, moved to the next site, and re-assembled.

2.2.7.3 Wind Turbine Component Lifts

Wind turbines are installed in large pre-assembled components that are interconnected in the field. The tower, which usually consists of three or four sections, is installed first. The first section is installed and bolted to the tower foundation, then subsequent sections are lifted one at a time and bolted together in place as shown in Figure 2.22. Once the last tower section is in place, the turbine nacelle is secured to the top of the tower as shown in Figure 2.23. Finally, the rotor (hub and blades) is lifted into place and secured onto the nacelle (Figure 2.24).

Once the crane and all wind turbine components have arrived at a site, the assembly of the major components typically takes 1-2 days. The lifting of large turbine components can only be done during periods of low winds and good visibility. Weather delays may occur at some sites.

To reduce the amount of time needed to complete the project, two or more large cranes may be used simultaneously to install the various wind turbines.

2.2.8 Reclamation Following Construction Operations

Teton would implement reclamation (described in Section 2.4.8) for those areas of temporary disturbance no longer needed during the O&M phase of the Proposed Action.

2.3 OPERATION AND MAINTENANCE

2.3.1 Health, Safety, and Environmental Plan

Prior to the start-up and operation of the wind energy facilities, the HSE Plan would be reviewed to incorporate additional requirements for O&M for the project. Specific procedures for complying with the BLM requirements that have not already been addressed in the plan would be added to ensure the continued focus on health, safety, and environmental awareness.

2.3.2 Project Operation and Maintenance Plan

The WMWE Project would require an O&M plan to achieve reliable and safe operation. The plan would be prepared in conjunction with the manufacturer of the turbines. Teton expects that full-time maintenance persons would be required for the entire 240 wind turbine project.

As with all operating equipment, some amount of unscheduled maintenance and repair would be necessary. It is just as important that these activities, while often important and urgent, still be performed according to the requirements of the POD, equipment specifications, and good industry practice.

As with the construction phase of the project, Teton understands that the project site is part of the public trust. As much as feasible, the site would be maintained and operated in a manner safe and compatible with public recreation, livestock grazing, Native American sensitivities, and other uses. During some maintenance or emergency response situations, it may be necessary to temporarily control access to a small portion of the project site to maintain public safety. Such situations would be discussed in the detailed project O&M plan.

2.3.3 Operation Activities

2.3.3.1 Orientation and Training

All maintenance employees of the project would receive training regarding safe work on wind turbines and the specific tasks necessary to provide scheduled and unscheduled wind turbine maintenance. All employees (regardless of job requirements) would be trained in the environmental management and monitoring requirements of the project ROW grant.

2.3.3.2 Wind Facility Performance Monitoring

Wind turbines generally operate autonomously, guided by sophisticated computers and software.

Figure 2.22 Typical Midsection Tower Assembly.

Figure 2.23 Typical Turbine Nacelle Placement.

Figure 2.24 Typical Complete Rotor Pickup.

The site manager and staff monitor the performance of the turbines and initiate manual control only as needed for maintenance and troubleshooting.

Periodically, plant management would analyze the performance trends of individual wind turbines and the overall project to ascertain the overall efficiency of operation. This analysis would utilize data collected from the wind turbines and the permanent met towers. It is possible some scheduled maintenance activities would be added or adjusted to improve the performance of the project-related equipment.

2.3.4 Maintenance Activities

The activities necessary to perform preventive maintenance, as well as equipment repairs as needed, are described in general below.

2.3.4.1 Project Inspections

As proponent personnel drive through the project area to perform scheduled activities, they would also perform a visual inspection of the project. The purpose of this inspection is to identify any obvious problems with the wind turbines that may require maintenance. If staff identifies a turbine that may be operating in an unsafe manner, that turbine would be stopped (remotely) until the condition can be fixed. This inspection is a redundant check because the turbine has many internal sensors that watch for any potentially unsafe operational condition.

Staff would also review, along with the turbines, the condition of the project roads and other visible aspects of the project infrastructure. This would include reviewing the condition of substation fencing and components, looking for any loose

trash on-site, and checking for any vandalism. Any conditions found that could impact public safety, wildlife, livestock, or the environment in general that cannot be immediately fixed would be reported to the BLM Authorized Officer or other appropriate authority (e.g., landowners or county personnel).

While normal project operations would allow these inspections to occur frequently, there may be periods when the site cannot be accessed and these inspections are suspended. Conditions causing such suspensions could include extremely high winds, blizzards, or heavy rain. The criteria for conditions in which the site would not be accessible would be described in detail in the HSE Plan and would also be subject to the judgment of the project manager and maintenance staff.

2.3.4.2 Scheduled Wind Turbine Maintenance

As with all machinery, regularly scheduled preventive maintenance is the best way to ensure that wind turbines operate in a safe and efficient manner. The project O&M Plan would include the scheduled minor and major maintenance and inspection activities anticipated during the calendar year.

Various inspections would be performed on a daily, weekly, or monthly basis. Results of these inspections are logged and used to plan future maintenance activities. Visual inspections inside the rotor head, nacelle, and tower bottom are done on a regularly scheduled basis. Information collected in these inspections is utilized to plan future maintenance activities. Particular attention would be paid to identify minor oil leaks so that appropriate repair work can be performed before the leaks pose a potential environmental issue.

Regularly scheduled preventive maintenance activities also are performed on a daily, weekly, or monthly basis. A list of all scheduled preventive maintenance activities would be included in the O&M Plan.

Two annual wind turbine maintenance cycles are anticipated. These would be planned for the spring and fall months of each year. While not currently anticipated, it may be necessary for blade washing to also be performed to improve wind turbine performance.

Over the project operational period, major maintenance or repair events are recorded so that underlying causes can be determined and analyzed. These analyses may lead to modifications to the turbines, project operation, or maintenance practices to improve the efficiency and safety of the project.

Teton anticipates that a maximum of approximately 57 direct O&M jobs would be required to service the project. In addition, pickups and other small service trucks would be used by on-site personnel, and Teton anticipates that 20 road trips per day would be required to perform maintenance activities on the entire project. This would result in approximately 5,000 road trips per year. The typical activities necessary to operate and maintain the WMWE Project are described below.

2.3.4.3 Unscheduled Wind Turbine Maintenance

Introduction

Wind turbine maintenance and internal inspection activities are normally performed on a scheduled basis. However, when problems occur, unscheduled maintenance would be required in order to maintain the operating efficiency of the project.

During the first several years of operation, the turbines would be new and major repairs are not anticipated; however, they cannot be ruled out. Any turbine experiencing mechanical difficulties that could result in safety or environmental risks or damage to the equipment would be taken offline until repairs can be completed. Otherwise, repairs would be planned for the first convenient opportunity.

The three levels of unscheduled maintenance are discussed below. All potential repair activities would be described in more detail in the manuals for the wind turbine design chosen for the project.

Minor Repairs and Component Replacement

Making minor repairs to the turbines or replacing faulty internal components are the most common form of unscheduled turbine maintenance.

All of these repairs can be done using small tools and the turbine-integrated winch system. It should not be necessary to bring even a small crane onto the site. No vehicles other than the project pickups and sport utility vehicles would likely be needed. These vehicles would stay on the project roads or in the clearing beneath each wind turbine.

Major Repairs and Component Replacement

Although far less common, it is possible that major components could need to be replaced during the operational phase of the project. These components could include the following:

- blades,
- generator,
- gearbox, and
- transformer (if in the nacelle).

Such a replacement may require at least one large crane be brought back to the site, and trucks would be needed to bring the crane to the turbine location. If the crane pad installed for the construction phase of the project was no longer available, such a pad would need to be installed.
If a major component becomes damaged and requires replacement, the turbine would be stopped and placed out of service until the component replacement is completed. Once the crane and replacement component arrive on-site and are prepared for service, the actual component replacement would only take 1 or 2 days. Once the new component is installed, the crane would be removed from the site and the turbine returned to service. This activity would be planned to minimize crane time on-site and the overall impact to the environment.

Wind Turbine Replacement

The replacement of a complete wind turbine at a project prior to decommissioning the facility is uncommon. It would only be necessary if there were problems with the wind turbine tower or foundation, as all other components can be replaced without removing the entire turbine.

The replacement of a wind turbine would require the same crane assembly as described above. The wind turbine components would be removed in the reverse order they were installed. Each of the removed components not used on the replacement wind turbine would then be loaded onto trucks and removed from the site. After the old components have been removed, replacement components would be brought to the site and arranged in a manner similar to that discussed above. The wind turbine would once again be erected using the appropriate combination of original and replacement components. Given the need to remove old components and bring new components to the site after the original wind turbine was disassembled, the entire wind turbine replacement activity could require the crane to remain on-site for a week or longer.

2.3.4.4 Balance of Plant Maintenance

Introduction

While the wind turbines are the major components of the project expected to require the most maintenance services, some maintenance would be needed for the balance of the project. Those maintenance services are described below.

Substation Maintenance

The project substation would be inspected periodically to look for any obvious problems or areas of concern. Additionally, the substation would undergo an annual inspection and maintenance cycle to ensure all protection equipment is functioning properly. This generally involves inspection of the breakers and switches to be certain they would operate as needed in a fault or emergency. Electrical connections would also be inspected and tested as needed to ensure no unsafe situations exist.

Maintenance to the substation transformer, switchgear, and buswork would require the substation be de-energized and, therefore, the

project shutdown. Teton would schedule this maintenance for low wind months of the year as much as possible. Most maintenance activities can be performed during a single day each year.

All substation equipment is within a fenced area, minimizing any potential impacts to the public, wildlife, or livestock.

Road Maintenance

Road maintenance within the WMWE project area would be performed by Teton on an as needed basis. Regular snow removal is expected to be required during the winter months to maintain access to the turbines and substation. Teton would also plow openings at least every 0.25 mi, or as directed by the BLM, in the snow berms to allow big game species to move off of and away from road activities. During periods of heavy snow, Teton may use snowmobiles to access some wind turbines. All snowmobile use would be restricted to existing roads and no off-road travel would be allowed. It is expected that minor amounts of surface dragging, blading, or grading would be required after the spring thaw to remove vehicle ruts. Other similar surface work may be needed after periods of heavy rainfall or just periodically due to maintenance traffic. Any identified needed repairs would be promptly addressed. Also, any culverts, drains, or other water management devices would be kept clear to allow effective drainage.

To mitigate against dust, the road surfaces would be watered or otherwise treated with dust control measures. These treatments would occur as needed based on weather conditions and the amount of traffic on the road. Teton estimates that approximately 14 acre-ft of water would be required annually over the life of operation for dust control. Water would be secured from existing permitted water sources, and it would be hauled by truck to the project area. Any treatment substance other than water would only be used after consultation with the BLM Authorized Officer or county personnel, if applicable.

O&M Building Maintenance

Any maintenance requirements for the O&M building are expected to be typical for a building of this type of construction and would be performed on an as-needed basis. Exterior maintenance would be performed in a timely manner to maintain a presentable appearance to the general public. Housekeeping and area cleanup would be done on a regular basis to avoid the buildup of litter and other unsightly materials.

2.4 DECOMMISSIONING

As with any energy project, the WMWE Project would have a fixed time after which it may no longer be cost effective to continue operation. At that time, the project would be decommissioned, and the existing equipment, facilities, and structures would be removed and the disturbed areas revegetated. While it is possible the project owners may want to work with the BLM, landowners, state, and county to repower the site (replace the existing wind energy project with a new project on the same site), repowering is not being considered in this plan.

2.4.1 Health, Safety, and Environmental Plan

When the project moves into the decommissioning stage, the operation's HSE Plan would be modified to include the decommissioning activities. Decommissioning requires outside contractors, cranes, and large equipment to be brought back to the site.

Components of the management system that would be addressed in the plan include, but are not limited to, risk management analysis, emergency response, HSE planning and procedures, implementation, monitoring and reporting results, setting performance targets, incident classification, investigation and reporting results, audits and inspections, and HSE management review.

Minimum contractor HSE requirements would be included in the plan. These are typically such requirements as personal protective equipment, housekeeping, maintaining a safe workplace, fire prevention, safe work practices, etc. Contractors

are expected to comply with these requirements at a minimum. Contractor safety plans would be reviewed for compliance. Contractor BMPs would be reviewed and incorporated into the plan as appropriate.

Once the framework of the plan is completed, the project would be reviewed for site-specific HSE requirements and would be modified to incorporate them.

Also included in the HSE Plan is a risk register that identifies potential hazards and the risks associated with them. Contractors are expected to address these risks and to develop mitigation plans for incorporation into the register. The risk register would be used and updated on a continuous basis to identify and mitigate risks as they arise. It is conceivable that mitigation plans as developed may not prove to be sufficient. In this case, the plan would be adjusted to provide a suitable solution to project risks.

Observation of HSE performance is key to avoiding incidents. Project personnel would be expected to regularly observe work practices and to provide positive reinforcement and guidance to fellow employees. Work practices that may be considered to place employees or the environment at risk would be identified, evaluated, and modified as necessary to eliminate or substantially reduce the risk.

2.4.2 Project Decommissioning Plan

The goal of project decommissioning is to remove the installed power generation equipment and return the site to a condition as close to a preconstruction state as feasible.

These activities are discussed in more detail in the subsequent sections. The specific requirements and approach for each activity is an estimate since the technologies and construction techniques available when the project is decommissioned are expected to change.

2.4.3 Wind Turbine/Meteorological Tower Removal

The decommissioning activity most notable to the general public would be the removal of the wind turbines and met towers. The disassembly and removal of this equipment would essentially be the same as its installation but in reverse order.

2.4.3.1 Crane Movement and Assembly

When a large crane first arrives onto the project site, it would be taken to the location for the first turbine removal. The crane would be assembled on that site, and then used to disassemble the wind turbine. Once the turbine at that site is disassembled, the crane would be “walked” to the next turbine site using the cranes tracked base (see Figure 2.12). If the requirements for walking the cranes to the met towers on the project roads cannot be accomplished, road improvements may be necessary. At locations where the road cannot be improved to within the tolerances for walking the crane, the crane would be dissembled, moved to the next site, and re-assembled.

If the crane pads built for the construction of the project were subsequently removed or no longer meet the requirements for the crane, then crane pads would need to be installed or improved.

2.4.3.2 Wind Turbine/Meteorological Tower Disassembly

The large components that make up a wind turbine would be dissembled in the reverse order that they were assembled. The rotor (hub and blades) are removed from the nacelle and, with the help of a smaller crane, turned horizontally and set on the ground. Next, the nacelle would be removed from the top of the tower, followed by each portion of the tower. The met tower would similarly be disassembled by a crane, starting with the upper tower section and moving downward.

Once the turbine rotor has been removed, a crew and small crane would disassemble it into the hub and three loose turbine blades.

2.4.3.3 Component Removal

The most efficient manner for component removal (other than the rotor) would involve individual parts being lowered from the turbine and placed directly onto a truck bed. These trucks can then immediately take the component off-site. This approach would limit the need for clearing an area around the turbine base to set down the rotor.

When the rotor is disassembled, the blades would be placed into a carrying frame. The blades in the frame can then be loaded onto a truck for removal from the site. The hub can also be removed once it is disassembled from the blades.

2.4.4 Electrical System Removal

2.4.4.1 Buried Cable Removal

The buried electrical cable and fiber optic cable located between each turbine would be cut off 24 inches below grade and left in place.

2.4.4.2 Substation Disassembly and Equipment Removal

Once the project and transmission line is de-energized, the substation would be disassembled. Major components would be removed from their foundations and placed onto trucks using a small crane. The steel structures and control building would be disassembled and removed from the site. The fence would be taken down, and fence posts would be removed. The gravel placed in the substation would be removed if it was not native rock that had been removed from excavations and crushed. Native rock would be scattered on-site.

Once again, buried grounding equipment would be cut off at least 24 inches below grade and left in place.

2.4.4.3 Transmission Line Removal

Assuming the transmission line no longer serves a purpose for this project, it would be disassembled and removed. Initially, the wires would be removed from the tower hangers and collected for recycling. The power line structures would then be disassembled and removed, including grounding rods to 24 inches below grade. The areas around the poles, along with any two-track access roads that were necessary, would be reclaimed.

2.4.5 Operations and Maintenance Building Removal

All equipment and furniture in the O&M building would be removed, and then the building would be disassembled or demolished and removed from the site. All debris from the demolition would be removed from the project site and either disposed of at an approved landfill, recycled, or re-used. Any installed septic system would also be abandoned in a manner consistent with state and local regulations.

2.4.6 Structural Foundation Removal

When the wind turbines, met towers, and substation components are removed from their foundations, the foundations would be removed according to the requirements of the ROW grant and/or landowner agreement. Teton expects that the concrete and steel in the foundations would be broken up and removed to a depth of 24 inches below grade. Shallow foundations (like that for the O&M building) would be removed in their entirety. All concrete and steel debris would be removed from the site and either disposed of at an approved landfill, recycled, or re-used.

2.4.7 Road Removal

The BLM, in conjunction with the landowners, would have the choice when the project is decommissioned as to whether the access roads constructed for this project would be removed or left in place to facilitate public access in the area. However, if the BLM, in conjunction with the landowner, chooses to leave the roads in place, they would become the responsibility of the BLM and/or the landowners.

Once all the necessary equipment and materials have been removed from an area and the road to that area is no longer needed, it can be removed. The road surface and bed materials would be

removed down to the original grade. Any native materials would be used for reclamation of the site, and foreign materials would be removed and properly disposed.

2.4.8 Reclamation Plan

2.4.8.1 Introduction

Teton would be responsible for stabilizing and reclaiming all disturbance created by the WMWE Project, and Teton would use appropriate stabilization and reclamation methods and materials for the area. Teton would also reclaim all temporary disturbances in accordance with these procedures as soon as physically possible.

2.4.8.2 Regrading and Retopsoiling Operations

For areas where equipment or materials are removed, those areas would be regraded back to preconstruction contours (if possible), and stockpiled subsoil would be replaced and hipped/disced to reduce compaction. Holes where foundations have been removed would be refilled with native material. Removed roads would be regraded to original contours, if cuts and fills make such regrading practical. Crane pads would also be regraded.

2.4.8.3 Topsoil Replacement and Seedbed Preparation

Once regrading operations have been completed, available stockpiled topsoil would be replaced on the disturbed areas. After the topsoil has been replaced, compacted soils or disturbed soils would be lightly disced or harrowed to loosen soils and break soil clods; surfaces would be roughened to provide a suitable seedbed to reduce the potential for wind and water erosion and to improve the infiltration. Use of fertilizers or other soil amendments is not anticipated because fertilizers tend to promote weed growth. If reclamation is unsuccessful, the need for fertilizers would be re-evaluated in consultation with the BLM and the landowners.

2.4.8.4 Revegetation Operations

The seed mixture to be used for revegetation operations is presented in Table 2.8. Species selection is based on existing species composition, establishment potential, growth characteristics, soil stabilizing qualities, palatability to wildlife, commercial availability, existing land uses, and agency recommendations.

Certified seed of native species adapted to conditions along the project area would be purchased. Alternative species may be used, with prior approval from the BLM Authorized Officer and/or private landowners if any of these species become unavailable or if alternative species would be better suited to site-specific conditions. All seed mixtures would be tested for purity; noxious, poisonous, and/or prohibited plant species; and viability. The seed mixture would not contain any noxious weed seeds. Test results would be submitted to and approved by the BLM Authorized Officer and landowner, unless certified weed-free seed is procured for this reclamation project.

Grass seed would be planted using a rangeland-type of drill equipped with a depth regulator to ensure proper depth of planting. Each species would be planted at an appropriate depth, generally 0.25 to 0.50 inch. Forb and shrub seeds would be planted using a cyclone-type broadcast seeder, and seeding rates would be doubled. In areas where it is not possible to drill seed, seed would be hand-broadcast or broadcast using a cyclone-type broadcast-seeder and seeding rates would be doubled. The seeded area would then be raked with a harrow or chain to cover seed and would be packed with a multipacker or similar implement to ensure appropriate soil/seed contact. In areas that are not accessible with revegetation equipment, broadcast-seeded areas would be hand-raked to cover seed. Areas where vegetation was only driven over (e.g., along the transmission line corridor) during construction would be broadcast seeded and raked to facilitate soil stabilization and vegetative regrowth. Temporary forage around the turbines may be necessary to facilitate the establishment of designated vegetation due to impacts from livestock, wildlife, and wild horses.

Table 2.8 Reclamation Seed Mixture.

Species	Seeding Rate (lbs PLS/acre)[1]
Grasses (Three to four species would be selected)	
Indian ricegrass (*Oryzopsis hymenoides*)	2.0
Bottlebrush squirreltail (*Elymus elymoides*)	2.0
Thickspick wheatgrass (*Elymus lanceolatus*)	6.0
Sandberg bluegrass (*Poa secunda*)	6.0
Forbs (Two species would be selected)	
Blue flax (*Linium lewisii*)	0.5
Scarlet globemallow (*Sphaeralcea coccinea*)	0.5
Rocky Mountain beeplant (*Cleome serrulata*)	0.5
Shrubs (Two species would be selected)	
Gardner's saltbush (*Atriplex gardneri*)	2.0
Winterfat (*Krascheninnikovia lanata*)	2.0
Wyoming big sagebrush (*Artemisia tridentata wyomingensis*)	1.0
Sterile Nonnative Species (May be used for site stabilization)	
Sterile Triticale (quick guard)	8.0-10.0
Sterile wheatgrass, barely, or rye	8.0-10.0

[1] PLS = pure live seed.

2.4.8.5 Reclamation Monitoring Plan

Teton would be responsible for annual monitoring of reclamation success along the project area until it can be demonstrated to the BLM that revegetation success criteria have been met. Monitoring would also be conducted to ensure that erosion control, weed management, and revegetation efforts continue to meet the objectives of stabilization and productivity along the ROW. These efforts would continue until erosion control, weed management, and revegetation is deemed successful by the BLM/landowner or until the BLM/landowner determines that continued efforts are not necessary.

2.4.8.6 Stability and Erosion Control

Teton would implement stability and erosion control practices for all temporary and permanent reclamation in accordance with the SWPPP.

Reclaimed areas within the project area would be considered stable if there are no large rills or gullies, no substantial soil movement, no headcutting in drainages, no slope instability, no subsidence, and no slumping that can be attributed to construction, operations, or maintenance. Teton would be responsible for annual inspections for the following types of problems as determined by the BLM Authorized Officer or landowner:

- soil movement where the depth of recent deposits around obstacles is greater than 0.5 inch;
- surface litter movements where more than 25% of surface litter has been transported and redeposited against obstacles downslope;
- development of rills greater than 3 inches deep at intervals of 10 ft or less;
- gully formation at intervals of 200 ft or less; and
- channel erosion where more than 25% of the channel bed and walls show active erosion, gully formation, and/or headcutting or bank failure.

If these features are discovered during reclamation inspections and their existence can be attributed to construction, O&M, or decommissioning operations of the WMWE Project, Teton would, in consultation with BLM and landowner, implement appropriate remedial action until reclamation objectives are met.

2.4.8.7 Reclamation/Revegetation Success Monitoring

Reclamation and revegetation would be considered successful on BLM-administered land when the Wyoming Rangeland Standard (BLM 2009a) has been met. On private and state-owned land, revegetation would be considered successful if it meets the specific standards established in the applicable agreements.

Reclaimed areas would be monitored by Teton for as long as determined by the BLM Authorized Officer or landowner. If any noxious weed species are discovered on project-related reclamation, Teton would implement appropriate weed control measures.

2.5 DESIGN FEATURES OF THE PROPOSED ACTION AND ALTERNATIVE A

The following design features would be implemented by Teton. Design features are based on applicable policies and BMPs provided in IM 2009-043, land use plan requirements, or other best management practices. Prior to construction, Teton would implement appropriate avoidance in areas and/or setbacks (discussed below) in order to minimize impacts to public safety, operation of existing facilities, and environmental resources.

2.5.1 Public Safety, Occupational Safety, and Hazardous Materials and Waste Management

The project cannot limit public access to the site to a level lower than it was prior to the start of construction, except in those areas where public safety could be jeopardized (or where theft control measures are appropriate). The existing access roads (County Road 53 and Fourteenmile Road) would remain open at all times except when the roads are physically and temporarily blocked by

the movement of project-related vehicles or equipment.

During construction activities such as wind turbine assembly, Teton would have crews on-site performing the activity and monitoring overall safety. Construction personnel would comply with all applicable federal and state safety regulations. Construction crew members and safety monitors would be trained to ask members of the public to maintain a safe distance from the work zone. Neither the crew members nor the safety officers have the authority or responsibility to keep members of the public away from the construction zone, especially if members of the public choose to ignore posted signs.

During the operation phase of this project, Teton would attempt to minimize vandalism and trespassing by having secured and locked access to wind turbine towers and electrical equipment and having O&M staff regularly patrol the area. In addition, the area around the substation and O&M building and storage area would be fenced for public safety. Fencing would be a minimum of 6 ft high and would be equipped with Sweetwater County approved screening material to minimize visual intrusion. Fencing will be maintained. No other permanent fencing is currently anticipated, but this plan could be adjusted if additional fencing is needed. During some scheduled or unscheduled maintenance activities that could involve open pits or other potentially unsafe areas, temporary safety fencing would be installed. Teton would also install speed limit signs in the project area in cooperation with Sweetwater County officials.

Teton would post warning signs along the access roads, including County Road 53 and Fourteenmile Road, informing the public of construction activities and recommending the public proceed with caution and watch for large vehicles and equipment. The existing access roads (County Road 53 and Fourteenmile Road) would remain open at all times except when they are physically and temporarily blocked by the movement of project-related vehicles or equipment.

A project web site would be established during construction to describe the project and would explain current activities and provide recommendations regarding safe practices on the project site. Additional outreach would be performed as necessary. The goal of this program is to provide information to the curious public without them needing to physically access the site.

Because of the improvements in wind turbine, tower, and blade designs over the past 10 years, Teton does not anticipate that ice throws from blades or tower failures would be a concern for public safety.

Teton has evaluated the Proposed Action for shadow flicker and determined that shadow flicker would not likely be visible outside of the project area, and there would be no impacts to any residences in the Rock Springs/Green River area since the closest residence is located 0.92 mi east and 700 ft below the rim of White Mountain.

Teton would provide a setback of 110% for all wind turbines (as measured from the ground to the top of the blade) from all property lines not included in the proposed project, from the ROW of all county roads in the project area, and from existing aboveground facilities. Teton would coordinate with the owners of the facilities (including buried facilities) to ensure that such facilities would be protected from disturbance and that existing operators are protected.

All terms and conditions regarding private, state, and federal leases would be conveyed to any subsequent property owner. The proposed project would not impact any existing cathodic protection equipment located within the proposed project area. All geotechnical holes or test pits would be backfilled in accordance with applicable requirements. Any required material or excess material would be obtained or dispersed of at a properly permitted facility.

During construction and decommissioning, portable toilets would be provided for workers on-site, and the waste would be properly disposed of through an approved waste disposal facility on an as-needed basis. During the O&M phase,

permanent toilet facilities would be placed in the O&M building, and waste would be disposed of through a state and county approved septic system. Solid waste such as garbage and other discarded solid materials would be collected at designated collection sites and disposed of at an approved solid waste management facility. Solid waste would not be imported into or disposed of within the WMWE project area. Some large equipment would be fueled on-site, and some small spills of petroleum products may occur due to periodic equipment maintenance and/or accidents. If such spills occur, petroleum-contaminated soils would be disposed of in accordance with the Spill Prevention, Control, and Countermeasures Plan (SPCCP) and direction from the BLM and/or WDEQ as appropriate. Typical hazardous chemicals and petroleum products used in equipment during the construction and decommissioning phases of a wind energy facility include diesel fuel, gasoline, gearbox oils, hydraulic fluids, lubricants, cleaning fluids, paints, degreasers, and other similar substances. Typical hazardous chemicals and petroleum products used in equipment during the O&M phase of the wind energy project include mineral oil, diesel fuel, gasoline, gearbox oils, hydraulic fluids, lubricants, and cleaning fluids. All nonhazardous wastes would be disposed of in accordance with appropriate county, state, and federal regulations.

Operators would handle and dispose of all hazardous wastes in accordance with applicable state and federal rules and regulations. Any release of hazardous substances in excess of reportable quantities, established in 40 CFR 117, would be reported as required by *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) (as amended). If a release of a reportable quantity of any hazardous substances occurs, a report would be provided to WDEQ and all other appropriate federal, state, and county agencies.

Teton has evaluated potential interference to existing radio transmitters and microwave reflector facilities and made appropriate adjustments to the turbine layout to avoid any potential areas of interference.

Teton has submitted and received "determinations of no hazard to air navigation" from the FAA for all 240 wind turbines in the WMWE project area. There are no known military operating areas within or near the WMWE project area that could pose a hazard to military flight operations.

Prior to the construction of specific phases, Teton would obtain all required permits from all appropriate federal, state, and county agencies.

2.5.2 Construction and O&M Operations

Prior to the construction of any project-related equipment, structures, or facilities, all available vegetation and all available topsoil would be salvaged and stockpiled for future reclamation operations. If less than 6 inches of topsoil are available, topsoil along with an appropriate quantity of other suitable subsoil (with BLM or landowner approval) would be salvaged so that a minimum of 6 inches of plant growth material would be available for use during revegetation operations. Topsoil and suitable subsoil would be stockpiled separately, and appropriate signs would be installed on each topsoil or subsoil pile.

Topsoil salvage operations would apply to all construction activities except for the construction of any required overhead transmission power lines. Topsoil salvage operations are not required for the construction of overhead power lines because these activities would result in minimal disturbance from wheeled vehicles driving over the vegetation and soil. In addition, natural revegetation would occur more rapidly if the vegetation and soil is left in place.

Teton would not conduct any construction, O&M, or decommissioning activities when soils in the work area are too wet to adequately support construction equipment. If construction equipment creates ruts greater than 4 inches deep, support would be deemed inadequate, and activities would be discontinued until soil conditions improve or appropriate remediation action is taken to ensure operations could continue without deep rutting.

In order for equipment and personnel to reach the wind turbine locations, existing roads would be used whenever possible; although, some existing two-track roads would need to be upgraded and new roads would need to be constructed. Designers would work to minimize the amount of work area required at each site, and, where possible, only a minimal amount of vegetation would be removed to allow for component delivery.

Once construction of the roads and turbine pads is complete, reclamation would be performed around the areas disturbed by the civil construction operations. Cut materials used during the road construction would be used to return contours to near preconstruction conditions. Any remaining cut materials would be distributed across the mountain in a manner that would not increase dust and erosion or change drainage conditions but would keep the materials on the mountain. Any exposed areas that are not covered by road materials would be revegetated using a seed mixture specified by the BLM. Control of invasive nonnative species would continue on-site during the revegetation process and during the life of the project.

The BLM has indicated that all excavated materials from their lands should be used within the boundaries of their land. If Teton determines that some native materials would need to be removed from BLM-administered land, Teton would obtain approval from the BLM before undertaking any such activities.

If additional met towers are required, Teton would obtain all required federal, state, and county permits before the structure would be installed. In addition, all new met towers would be self-supporting and would not require any guy wires.

The O&M building would meet Sweetwater County Building Code requirements, and it would be painted a shale green color.

All engineered plans and/or as-built drawings would be provided to BLM and Sweetwater County and would be certified by a Wyoming licensed Professional Engineer.

One area within the project area would be designated and used for washing out concrete trucks. The washout area would include catchment with an impermeable liner. Washout water would be recycled in the batch plant or pumped into tank trucks and removed from the site. The location for disposal would be at an approved disposal facility.

For those areas where public safety risks may exist and site personnel would not be available to control public access (such as excavated foundation holes and electrical collection system trenches), temporary fences would be erected. Similarly, temporary fencing would be installed around any staging areas or other areas deemed hazardous or where issues with security or theft are of concern. Teton would coordinate the fencing/security with the appropriate entity (e.g., BLM Authorized Officer, landowner, county personnel). The project substation and O&M building would be permanently fenced for public safety.

The staging area would be temporarily fenced with chain-link fencing. Temporary fencing around unfinished turbine bases is designed to warn people of the potential danger rather than to prevent physical access; therefore, this fencing is typically a high visibility plastic mesh material. Excavations would be fenced with chain-link fencing or other livestock fencing to prevent livestock from entering or falling into the open excavations.

The gravel and cement for this project would be obtained from private sources that would be properly permitted by the appropriate state and county agencies located off-site, and water would be stored in a temporary aboveground storage tank. Teton would minimize the size of material stockpiles by ensuring that the gravel and cement would be trucked to the site on as close to an on-time use schedule as possible. Teton would also comply with applicable dust control requirements of the WDEQ/AQD.

Concrete forms (i.e., shuttering) may be re-used, but in the case of timber shuttering, it may be

discarded at a proper disposal site when it is no longer fit for re-use.

Marking and lighting of wind turbine and met towers complies with FAA guidance presented in FAA Advisory Circular, AC 70/7460-1K, *Obstruction Marking and Lighting* (FAA 2007). For the WMWE Project, the FAA would require that all wind towers be painted white and a medium intensity red strobe (flashing) warning light would be placed on top of the nacelle of the turbines located at the end of each turbine "string," plus lighting on every third or fourth turbine. In order to minimize potential impacts to avian species, flashing lights would be used on wind turbines or met towers requiring FAA pilot warning lights.

Any conditions found that could impact public safety, wildlife, livestock, or the environment in general that cannot be immediately fixed would be reported to the BLM Authorized Officer or other appropriate authority (landowner, county personnel).

2.5.3 Decommissioning and Reclamation Operations

During the decommissioning phase of this project, all above-grade project-related facilities (e.g., wind turbines, towers, roads, buildings, and substation) would be removed from the site to a depth of at least 24 inches below grade and backfilled with native materials. The gravel placed in the substation would be removed if it was not native rock that had been removed from excavations and crushed, and native rock would be scattered on-site.

The BLM, in conjunction with the landowners, would have the choice when the project is decommissioned as to whether the access roads constructed for this project would be removed or left in place to facilitate public access in the area. However, if the BLM, in conjunction with the landowner, chooses to leave the roads in place, they would become the responsibility of the BLM and/or the landowners.

Once all the necessary equipment and materials have been removed from an area and the road to that area is no longer needed, the road itself would be removed. The road surface and bed materials would be removed down to the original grade. Any native materials would be used for reclamation of the site, and foreign materials would be removed and properly disposed.

During reclamation operations, available stockpiled topsoil would be replaced on the disturbed areas. After the topsoil has been replaced, compacted soils or disturbed soils would be lightly disced or harrowed to loosen soils and break soil clods; surfaces would be roughened to provide a suitable seedbed to reduce the potential for wind and water erosion and to improve the infiltration.

Teton would use the reclamation seed mixture presented in Table 2.8 and only certified seed of native species adapted to conditions along the project area would be purchased. Alternative species may be used, with prior approval from the BLM Authorized Officer and/or private landowners, if any of these species become unavailable or if alternative species would be better suited to site-specific conditions. All seed mixtures would be tested for purity; noxious, poisonous, and/or prohibited plant species; and viability. The seed mixture would not contain any noxious weed seeds. Test results would be submitted to and approved by the BLM Authorized Officer, unless certified weed-free seed is procured for this reclamation project.

Grass seed would be planted using a rangeland-type of drill equipped with a depth regulator to ensure proper depth of planting. Each species would be planted at an appropriate depth, generally 0.25 to 0.50 inch. Forb and shrub seeds would be planted using a cyclone-type broadcast seeder, and seeding rates would be doubled. In areas where it is not possible to drill seed, seed would be hand-broadcast or broadcast using a cyclone-type broadcast-seeder, and seeding rates would be doubled. The seeded area would then be raked with a harrow or chain to cover seed and would be packed with a multipacker or similar implement to ensure appropriate soil/seed contact.

In areas that are not accessible with revegetation equipment, broadcast-seeded areas would be hand-raked to cover seed. Areas where vegetation was only driven over (e.g., along the transmission line corridor) during construction would be broadcast seeded and raked to facilitate soil stabilization and vegetative regrowth.

Teton would be responsible for the monitoring of reclamation success within the project area until it can be demonstrated that revegetation success criteria have been met. Monitoring would also be conducted to ensure that erosion control, weed management, and revegetation efforts continue to meet the objectives of stabilization and productivity along the ROW. These efforts would continue until erosion control, weed management, and revegetation is deemed successful by the BLM/landowner or until the BLM/landowner determines that continued efforts are not necessary.

Teton would implement stability and erosion control practices for all temporary and permanent reclamation in accordance with the SWPPP.

Reclaimed areas within the project area would be considered stable if there are no large rills or gullies, no substantial soil movement, no headcutting in drainages, no slope instability, no subsidence, and no slumping that can be attributed to construction, operations, or maintenance. Teton would be responsible for annual inspections for the following types of problems as long as the ROW grant(s) are still active:

- soil movement where the depth of recent deposits around obstacles is greater than 0.5 inch;
- surface litter movements where more than 25% of surface litter has been transported and redeposited against obstacles downslope;
- development of rills greater than 3 inches deep at intervals of 10 ft or less;
- gully formation at intervals of 200 ft or less; and
- channel erosion where more than 25% of the channel bed and walls show active erosion, gully formation, and/or headcutting or bank failure.

If these features are discovered during reclamation inspections and their existence can be attributed to construction, O&M, or decommissioning operations of the WMWE Project, Teton would, in consultation with BLM, implement appropriate remedial action until reclamation objectives are met.

Reclaimed areas would also be monitored by Teton for as long as the ROW grant(s) are still active for invasive nonnative weeds annually in late spring. If any noxious weed species are discovered on project-related reclamation, Teton would, in cooperation with the landowners and Sweetwater County officials, implement appropriate weed control measures.

2.5.4 Transportation

Where possible, the design of access and turbine string roads would utilize the flow of the natural contours and the cut and fill required for the access road would be balanced to minimize the amount of materials that would need to be brought onto or removed from the site.

During the life of the project, Teton would be responsible for maintenance on all project roads including those roads described in the Sweetwater County Road Maintenance Agreement as approved by County Board of County Commissioners. The Sweetwater County Road Agreement would outline the procedures and responsibilities for use and maintenance of utilized county roads. This Agreement would address all on and off project site county roads utilized by Teton and their contractors including transportation planning, construction/alteration, dust control, access, drainage, parking, signage, traffic control, maintenance, snow removal, road use, compliance, phasing, bonding and other road related issues. Teton would obtain all required approvals from the Wyoming Department of Transportation, including possible improvements to the intersection of the County Road 4-14 and U.S. Highway 191.

During the life of the project, Teton or its subcontractors would not access County Road

4-53 through the City of Green River to move large equipment or components or resources.

Teton would post warning signs along the access roads, including County Road 53 and Fourteenmile Road. Signage would include speed limit signs and signs informing the public of construction activities, recommending the public proceed with caution and watch for large vehicles and equipment. The content and location of such signs would be coordinated with the Wyoming Department of Transportation and Sweetwater County officials. The existing access roads (County Road 53 and Fourteenmile Road) would remain open at all times except when they are physically and temporarily blocked by the movement of project-related vehicles or equipment. Such road closures would be coordinated with Sweetwater County officials.

Vehicle traffic would be confined within the site boundary for safety, fire control, and the control of invasive nonnative species. Signs on the public roads utilized by these trucks would be erected to warn the public of the increased construction traffic, and all signage would be coordinated through the Wyoming Department of Transportation and the Sweetwater County Road and Bridge Department. In addition, all vehicles would be washed down at a location approved by the BLM for the control of invasive nonnative species prior to entering the site.

Road maintenance within the WMWE project area would be performed by Teton on an as-needed basis. Regular snow removal is expected to be required during the winter months to maintain access to the turbines and substation. Teton would also plow openings in the snow berms to allow big game species to move off of and away from road activities.

Teton would also obtain all required permits associated with the proposed project from appropriate federal, state, and local government agencies.

2.5.5 Wildlife

2.5.5.1 Raptors

To avoid impacts on the nesting raptors, Teton has adopted established seasonal restriction areas in accordance with BLM policy (BLM 1997). Teton would comply with these buffers during the construction and O&M phases of this project. Table 2.9 lists the seasonal restrictions and no surface occupancy buffers. In addition, all electrical systems and components would be designed, constructed, operated, and maintained in conformance with the National Electrical Safety Code and other restrictions, and no surface occupancy buffers for various raptor species are expected to occur in the project area. Teton would not place any wind turbines within the designated applicable codes and standards, as well as *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (Avian Power Line Interaction Committee 2006). Teton would not place any wind turbines within 50 m (164 ft) of the eastern edge of White Mountain.

2.5.5.2 Passerine and Other Small Birds

To minimize potential impacts to passerine and other small birds, the removal of natural vegetation (grassland and shrub communities) would be minimized to the extent possible during construction. In addition, the movement of personnel and equipment on-site would be limited to the extent possible to construction areas to avoid inadvertent compaction of vegetation. To minimize potential impacts to birds flying at night, Teton would utilize flashing lights on any wind turbines or met towers that require FAA lighting.

In order to minimize potential impacts to avian species, wind turbines would be setback at least 50 m (164 ft) from the east edge of White Mountain and at least 50 m (164 ft) from drainages within the project area. In addition, to the extent possible, surface disturbance would be minimized during the nesting season to avoid taking of nests, eggs, or individuals.

Table 2.9 Season Restrictions for Surface Disturbance Activities.[1]

Species	Construction Restriction	Seasonal Restriction Area	No Surface Occupancy Buffer
Golden eagle nest	February 1 - July 31	Within 0.5-mi radius from active nest	Within 600 m of active nests
Ferruginous hawk nest	February 1 - July 31	Within 1.0-mi radius from active nest	Within 400 m of active nests
Burrowing owl nest	April 1 - September 10	Within 0.5-mi radius from active nest	Within 250 m of active nests
Other raptors	February 1 - July 31	Within 0.5-mi radius from active nest	Within 250 m of active nests

[1] BLM RMP for the Rock Spring Field Office (BLM 1997).

2.5.5.3 Bats

During construction, to minimize potential impacts to bats, wind turbines would be setback at least 50 m (164 ft) from drainages within the project area. To minimize potential impacts to bats during the O&M phase of the project, Teton would work with the BLM to develop and implement an operational protocol to modify the cut-in speeds of wind turbines within the WMWE project area. These protocols would be implemented during a portion of evening and night time hours of operations during the peak bat migration season. This protocol would be developed based on the preliminary results of the Arnett et al. (2009) study that documented reduced bat fatalities by changing the cut-in speed of wind turbines. In this study, the experimental cut-in speeds ranged between 11.1 mph (5.0 m/s) and 14.5 mph (6.5 m/s) with a corresponding nightly reduction in bat fatalities from 53 to 87%. The results of on-site post-construction avian and bat mortalities would be used by Teton and the BLM to fine tune the cut-in speed protocol.

2.5.5.4 Pygmy Rabbits

To mitigate potential impacts to pygmy rabbits, the removal of natural vegetation (grassland and shrub communities) would be minimized to the extent possible during construction. In addition, the movement of personnel and equipment on-site would be limited to the extent possible to construction areas to avoid inadvertent compaction of soil. In addition, presence/ absence surveys for pygmy rabbits and their associated habitat would be conducted prior to vegetation removal and construction. If pygmy rabbits are found, Teton would work with the BLM to modify turbine placement to avoid habitat to the extent possible.

2.5.5.5 Mule Deer, Pronghorn Antelope, and Elk

The loss of habitat (i.e., disturbance) would be minimized to the extent possible. Indirect effects that could cause degradation of remaining habitat would be minimized by controlling activities that could result in the spread of invasive nonnative species, avoiding impacts to areas not associated with the project, and revegetating areas with native vegetation.

A small portion (519 acres) of the WMWE project area is located in crucial winter/yearlong range for elk. Based on the layout for the Proposed Action, approximately 80.0 acres of initial disturbance and 33.9 acres of life-of-project disturbance would occur in crucial elk winter/yearlong range located on privately owned land. In addition, approximately 1,011 acres of the WMWE project area occurs in pronghorn antelope habitat the WGFD has designated as crucial winter/yearlong range. In order to minimize potential impacts to elk and pronghorn antelope in these areas, Teton would comply with seasonal restrictions and would not conduct any project-related construction

activities within elk and antelope crucial/yearlong range from November 15 to April 30. However, Teton may request an exception from the seasonal restriction stipulation from the landowner and the BLM, and the request would be evaluated on a case-by-case basis, and the landowner and BLM would inform Teton if the exception would be granted.

Construction and O&M personnel would be informed that big game occurs in the project area. They are not allowed to haze or harass the animals, and they should minimize any direct disturbance to the animal whenever possible. Any incidents of poaching would be immediately reported to the WGFD.

2.5.5.6 Greater Sage-grouse

Construction and O&M personnel would be informed that greater sage-grouse occur in the project area. They are not allowed to haze or harass greater sage-grouse, and they should minimize any direct disturbance to the greater sage-grouse whenever possible.

2.5.5.7 Cedar Rim Thistle

To mitigate potential impacts to cedar rim thistle, Teton would conduct surveys for cedar rim thistle and their associated habitat prior to vegetation removal and construction. If any cedar rim thistle is found, Teton would work with the BLM to modify turbine/road placement to avoid impacts to these plants.

2.5.5.8 Colorado River Endangered Fish Species

In order to mitigate potential impacts of the project on endangered fish species found in the upper Colorado River Basin, Teton would provide a financial contribution to the Colorado River Recovery Program as determined by the USFWS for water depletion exceeding 100 acre-ft.

2.5.5.9 Midget-faded Rattlesnake and Other Reptiles and Amphibians

Teton would conduct surveys in rock outcroppings for rattlesnake dens and other reptiles. These surveys would be conducted in the spring when temperatures are conducive to locate rattlesnakes. If den(s) and/or foraging areas are found, Teton would work with the BLM and WGFD to determine the appropriate mitigation measures (e.g., road and turbine placement) to eliminate or reduce these impacts. Any observations of amphibians would be noted and appropriate mitigation determined.

2.5.5.10 Wildlife Monitoring

During the construction and decommissioning of the project, active raptor nests would be visually monitored on a weekly basis to determine which nests could potentially be impacted during the construction period. Teton would coordinate with the BLM Authorized Officer or landowner to ensure that potentially impacted nests are being monitored and that the seasonal restrictions are being enforced or if a waiver is appropriate.

Presence/absence surveys for mountain plover and pygmy rabbits and their habitat would be conducted prior to vegetation clearing and construction.

During the construction phase, Teton would visually monitor the project area on a weekly basis, at a minimum, to ensure that construction sites, staging areas, roadways, and associated activities potentially impacting habitat are limited to areas agreed to prior to construction. Irregularities would be reported immediately to project management and corrective actions would be taken.

Teton would conduct a 3-year post-construction avian and bat mortality study for the project unless sufficient evidence determines that continued monitoring is unnecessary. This study would collect data on the number of avian species (including birds and bats) that have been struck by wind turbines in the project area. The specific protocols to be used in this study would be developed in cooperation with the BLM, the WGFD, and the USFWS.

To evaluate spatial distribution and potential effects of turbine construction on big game (elk,

mule deer, pronghorn, and greater sage-grouse), pellet count distribution surveys will be conducted. Surveys will be conducted preconstruction, during construction, and post-construction. The surveys will consist of the following:

- Six survey plots per proposed turbine location will be established next to a maximum of 35 proposed wind turbines (210 plots) that will be located on BLM-administered lands.
- Survey plots will be established at random distances from 10 to 80 m (33 to 265 ft) from each proposed turbine along a transect line.
- For reference (or control) data, six plots will also be established along transect lines at an equal number of random points located in an area of similar topography and vegetation as the turbine survey plots (a maximum of 210 plots). The reference survey plots will be located at least 1 mi from the nearest turbine in an area defined by the assigned BLM RSFO wildlife biologist on BLM-administered lands and would be surveyed at the same time as the turbine plots are surveyed.
- Each plot will be marked with a 12-inch piece of rebar, and the location will be recorded with a global positioning system unit.
- All pellet groups within a 2-m (7-ft) radius of the center of the survey plot will be identified by species, counted, and then removed from the survey plot area.
- Surveys will be conducted during the spring and fall. The spring count surveys will document the previous winter's use, and the fall surveys will evaluate the previous summer's use.
- Preconstruction surveys will be conducted during the fall of 2009 and the spring of 2010.
- Construction surveys will be conducted during the fall of 2010 and the spring of 2011.
- Post-construction surveys will be conducted in the spring of 2015 and the fall of 2015. During the fall of 2014, plots will be visited, and all pellet groups will be cleared off; no data will be collected.

Teton would report all incidents of poaching in the project area immediately to the WGFD.

2.5.6 Wild Horses

Despite the loss of a limited amount of grazing habitat and noise, wild horses are expected to adjust to the increased traffic during construction, as well as the presence of the wind turbines and associated structures and facilities. It is possible that wild horses could be involved in an accident with construction vehicles or harmed by becoming trapped in open trenches or excavations. Speed limit signs would be posted, and construction and O&M personnel would be informed that wild horses occur in the project area. They are not allowed to haze or harass wild horses, and they should minimize any direct disturbance to the wild horses whenever possible. Should an accident occur, the BLM Authorized Officer would be notified immediately. To facilitate wild horse roundups and/or surveys, the BLM would coordinate with Teton, who would agree to shut wind turbines down for a maximum of 4-6 hours at any one time for a course of 2 days.

2.5.7 Livestock

Teton would coordinate with grazing permittees during each phase of development to ensure that permittees are aware of construction activities. Initial mitigation would be in the form of revegetation efforts applied to areas disturbed by construction activities. Re-establishment of desirable native vegetation is expected to take several years; however, Teton expects native plant communities to become re-established, and there would be minimal long-term impacts to livestock. Construction and O&M personnel would be informed that they are working in an area of open livestock grazing and to drive the posted speed limit and to watch for livestock and wildlife that may be on the roads. In addition, open trenches or excavations that are left unattended overnight would be fenced for safety, and existing cattle guards would be left in place. If livestock are involved in an accident involving Teton vehicles, the responsible party would be liable to provide appropriate compensation to the livestock owner.

If necessary, Teton would place livestock crossing signs, where appropriate.

2.5.8 Control of Invasive Nonnative Species

The control of invasive nonnative species is difficult, and some weeds can enter the project area on equipment and vehicles, while others may spread from distant areas by spores blowing onto the site in the wind. Teton would design and build the project so that the least amount of ground disturbance occurs, thereby exposing the least amount of soil possible. Large construction equipment that travels off project roads would be cleaned prior to entering the site. Teton would work with the BLM, landowners, other county or state agencies as appropriate, and the Sweetwater County Board of Weed and Pest Control to establish a weed control and monitoring program for the life of the project. This may entail spot spraying with an approved herbicide along disturbed areas for invasive nonnative species.

Teton would also use only certified-weed-free reclamation materials.

2.5.9 Air Quality and Fugitive Dust Control

During the construction, O&M, and decommissioning phases of this project, some localized increases in dust levels would be unavoidable. To minimize these levels, Teton would use water or other dust control measures on heavily used project-related roads and other construction areas should dust become a problem. Teton would coordinate with Sweetwater County and Sweetwater County Conservation District officials on dust control measures on county roads and agency staff or landowners on project roads. Traffic speed would also be held to appropriate levels. In addition, disturbed areas would be revegetated as soon as possible following disturbance, and engines would be maintained in accordance with manufacturer recommendations to minimize emissions.

2.5.10 Noise

The largest source of noise during construction and decommission phases of the operation would be diesel-powered equipment. Therefore, all equipment would be operated with the manufacturer's suggested noise control systems (e.g., mufflers and noise dampening materials), and all construction operations would take place during daylight hours. Additional information concerning noise during the O&M phase is addressed in Section 4.5.1.2 of this EA.

2.5.11 Water Resource Protection

Before the construction and decommissioning phases of this project, an SWPPP would be prepared for the project, and the construction contractor would implement the appropriate BMPs for each specific situation. The use of appropriate BMPs would reduce the amount of sediment being produced and would minimize the amount of sediment being released into the environment, thereby mitigating impacts to water resources. A detailed description of the specific BMPs would be presented in the SWPPP and would be submitted to Sweetwater County and BLM officials with the construction permit application. A SPCCP is required under federal regulation, and Teton would prepare and implement a SPCCP that would be used to control the release of fuels, oil, or other fluids, and BMPs are included in the SWPPP and will not be repeated here. Any spills would be reported to the appropriate federal, state, and/or county agencies.

A SWPPP would be prepared for the construction and O&M phase of this project, and O&M personnel would implement the appropriate BMPs for each specific situation. The use of appropriate BMPs would reduce the amount of sediment being produced and would minimize the amount of sediment being released into the environment, thereby mitigating impacts to water resources. This includes design and installation of culverts, rip rap, and catchment basins where appropriate. An SPCCP would be required during the construction and O&M phases of this project, and Teton would have an SPCCP prepared in accordance with applicable federal regulations and guidelines. The BMPs in the SPCCP would control the release of fuels or oil.

To minimize impacts to surface water drainages, wind turbines would be set back at least 50 m (164 ft) from major drainages within the project area.

2.5.12 Fire Prevention Plan

The project HSE Plan would provide a list of emergency contacts and protocols in case of a wildfire. During the construction, O&M, and decommissioning phases of this project, fire extinguishers, 5-gallon backpack hand water pumps, and fire-fighting hand tools such as shovels, Pulaskis, or McLeods would be located in the base of each wind turbine tower, in each project construction vehicle, in the substation control building, and in the O&M building. Personnel performing "hot work" such as welding would be required to have the same fire-fighting equipment listed above. The water tank truck used for dust abatement would be left full of water and fuel at a location designated by the Teton project manager so that it is in a condition where it could be readily used in case of a fire. Smoking and off-road parking would be restricted to designated areas. Signs would be posted in strategic locations on-site to remind personnel of the emergency response procedures, liabilities, and telephone contact numbers for fire emergencies.

Mitigation would depend on specific fire conditions and other special circumstances prevailing in the project area. If necessary, site-specific actions could include, but are not be limited to, actions such as the following:

- establishment of spotter positions on key locations within the project area;
- prepositioning fire suppression capabilities (e.g., contracted engine crews) under high or extreme fire conditions;
- restriction of certain on-site high risk activities (e.g., welding) or suspension of all construction activities under high or extreme fire conditions;
- avoidance of sensitive sites and/or those having high fire potential when extreme fire conditions occur; and
- travel restrictions for contractor personnel when fire dangers are high.

Determinations of need for additional protection measures would be made by the Teton project manager in cooperation with the BLM Authorized Officer.

2.5.13 Cultural Resources

Prior to ground-disturbing activities, Teton would contract to have a qualified archaeological firm conduct a Class III cultural resource inventory of areas to be disturbed or additional ROW areas located on BLM-administered, privately owned, and state-owned land that had not been previously inventoried. If a cultural resource site considered eligible for or already listed on the National Register of Historic Places (NRHP) is identified, Teton would utilize avoidance as the preferred method of mitigating potential adverse effects to the property.

Teton would mitigate adverse effects to cultural/historical properties that cannot be avoided by the preparation and implementation of a BLM/State Historic Preservation Office (SHPO)-approved Data Recovery Plan and/or Programmatic Agreement (PA) before authorizing surface disturbing activities. Teton, the BLM, SHPO, and other interested parties would complete the Section 106 process and appropriate mitigation measures would be implemented as part of the PA.

Construction and O&M personnel would be instructed that they are not allowed to search for cultural resources (i.e., arrowhead hunting) while working on this project. If any cultural resources are discovered on BLM-administered, privately owned, or state-owned lands during construction, O&M, or decommissioning operations, all construction activities within the immediate vicinity would be suspended, and the BLM Authorized Officer would be immediately notified. Work in the area would not resume until a Notice to Proceed is issued by the BLM.

2.5.14 Paleontology

If required by the BLM, an on-the-ground survey of areas to be impacted would be performed by a qualified paleontologist holding a BLM

Paleontological Resources Use Permit prior to approval of any surface disturbing activities. The need for an on-the-ground survey could be waived by the BLM if it is determined that the proposed activities would not impact important geologic outcrop areas, the area has previously been surveyed for paleontological resources, or the area has been previously disturbed. If a survey is conducted and significant fossils are discovered during the survey, BLM may require the proponent to alter the construction plan to avoid disturbing the locality or mitigate the site by either collecting a sample of the fossil material or fully excavating the locality. The BLM may require, based on the paleontologist's recommendation, that construction activities be monitored during surface disturbances for the presence of previously undocumented scientifically important fossils.

If paleontological resources are discovered during construction operations, the find would be reported to the BLM Authorized Officer immediately and construction operations would be suspended within 250 ft of said find. An evaluation of the paleontological discovery would be made by a BLM-approved professional paleontologist within 5 working days, weather permitting, to determine the appropriate action(s) to prevent the potential loss of any significant paleontological value. Operations within 250 ft of such discovery would not be resumed until written authorization to proceed is issued by the BLM Authorized Officer. Teton would bear the cost of any required paleontological appraisals, surface collection of fossils, or salvage of any large conspicuous fossils or important scientific interest discovered during the operations.

Teton would inform all field personnel not to search for, scavenge, or remove any paleontological resources found while working in the WMWE project area.

2.5.15 Visual Resources

To minimize visual impacts, Teton would adopt the following visual mitigation measures:

- The design of the WMWE Project would provide visual order and unity among clusters of turbines (visual units) to avoid visual disruptions and perceived "disorder, disarray, or clutter."
- To the extent possible given the terrain of a site, Teton would create clusters or groupings of wind turbines when placed in large numbers, avoid a cluttering effect by separating otherwise overly long lines of turbines or large arrays, and insert breaks or open zones to create distinct visual units or groups of turbines.
- Teton would create visual uniformity in the shape, color, and size of rotor blades, nacelles, and towers.
- Teton would use tubular towers. Tubular towers present a simpler profile and less complex surface characteristics and reflective/shading properties.
- Components of the wind turbines would be in proper proportion to one another. Nacelles and towers would be planned to form an aesthetic unit and would be combined with particular sizes and shapes in mind to achieve an aesthetic balance between the rotor, nacelle, and tower.
- Color selection for turbines would be applied uniformly to tower, nacelle, and rotor in accordance with FAA requirements.
- The wind turbines would use nonreflective coatings to reduce reflection and glare.
- The O&M building would be painted before or immediately after installation with a green shale color.
- Uncoated galvanized metallic surfaces would be avoided whenever possible because they would create a stronger visual contrast, particularly as they oxidize and darken.
- Commercial messages on turbines and towers would be prohibited.
- The site design would be integrated with the existing landscape by using as many of the existing roads as possible.
- The operator would bury power collection cables or lines on the site in a manner that minimizes additional surface disturbance.
- Site design would minimize security lights, and any security lights located at the O&M building would be turned off except when activated by motion detectors. All lighting fixtures shall be down focused and full cut-in design.

Minimum wattage should be selected for the luminaries.

- Teton would minimize ground disturbance and control erosion by avoiding steep slopes and by minimizing the amount of construction and ground clearing needed for roads, staging areas, and turbine pads.
- Dust suppression techniques would be employed where and when required to minimize impacts of vehicular and pedestrian traffic, construction, and wind on exposed surface soils.
- Disturbed areas would be regraded as soon as possible to their original contour and revegetated immediately after, or as contemporaneously as possible with construction. Teton would be prompt to limit erosion and to accelerate restoring the preconstruction color and texture of the landscape.
- Teton would maintain the WMWE Project during operation as inoperative or incomplete turbines cause the misperception to viewers that "wind power does not work" or that it is unreliable. Inoperative turbines would be completely repaired, replaced, or removed. Except during specific maintenance operations, nacelle covers and rotor nose cones would always be in place and undamaged.
- The WMWE Project would evidence environmental care, which would also reinforce the expectation and impression of good management for benign or clean power. Nacelles and towers would also be kept clean to remove any spilled or leaking fluids and the dirt and dust that would accumulate.
- Facilities would be kept clean of debris, "fugitive" trash or waste, and graffiti.
- Scrap heaps and material dumps would be prohibited and prevented.
- The material stored at the O&M building would be kept to an absolute minimum. Any surplus, broken, or disused materials and equipment would be maintained in an orderly manner.
- Teton would prepare a decommissioning plan, and it would include the removal of all turbines and ancillary structures and reclamation and revegetation of the site.

2.5.16 Bonding

Teton would provide appropriate reclamation bonding for each project component (e.g. roads, wind turbine, substation, O&M building, etc). The amount of the bond on BLM-administered public lands would be determined in accordance with BLM IM 2009-043 or subsequent instruction memoranda. Bonding on State of Wyoming lands would be determined in accordance with an approved wind energy lease agreement issued by the Wyoming Office of State Lands & Investment. Bonding on private lands would be determined by the land owner. Sweetwater County wind farm zoning regulations also require reclamation bonding for wind energy projects; however, Teton would provide acceptable evidence demonstrating that an adequate reclamation bond has been approved or accepted by the specific landowners. Therefore, separate bonding for Sweetwater County would not be required. The amount of each bond would include the cost of removal and surface restoration obligations.

2.6 ALTERNATIVE A - DEVELOPMENT ONLY ON PRIVATE LANDS

Under Alternative A, up to 170 wind turbines could be constructed on private lands or State of Wyoming lands. No wind turbines would be constructed on public lands administered by the BLM (Figure 2.25). The BLM would authorize as needed, ROWs for access roads, and collector lines that would have to cross BLM-administered land to allow the project to be feasible. Details of how this alternative would be implemented during the construction, O&M, and decommissioning phases would be identical to those described in the Proposed Action. Table 2.10 presents the acres of potential disturbance associated with Alternative A.

Applicant proposed design features outlined in Section 2.5 would apply with the exception of required turbine bonding on public land since no turbines would be constructed on public lands. Other design features could be modified in order to recognize that construction of turbines would not occur on public land or to meet the needs of the landowner.

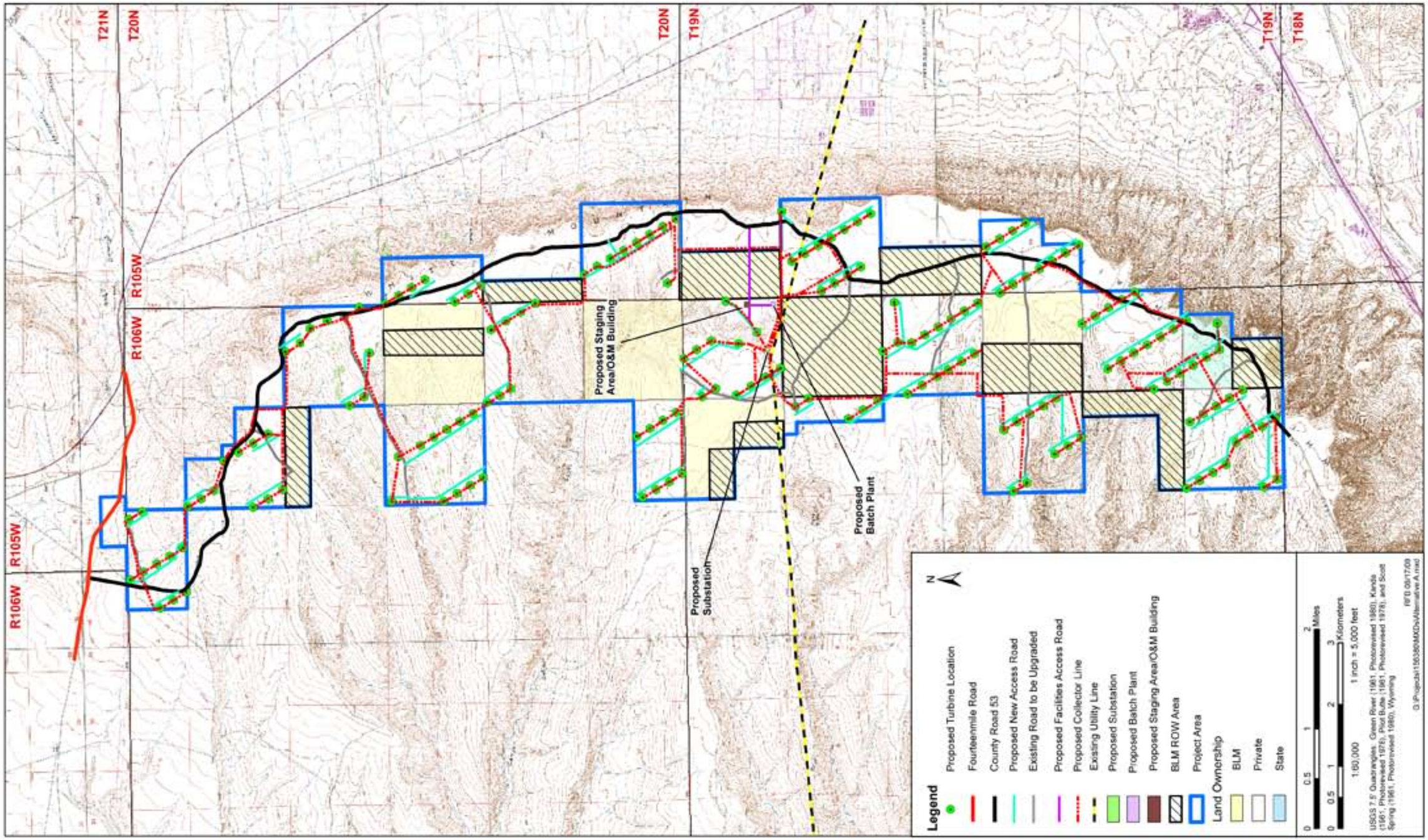

Figure 2.25 Layout of WMWE Project, Alternative A.

Table 2.10 Estimated Acres of Surface Disturbance Within the WMWE Project Area Under Alternative A.

Disturbance Type	Initial Disturbance (acres)	Life-of-project Disturbance (acres)
Corridor access roads[1]	244.1	117.6
Staging area and O&M building	2.0	0.8
Substation and transmission line	11.0	0.3
Turbine pads[2]	124.9	25.0
Collection line trenches[3]	273.2	0.0
Concrete batch plant	2.0	0.0
Total	657.2	143.7

[1] Initial disturbance: 37.3 mi x 54 ft = 244.1 acres; life-of-project disturbance: 37.3 mi x 26 ft = 117.6 acres.
[2] Initial disturbance: 160 ft x 200 ft x 170 turbines = 124.9 acres; life-of-project disturbance: 80 ft x 80 ft x 170 turbines = 25.0 acres.
[3] Initial disturbance: 49.0 mi x 46 ft = 273.2 acres; life-of-project disturbance: 0.0 acres, all temporary construction-related disturbance would be reclaimed immediately.

2.7 NO ACTION ALTERNATIVE

Under the No Action Alternative, the proposed wind energy facility would not be authorized or approved. No ground would be disturbed, and no impacts to the existing physical or biological environment would take place beyond those that already exist.

The analysis of a No Action Alternative provides a benchmark, enabling decision-makers to compare the magnitude of environmental effects of each action alternative. Under the No Action Alternative, the BLM would deny the request for a ROW grant for the proposed wind energy facility or components (e.g., buried cables, access roads) on public lands, thereby preventing most, if not all, development on the adjacent private and state lands.

2.8 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

2.8.1 Alternative Wind Energy Facility Site

Lands outside of the proposed project area were considered for development of the wind energy facility. However, the other sites were eliminated because wind resources were not as favorable as they were within the existing WMWE project area or public lands already have testing and monitoring ROWs held by other entities that preclude consideration by Teton. Therefore, this alternative was eliminated from detailed consideration in this EA.

2.8.2 Place More Wind Turbines Within the WMWE Project Area

Teton has considered the placement of more wind turbines within the WMWE project area; however, based on the size of wind turbines to be used for this project, the spacing required for the wind turbines, topography, and the available wind resources, Teton has designed the maximum number of wind turbines within the project area. Therefore, Teton is not interested in placing any additional wind turbines within the project area, and this alternative was eliminated from further consideration in this EA.

3.0 AFFECTED ENVIRONMENT

The proposed WMWE project area is located in southwestern Sweetwater County approximately 3.0 mi northwest of the town of Rock Springs, Wyoming (refer to Figure 1.1). The project area is located on the eastern edge of White Mountain, a prominent local mesa that rises approximately 1,000 ft above the elevation of Rock Springs. County Road 53 bisects the project area from north to south. Vegetation consists primarily of shortgrass and sagebrush-scrub habitat and is uniform throughout. The escarpment of the east side of White Mountain (outside the project area) is steep with eroded gullies and dense pockets of buckbrush and juniper.

This chapter describes the existing conditions of the physical, biological, cultural, and socioeconomic resources. The resources addressed in this chapter were identified during the internal and public scoping processes as having the potential to be affected by project-related activities.

3.1 AIR QUALITY AND CLIMATE

3.1.1 Air Quality

The impact assessment areas (IAA) for air quality is the project boundary plus a 31-mi buffer. A total of 62,726 acres (2.50%) of the 2,505,739-acre IAA has been disturbed, primarily by roads and cities.

The WDEQ/AQD has been authorized by the EPA to enforce national ambient air quality standards set forth in the *Clean Air Act*, as amended (42 U.S.C. §7401 et seq.) through Article 2 of the *Wyoming Environmental Quality Act* (Wyoming Statute [W.S.] 35-11-201 et seq.) and the Wyoming State Implementation Plan. The Wyoming and National Ambient Air Quality Standards (WAAQS and NAAQS) set upper limits for specific air pollutant concentrations at all locations where the public has access, expressed in micrograms per cubic meter ($\mu g/m^3$). Relevant WAAQS and NAAQS are presented in Table 3.1.

Relevant WAAQS and NAAQS are presented in Table 3.1. Wyoming Air Quality Standards and Regulations (WAQS&R) define ambient air as "that portion of the atmosphere, external to buildings, to which the general public has access" (WDEQ/AQD 2000a).

No site-specific air monitoring efforts have been conducted in the project area, and the proposed facility area is located in a rural setting with minimal industrial sources or vehicular traffic emission contributions to the airshed.

While there is no site-specific air quality monitoring within the project area, air quality monitoring has been conducted in Rock Springs (approximately 3.0 mi southeast of the project area). For 2008, the annual mean for $PM_{2.5}$ was 7.18 $\mu g/m^3$ and the annual mean for PM_{10} was 25$\mu g/m^3$.

3.1.2 Climate

The IAA is located in the ecoregion described as the Intermountain semi-desert province (U.S. Forest Service 2009). This province covers the plains and tablelands of the Columbia-Snake River Plateaus and Wyoming Basin. The higher overall elevation of the Wyoming Basin gives it slightly lower average temperatures and precipitation than on others portions of the province. Winters in southwest Wyoming are cold, and summers are short and cool. The climate of the Wyoming Basin is semiarid and cool. The annual mean temperature for Rock Springs is 42.6F (1971-2000) and the average annual precipitation in Rock Spring is 9.42 inches (1971-2000) (Curtis and Grimes 2004). Precipitation is fairly evenly distributed throughout the year, ranging from an average monthly low of 0.52 inches in February to an average monthly high of 1.36 inches in May (Curtis and Grimes 2004) with an average growing season of approximately 112 days (Curtis and Grimes 2004). Winds average approximately 12.1 mph and are primarily from the west-southwest (Martner 1986).

Table 3.1 Selected National, Colorado, and Wyoming Air Quality Standards (μg/m^3).

Pollutant/Averaging Time	NAAQS[1]	CAAQS[2]	WAAQS[3]	PSD Class I Increment[4]	PSD Class II Increment[4]
Carbon Monoxide (CO)					
1-hour[5]	40,000	40,000	40,000	--[6]	--[6]
8-hour[5]	10,000	10,000	10,000	--	--
Nitrogen Dioxide (NO_2)					
Annual[7]	100	100	100	2.5	25
Ozone					
1-hour[5]	--[8]	235	--[9]	--[6]	--[6]
8-hour[10]	157	157	157	--	--
Particulate Matter at Less than 10 Microns (PM_{10})					
24-hour[5]	150	150	150	8	30
Annual[7]	--[8]	50	50	4	17
Particulate Matter at Less than 2.5 Microns ($PM_{2.5}$)					
24-hour[11]	35	35	35	--[6]	--[6]
Annual[7]	15	15	15	--	--
Sulfur Dioxide (SO_2)					
3-hour[5]	1,300[12]	700	1,300	25	512
24-hour[5]	365	365	260	5	91
Annual[4]	80	60	60	2	20

1 NAAQS = National Ambient Air Quality Standards (adapted from 40 CFR 50.5-50.12). Primary standard unless otherwise noted. National Primary Standards establish the level of air quality necessary to protect public health from any known or anticipated effects of a pollutant, allowing a margin of safety to protect sensitive members of the population.

2 CAAQS = Colorado Ambient Air Quality Standards.

3 WAAQS = Wyoming Ambient Air Quality Standard.

4 The prevention of significant deterioration (PSD) demonstrations serve information purposes only and do not constitute a regulatory PSD increment consumption analysis.

5 No more than one exceedance per year.

6 No PSD increments have been established for this pollutant.

7 Annual arithmetic mean.

8 The NAAQS for this averaging time for this pollutant has been revoked by EPA.

9 There is no 1-hour WAAQS established for ozone.

10 Average of annual fourth-highest daily maximum 8-hour average.

11 An area is in compliance with the standard if the 98th percentile of 24-hour $PM_{2.5}$ concentrations in a year, averaged over 3 years, is less than or equal to the level of the standard.

12 Secondary standard. National Secondary Standards establish the level of air quality to protect the public welfare by preventing injury to agricultural crops and livestock deterioration of materials and property and adverse impacts to the environment.

3.1.3 Global Climate Change

Ongoing scientific research has identified the potential impacts of "greenhouse gas" (GHG) emissions (including carbon dioxide, CO_2; methane; nitrous oxide; water vapor; and several trace gasses) on global climate. Through complex interactions on a regional and global scale, these GHG emissions are thought to cause a net warming effect of the atmosphere (making surface temperatures suitable for life on earth), primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), recent industrialization and burning of fossil carbon sources are thought to have caused CO_2 concentrations to increase dramatically, and likely to contribute to overall climatic changes, typically referred to as global warming. Increasing CO_2 concentrations also lead to preferential fertilization and growth of specific plant species.

The assessment of GHG emissions and climate change is in its formative phase; therefore, it is not yet possible to know with confidence the net impact to global climate. However, the Intergovernmental Panel on Climate Change (2007) recently concluded that "warming of the climate system is unequivocal" and "most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic [man-made] greenhouse gas concentrations."

The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts. However, potential impacts to air quality due to climate change are likely to be varied. For example, if global climate change results in a warmer and drier climate, increased particulate matter impacts could occur due to increased windblown dust from drier and less stable soils. Cool season plant species' spatial ranges are predicted to move north and to higher elevations, and extinction of endemic threatened/endangered plants may be accelerated. This could be due to loss of habitat, or due to competition from other species whose ranges may shift northward, the population of some animal species may be reduced. Less snow at lower elevations could likely impact the timing and quantity of snowmelt, which, in turn, could impact aquatic species.

3.2 CULTURAL RESOURCES (INCLUDING NATIVE AMERICAN CONCERNS)

The IAA for cultural resources is the project boundary plus a 20-mi zone. A total of 38,289 acres (3.26%) of the 1,175,515-acre IAA has been disturbed, primarily by cities.

3.2.1 Cultural Resources

Cultural resources are the nonrenewable physical remains of past human activity and are protected under the Antiquities Act (1906), Section 106 of the *National Historic Preservation Act* (1966, as amended) (NHPA), the *Archaeological Resources Protection Act* (1979, as amended), the *Native American Graves Protection and Repatriation Act* (1990), and other statutes. The evaluation of a cultural resource's significance is based on criteria set forth in 36 CFR 60.4.

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

A) That are associated with events that have made a significant contribution to the broad patterns of our history; or
B) That are associated with the lives of persons significant in our past; or
C) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
D) That has yielded or may be likely to yield information important in prehistory or history.

A cultural resource may be eligible for inclusion in the NRHP if it meets one of the four criteria outlined above and retains sufficient integrity to convey its significance.

Archaeological investigations in the Green River Basin indicate that human activity has occurred across the landscape over the past 12,000 years, beginning during the Paleoindian period and continuing to the present. Throughout the prehistoric past, mobile hunters and gatherers traversed the area and exploited a wide variety of natural resources (Frison 1991). Historically, this portion of the Green River Basin was utilized as a corridor for early transportation routes, including emigrant trails, regional stage/freight roads, railroads, and communication networks. Historic settlement of the area occurred in association with these routes and was primarily fostered by natural resource extraction and ranching.

The area of potential effect (APE) for cultural resources consists of the block area encompassing the proposed project area to address direct effects plus a 20-mi zone around the project area to address visual effects.

3.2.1.1 Cultural Resources Within the APE for Direct Effects

A file search was conducted at the SHPO, Cultural Records Office, on February 9, 2009 (Wyoming SHPO 2009). The database review encompassed all the sections within the proposed project area, including Sections 6, 7, 18, and 19, T19N, R105W; Sections 1, 2, 11-13, 23-26, 35, and 36, T19N, R106W; Sections 19, 30, and 31, T20N, R105W; Sections 3, 11, 13, 14, 23-25, 35, and 36, T20N, R106W; and Section 31, T21N, R106W. According to the review, 21 projects have been completed within and adjacent to the current project area, and 19 sites have been discovered as a result.

Of the 21 projects, 12 were linear inventories for five seismic lines, five pipelines, one access road, and one powerline; five were block inventories completed for three miscellaneous projects, one range improvement project, and one well pad; and four were block/linear inventories conducted for two well/access road projects, one cell tower/ power line/access road project, and one miscellaneous project. Of the total 21 projects, only two were conducted prior to 1980 and do not reflect current standards for archaeological inventories.

In addition to the 21 projects identified during the review, a Class III inventory of approximately 2,650 acres of the total 13,165-acre WMWE project area was conducted in October and November 2008. The inventoried area consisted of 11 BLM-managed parcels (development ROW), representing approximately 20% of the total project area, and included some areas that were previously inventoried during the aforementioned projects. On March 10 and June 15, 2009, the BLM sent the reports (Fleming et al. 2009a and 2009b) to the SHPO for review and concurrence. A SHPO concurrence letter dated July 14, 2009, was received by the BLM, and the project was recently accessioned into the SHPO database.

Of the 19 sites, 15 were recorded during the 21 previous projects identified in the database, and four were recorded during the recent Class III inventory. The 19 sites consist of 15 prehistoric sites, three historic sites, and one multicomponent site. The 15 prehistoric sites consist of 10 lithic scatters and five open camps; the three historic sites consist of one foundation, one cairn, and one debris scatter; and the one multicomponent site is composed of a prehistoric open camp and historic debris scatter. Of the 19 sites, two are recommended as eligible for listing on the NRHP, seven are unevaluated, and 10 are recommended as not eligible for listing on the NRHP. Of the two NRHP-eligible sites, one is located within the proposed project area, while the other is located more than 0.5 mi west of the proposed project area.

The identification and evaluation of potential rural historic and traditional cultural landscapes within the APE for direct effects is ongoing.

Prehistoric Site Types

The 15 prehistoric sites and the one prehistoric component from the multicomponent site located

in the proposed project area can be grouped into two categories: open camp/habitation sites and lithic scatters/knapping stations. Five sites and the prehistoric component from the multicomponent site are classified as open camp habitation sites based on the presence of hearths, heat-altered rock, lithic debris, and diverse artifact assemblages (tools, milling implements, etc.). The prehistoric component from the multicomponent site is recommended as eligible for listing on the NRHP based on the potential for buried cultural deposits. The 10 prehistoric sites classified as lithic scatters/knapping stations are characterized by the presence of debris from the modification/reduction of stone and are generally associated with no other artifact types or features. One lithic scatter is recommended as NRHP-eligible based on the potential for buried cultural deposits. Based on existing regional data and the project area topography, additional prehistoric site types within the proposed project area may include rock alignments and cairns. These sites could possess traditional cultural importance for Native Americans and, following consultation with Native American Tribes, could potentially be classified as Traditional Cultural Properties (TCPs).

Historic Site Types

A total of three historic sites and one historic component from the multicomponent site have been recorded within the proposed project area. The sites consist of one foundation, one cairn, and one debris scatter, and the historic component from the multicomponent site is a debris scatter. The foundation has not been formally recorded and is currently unevaluated with regard to the NRHP. The two debris scatters are likely associated with historic stock-herding activities in the area, and both are not eligible for the NRHP.

3.2.1.2 Cultural Resources Within the APE for Visual Effects

In order to assess potential visual effects from the proposed project, a viewshed analysis was conducted using GIS software to delineate areas within the 20-mi visual APE from which the proposed project would be visible. Locations of previously recorded sites within the visual APE were obtained from the SHPO, Cultural Records Office, and merged with the results of the viewshed analysis. Any sites within areas from which the proposed project would not be visible due to intervening topography were eliminated from the visual effects analysis. A summary of the 163 identified prehistoric and historic sites for visual effects analysis is provided below. Additionally, the identification and evaluation of potential rural historic landscapes and traditional cultural properties within the APE for visual effects is ongoing.

Prehistoric Sites

The BLM, in consultation with Native American tribes, determined that sites for visual effects analysis would be identified based on site type rather than NRHP eligibility. The sites consist of those that contain sensitive features or remains that likely possess traditional cultural importance to modern Native Americans. Examples of such prehistoric sites include human burials, rock alignments, petroglyphs, rock cairns, stone circles, and modern-day Native American use for resource extraction, or religious sites. A total of 35 prehistoric sites were identified for visual effects analysis in areas within the visual APE where the proposed project would be visible.

Historic Sites

A total of 128 historic sites were identified for visual effects analysis in areas within the visual APE where the proposed project would be visible. These sites were identified based on NRHP eligibility status and consist of 87 eligible or listed sites and 41 unevaluatued sites. All historic sites that are not eligible were excluded from visual effects analysis as were sites that are eligible only under Criterion D in accordance with Appendix C of the State Protocol (BLM and SHPO 2006).

3.2.2 Native American Concerns

In accordance with the *American Indian Religious Freedom Act* (1979), the *Native American Graves Protection and Repatriation Act*, the NHPA, BLM Manual 8160-1 Handbook, and other statutes and

guidelines, Native American tribes were consulted during the preparation of this EA. The tribes retain all rights not explicitly ceded in the treaties transferring ownership to the federal government. The Northern Arapaho, Northern Ute, Eastern Shoshone, and Shoshone-Bannock tribes were sent letters requesting their comments concerning any religious or cultural areas within or near the WMWE project area. The scoping request for information regarding important cultural resources does not eliminate the need to consult with the tribes regarding claims made during the development stage. Consultation with each of the four tribes is ongoing. A summary of the activities conducted as part of the Native American consultation process through January 27, 2010, are provided in Appendix B.

Several known sensitive sites exist in the surrounding area, including Boars Tusk, the White Mountain Petroglyph Site, the Cedar Canyon Petroglyph Site, and Pilot Butte. These sites have the potential to be formally designated as TCPs by the federal government after implementing and completing formal Native American consultation. Furthermore, the identification and evaluation of a potential sacred landscape within the APE for visual and direct effects is ongoing.

3.3 GEOLOGY AND PALEONTOLOGY

The IAA for paleontological resources is the WMWE project area. A total of 420 acres (3.19%) of the 13,165-acre IAA has been disturbed, primarily by existing roads.

The WMWE project area is located on the western flank of the Rock Springs Uplift and the Green River Formation outcrops in the project area. The Green River Formation was formed during the Eocene Age, approximately 54.8 to 33.7 million years ago (Roehler 1992, 1993), and represents the deposits of an ancient lake system. The Green River Formation complexly intertongue is the result of expansions and contractions of the lake system (Roehler 1991). Paleontological resources in southwest Wyoming span the time from the late Cretaceous to early Tertiary and include remains of dinosaurs, mammals, turtles, crocodiles, and other reptiles, fish, snails, and plants.

The Green River Formation has a combined total thickness of 2,763 ft, measured in the Green River Basin (Roehler 1993), and the Green River Formation is an important sequence of ancient lake deposits occurring in three former lake areas: the Fossil Basin (ancient Fossil Lake), the Greater Green River Basin (ancient Lake Gosiute), and the combined Uinta-Piceance Creek Basins (ancient Lake Uinta). It is a famous source of fossils, especially in the Fossil Basin but also in all other areas, and has produced significant vertebrate, invertebrate, and plant fossil materials. In the WMWE project area, the Green River Formation is divided (from the bottom upwards) into the Wilkins Peak Member and the Laney Shale Member (Roehler 1992).

The Wilkins Peak Member of the Green River Formation is found south of Rock Springs. It, like the Cathedral Bluffs Tongue, has the Wasatchian-Bridgerian boundary within it, and much of the Wilkins Peak Member is evaporitic in nature and was deposited during times when lake levels were low and minerals became concentrated. It contains highly valuable trona deposits that are actively being mined west of Rock Springs. Much of the Wilkins Peak Member in the area near Rock Springs and White Mountain contains many radioactive beds that are both uraniferous and phosphatic, and it forms much of the eastern slopes of White Mountain (Love 1995). The Wilkins Peak Member characteristically weathers in a white color and presumably gave White Mountain its name. The Wilkins Peak Member is located along the east edge of the WMWE project area (Figure 3.1).

The Laney Shale Member of the Green River Formation consists of oil shale and resistant sandstone lentils at or near the base of the unit and an overlying unit of shale, mudstone, and limestone (Roehler 1993). South of Green River, oil shales are common near the base of the Laney Member (Culbertson 1962). The massive sandstone lenses in this lower unit appear to be restricted to the west-central part of the Greater Green River Basin, occurring mainly on White Mountain and for few miles to the west and southwest of it. The upper unit of the Laney Shale is much more widespread and occurs from the

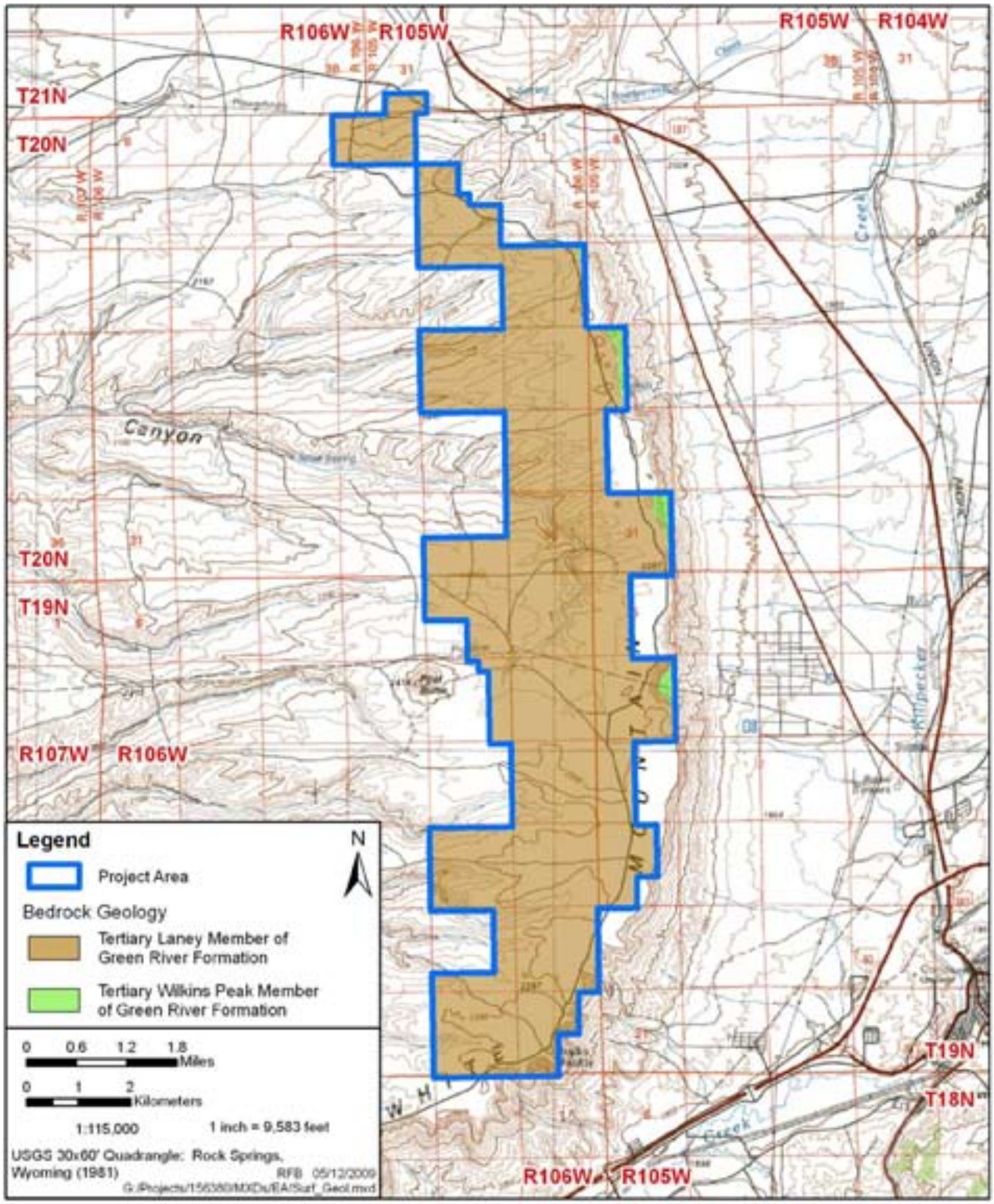

Figure 3.1 Surface Geology, WMWE Project.

west side of the Flaming Gorge Reservoir northwards into Sublette County and eastwards into the Washakie Basin. This unit is locally fossiliferous, with numerous localities in the Washakie Basin (Uinta Paleontological Associates, Inc. 2009). The Laney Shale Member makes up the majority of bedrock formation found within the WMWE project area (refer to Figure 3.1).

In order to assess the importance of various geological formations and the related paleontological resources associated with these formations, the BLM in Wyoming has adopted a classification system called the Probable Fossil Yield Classification (PFYC) system that provides broad probabilities for the occurrence of paleontological resources. The PFYC system is composed of five classes with Class 1 having the lowest probability of fossils to Class 5 having the highest probability of fossils. Class 5 areas are highly fossiliferous geologic units that regularly and predictably produce vertebrate fossils and/or scientifically significant nonvertebrate fossils.

Based on the PFYC system, the BLM has designated the Green River Formation (including the Wilkins Peak Member and Laney Shale Member) as Class 5 (Table 3.2). Despite this classification, no fossil localities are known to exist within the WMWE project area (Uinta Paleontological Associates, Inc. 2009).

However, several important fossil localities are known to occur in the general area. Even though there are no known fossil localities within the project area, the presence of rock units that have yielded important fossils elsewhere indicate that the probability of construction activities impacting important fossils may be high.

3.4 LAND USE

Land holdings within the project area are a checkerboard land pattern, with every other section alternating between public and private ownership. The checkerboard pattern is a result of land grants given to the railroad companies to develop transportation corridors in the west. The public lands are administered by the BLM RSFO. The RSGA has the grazing lease and is currently in control of a majority of the private lands within the project area.

3.4.1 Grazing

The IAA for grazing is the Rock Springs grazing allotment (Figure 3.2) located west of U.S. Highway 191 and north off Interstate 80 (I-80). A total of 9,734 acres (2.33%) of the 418,506-acre (20.31% of the allotment boundary) IAA has been disturbed primarily by major industrial facilities.

Livestock grazing on BLM-administered lands is authorized under the *Taylor Grazing Act of 1934.* The proposed project would be located within the Rock Springs grazing allotment (WY13018), which encompasses approximately 2,061,062 acres (refer to Figure 3.2).

The Rock Springs Allotment consists primarily of checkerboard land. Sections alternate from federal to private land, with approximately half being private land owned or leased by RSGA. There are a few others who own land within this allotment and are issued BLM permits. These are called "in-holders" because their land is found within RSGA holdings. Ninety-two percent of use occurs from December 1 to May 15 for cattle and sheep.

3.4.2 Recreation

No developed recreational sites or facilities exist within the WMWE project area; however, the BLM has established a scenic drive and wild horse viewing route along the rim of White Mountain utilizing County Road 53. Numerous dispersed recreational activities (e.g., hunting, camping, hiking, mountain biking, rock hounding, photography, wildlife and wild horse viewing, off-road vehicle [ORV] use, and sightseeing) are also available throughout the year due in part to the proximity of the WMWE project area to Rock Springs. In fiscal year 2008, 55,104 visitors accessed the Pilot Butte turnout at the center of the backcounty byway, and two outfitters are currently permitted to operate in the White Mountain/Little Colorado Wild Horse Herd Management Areas (WHHMAs) for the purpose of bringing tourists to view wild horses. All BLM-administered lands

Table 3.2 Geologic Formations and Fossil Potential, WMWE Project.

Formation	Member	Geology Map Abbreviation [1]	PFYC Rating Class [2]	Fossils Known in Formation/ Member	Records of Fossils in Project Area
Green River	Laney	Tgl	5	Yes	No
	Wilkins Peak	Tgwt	5	Yes	No

[1] Tgl = Tertiary Laney Member of the Green River Formation, Tgwt = Tertiary Wilkins Member of the Green River Formation

[2] PFYC rating (based on Potential Fossil Yield Classification system; BLM Instruction Memorandum No. 2009-001; October 10, 2008), where: 1 = very low potential; 2 = low potential; 3 = moderate or unknown potential; 4 = high potential; and 5 = very high potential (Uinta Paleontological Associates, Inc. 2009).

within the WMWE Project are currently open for public use.

3.4.3 Transportation

Access to the proposed project area is by way of County Road 53 and Fourteenmile Road from U.S. Highway 191. County Road 53 is the only maintained road in the proposed project area that runs the entire length of the proposed project area from north to south. A short segment of Fourteenmile Road is located within the northern portion of the proposed project area. Numerous two-track roads and trails occur throughout the project area.

3.5 NOISE

The IAA for noise resources is the project boundary plus 2.0 mi. A total of 4,402 acres (7.13%) of the 61,750-acre IAA has been disturbed, primarily by the city of Rock Springs and adjacent development.

Traffic on local and county roads, state highways, and I-80; recreational and off-road vehicle activity; road construction activities; trains; and wind are the primary sources of noise that may be audible within the project area. Noise-sensitive areas in the IAA include residential areas, hunting areas, occupied raptor nests, greater sage-grouse leks during the breeding and nesting season, and crucial big game winter range during critical winter periods.

The A-weighed sound pressure level, or A-scale, is used extensively in the U.S. for the measurement of community and transportation noise. The A-weighted decibel (dBA) scale measures sound levels over the entire range of audible frequencies, weighted to accommodate the fact that humans hear middle range frequencies better than high or low frequencies. The dBA of commonly heard sounds is presented in Table 3.3. Noise levels in rural landscapes are generally lowest in the early morning and in the evening when wind speeds are lower and highest in the afternoon when wind speeds are higher. A truck operating at 30 mph generates about 65 dBA at a distance of 300 ft; farm equipment likely is somewhat noisier (British Wind Energy Association 2009). Passenger cars traveling 50 mph generate about 65 dBA at 50 ft, and diesel trucks generate about 85 dBA at 50 ft, so near U.S. Highway 191 and I-80, traffic noise levels are likely in the range of 65 to 85 dBA (refer to Table 3.3).

Background noise was measured on White Mountain as part of the BLM wind energy program policies and BMPs on February 5 and 11, 2009. Noise measurements were taken every 0.5 mi along County Road 53 using an Extech sound level meter. Ambient noise levels ranged from 28 to 68 dBA on a calm day (February 5),

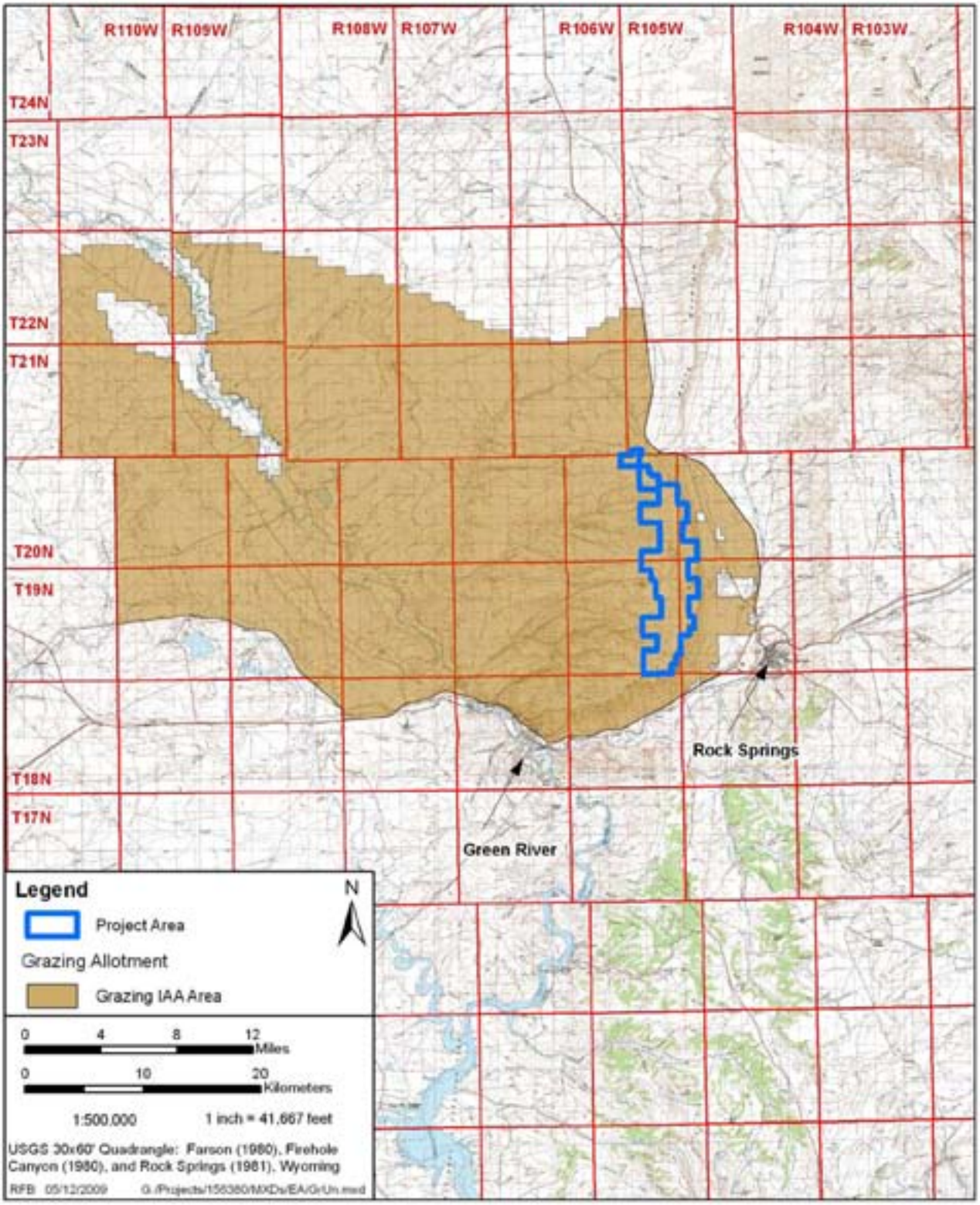

Figure 3.2 Grazing Allotment, WMWE Project.

Table 3.3 Noise Levels of Commonly Heard Sounds.[1]

Source/Activity	dBA [2]
Threshold of hearing	0
Rural night-time background	20-40
Normal conversation (at 3 ft)	60
Wind project at 1,100 ft	35-45
Car at 40 mph at 300 ft	55
Busy office	60
Truck at 30 mph at 300 ft	65
Jet aircraft at 800 ft	105
Threshold of pain to hearing	140

1 Source: British Wind Energy Association (2004) and Rau and Wooten (1980).
2 dBA = A-weighted decibels.

whereas ambient noise levels on an average windy day ranged from 47 to 90 dBA (Teton 2009).

The expected sound level for individual turbines at 130 ft is expected to be 55-65 dBA (Teton 2009), which is equivalent to a normal conversation. Therefore, on windy days when the turbines are turning, actual noise from the turbines is expected to be less than the ambient noise or near to the background noise levels.

3.6 SOCIOECONOMICS

3.6.1 Demography

Based on U.S. Census Bureau statistics (U.S. Department of Commerce [USDOC] 2009a), Sweetwater County's 2006 population was estimated at 38,763, a 3.1% increase in population from that of the 2000 decennial census, and only 60 people fewer than the population recorded in the 1990 decennial census (USDOC 2009b). In comparison, the State of Wyoming experienced a 4.3% increase in population between 2000 and 2006 (USDOC 2009b, 2009c).

According to the 2000 decennial census, Sweetwater County's labor force (individuals 16 years of age or older) was 70.6% of the population (20,022 individuals), with the number increasing to 73.6% (21,621) of the population in USDOC's 2005-2007 American Community Survey (USDOC 2009d, 2009e). In comparison, the U.S. labor force was only 64.7% of the population in the 2005-2007 surveys (USDOC 2009f). Most recent preliminary data place Sweetwater County's unemployment rate in July of 2009 at 6.5%, compared to a statewide 6.5% unemployment rate. The unemployment rate for Sweetwater County has increased 1.5% since July of 2009; whereas the Wyoming unemployment rate has remained the same. Nevertheless, Sweetwater County's December 2008 unemployment rate is approximately half of the July 2009 national average of 9.4% (Wyoming Department of Employment, Research & Planning 2009).

According to 2000 census data, Sweetwater County occupations in Wyoming were dominated by sales and office jobs (23.4% of the workforce); management, professional, and related occupations (23.3%); and construction, extraction, and maintenance jobs (21.1%); with production, transportation, and material moving (16.1%); service (15.9%); and farming, fishing, and forestry (0.2%) providing the remaining jobs (USDOC 2009d). Industry, education, health, and social

services (18.2%); agriculture, forestry, fishing, and mining (14.8%); and transportation, warehousing, and utilities (11.9%) dominated jobs in Sweetwater County, with all other industry classes comprising less than 10% each. Private wage and salary workers comprise 76.5% of the Sweetwater County workforce, followed by government workers (17.7%), self-employed/unincorporated business workers (5.6%), and unpaid family members (0.2%) (USDOC 2009d). Major employers in the county include FMC Wyoming Corporation (844 employees), Haliburton (755), Sweetwater County School District #1 (720), General Chemical (531), Solvay Minerals (428), OCI (428), PacifiCorp (393), Sweetwater Memorial Hospital (372), Schlumberger (335), Bridger Coal (319), and Sweetwater County School District #2 (290) (Why Wyoming.org 2009).

Annual per capita income for Sweetwater County in USDOC's 2005-2007 3-year Community Survey was $28,835 (in 2007 inflation-adjusted dollars) compared to $16,810 in 1990 (an increase of 71.5% over 17 years) (USDOC 2009e). The cost of living index for the county in the fourth quarter of 2008 was 107, compared to 97 in the second quarter of 2002 (Wyoming Economic Analysis Division 2003, 2009). The index uses 100 as the statewide average; thus, the cost of living was seven points below the statewide average in 2002, but by the end of 2008, it had climbed to seven points above the statewide average. In 2000, 7.8% of the Sweetwater County population was living below the poverty level (USDOC 2009d). That number increased to 8.1% in 2004 (USDOC 2009a, 2009b), but the 2005-2007 American Community Survey reported a drop to 7.2% (USDOC 2009e). In that same survey, the statewide percentage was considerably higher at 8.9%, although still well below the national average of 13.3% (USDOC 2009g).

As of the 2000 census, Sweetwater County reported 15,921 housing units, with one-unit detached structures comprising 58.8%, and mobile homes comprising 23.2%. No other structure type exceeded 4.2% of the total (USDOC 2009h). Occupancy was 88.6% of the total units, with 11.4% vacancies and 1.5% seasonal/recreational residences (USDOC 2009i). The 2005 through 2007 American Community Survey shows 16,480 housing units with 91.7% occupancy (an increase of 3.1% over the 2000 decennial census for both housing units and occupancy rate) (USDOC 2009e). The occupancy rate of Wyoming reported in the same 2005-2007 survey was 85.9 or 5.8% lower than that of the county (USDOC 2009j).

Thirty-one schools in two school districts served 6,964 students in the 2006-2007 school year, and the average student to teacher ratio was approximately 15:1. Western Wyoming Community College also enrolled 3,967 students in that year (Why Wyoming.org 2009).

The adjusted crime rate in Sweetwater County declined between 1995 and 2003, but is higher than the statewide crime rate (Pinedale Anticline Working Group [PAWG] 2005).

Electric power is provided to the county by Bridger Valley REA and Rocky Mountain Power. Costs (cents per KWh) range from $0.0502 (industrial) to $0.0837 (residential) for the former, and from $0.0381 (industrial) to $0.0688 (residential) for the latter (Why Wyoming.org 2009).

3.6.2 Health, Safety, and Transportation

The proposed project area is undeveloped, and no permanent residential structures occur within the proposed project area. County Road 53 runs the length of the project area. Access to the proposed project area is by way of County Road 53 and Fourteenmile Road from U.S. Highway 191. Therefore, the primary safety risks for people working or traveling in the general project area are related to vehicle accidents.

3.7 SOILS

The IAA for soil resources is the boundary of the level 12 Hydrologic Unit Code (HUC) (Figure 3.3). A total of 19,954 acres (7.43%) of the 268,613-acre IAA has been disturbed, primarily by cities.

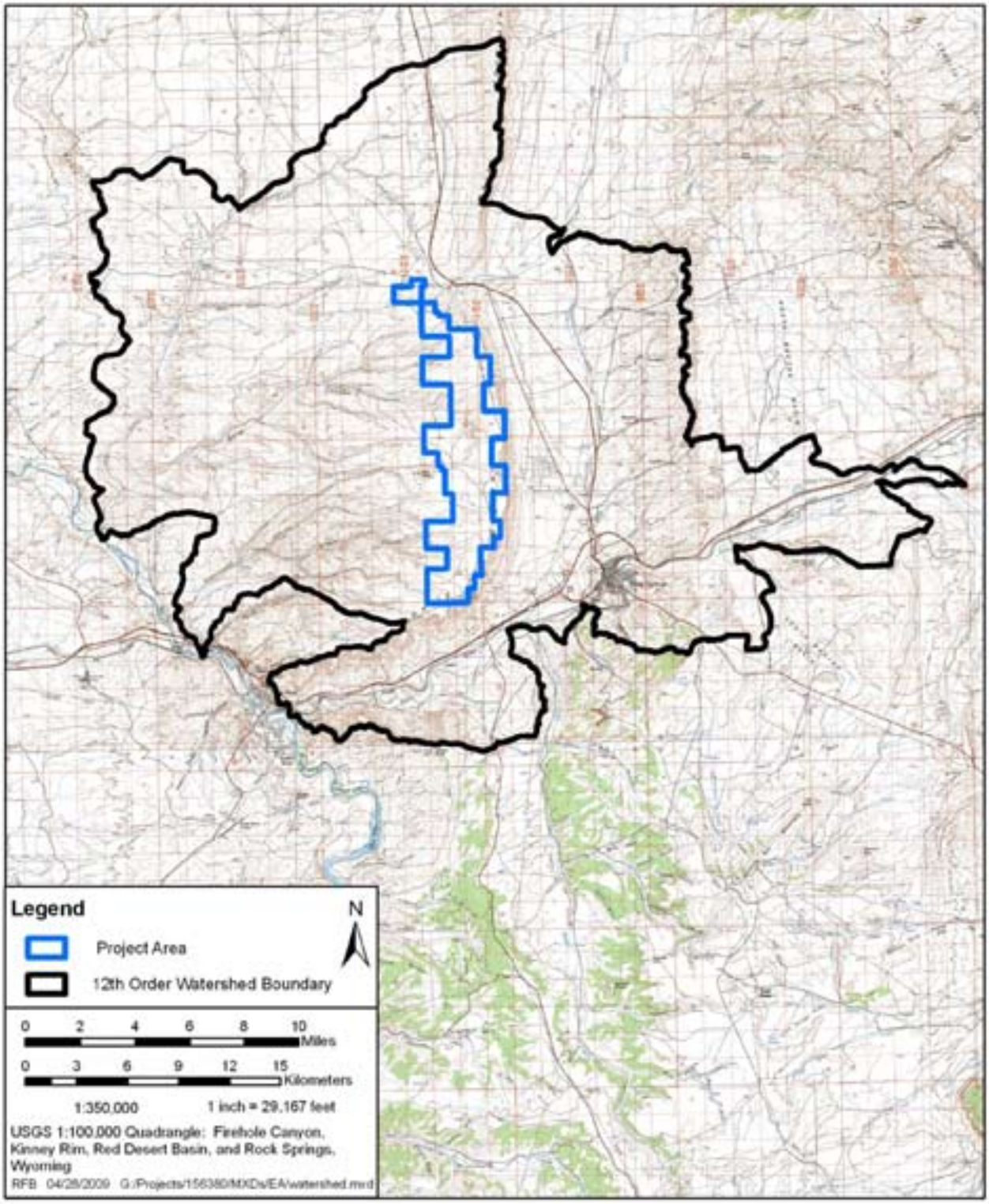

Figure 3.3 Location of Level 12 HUC.

The project area is primarily composed of Ustic haplargids soils (Figure 3.4). A second type, Ustic torriorthents, occurs along the extreme east side of the project area and is associated with the eastern side of the project area along the rim and sideslopes of White Mountain (BLM 1996; Munn and Arneson 1999).

The Ustic haplargids soils (Munn and Arneson 1999) are composed of Blackhall, Renrsac, Carmody, Grieves, Renot, Thermopolis, Elk Mountain, Blazon, Delphill, Redwash, Red Creek, and Shinbara soil types. These soils are shallow and moderately drained and formed on sloping upland plains with deep steep-sided ravines.

The Urtic torrienthents (Munn and Arneson 1999) are composed of Huguston, Wint, Spool, and Lamarsh soils, which occur on shallow soil rock outcrops, are well-drained, and were formed on steep ridges, escarpments, and mountain slopes.

Soils susceptible to surface disturbing activities include unstable soils, sandy soils, and erosive soils. Unstable soils are those soils or soil groups susceptible to landslides or slumping activity and may be a hazard to permanent structures. None of the soils within the WMWE project area are categorized as unstable soils (BLM 1996). Sandy soils are very susceptible to wind erosion when the protective vegetative cover is removed. The Huguston soil type is categorized as a sandy soil. Erosive soils are a result of their depth, texture, and/or position on the landscape. Huguston, Redwash, Thermopolis-Outcrop, Shinbara, Thermopolis, and Redwash-Spool-Outcrop are categorized as erosive soil types.

3.8 THREATENED, ENDANGERED, PROPOSED, CANDIDATE, AND BLM SENSITIVE SPECIES

The federal *Endangered Species Act* (16 U.S.C. 1531-1543) protects listed threatened and endangered plant and animal species and their critical habitats. A list of federally listed threatened, endangered, proposed, and candidate (TEPC) species that potentially occur in the vicinity of the proposed project was provided by the BLM RSFO through correspondence with the USFWS Wyoming State Office. Records of known occurrences of federal, state, and BLM sensitive species were queried from the Wyoming Natural Diversity Database (WNDD 2009).

TEPC species are those that have been specifically designated as such by the USFWS. Threatened species are those that are likely to become endangered in the foreseeable future throughout all or a significant portion of their range. Endangered species are those that are in danger of extinction throughout all or a significant portion of their range. Proposed species are those for which the USFWS has published proposed rules in the Federal Register for listing of the species but for which a final rule has not been adopted. Candidate species are those for which the USFWS has sufficient data to list as threatened or endangered but for which proposed rules have not yet been issued. BLM sensitive species are those that may warrant designation as candidate species but sufficient data are not currently available for such a designation decision; these species may be designated as BLM sensitive species by the BLM.

Based on WNDD (2009), no TEPC species occurrences have been documented in the project area; however, black-footed ferret and gray wolf have historically recorded occurrences within 6.0 mi of the project area.

3.8.1 TEPC Animal and Plant Species

The black-footed ferret (*Mustela nigripes*), a federal endangered species; the Canada lynx (*Lynx canadensis*), a federal threatened species; the gray wolf (*Canis lupus*), part of a nonessential experimental population; yellow-billed cuckoo (*Coccyzus americanus*), a federal candidate species; four Colorado River endangered fish species--bonytail chub (*Gila elegans)*, Colorado pikeminnow (*Ptychocheilus lucius)*, humpback chub (*Gila cypha)*, and razorback sucker (*Xyrauchen texanus*); blowout penstemon (*Penstemon haydenii*); and Ute ladies'-tresses (*Spiranthes diluvalis*), a federal threatened species have been identified by the USFWS and BLM RSFO as having potential to occur within or in the vicinity of the proposed project area (Table 3.4). No other TEPC species have been identified as

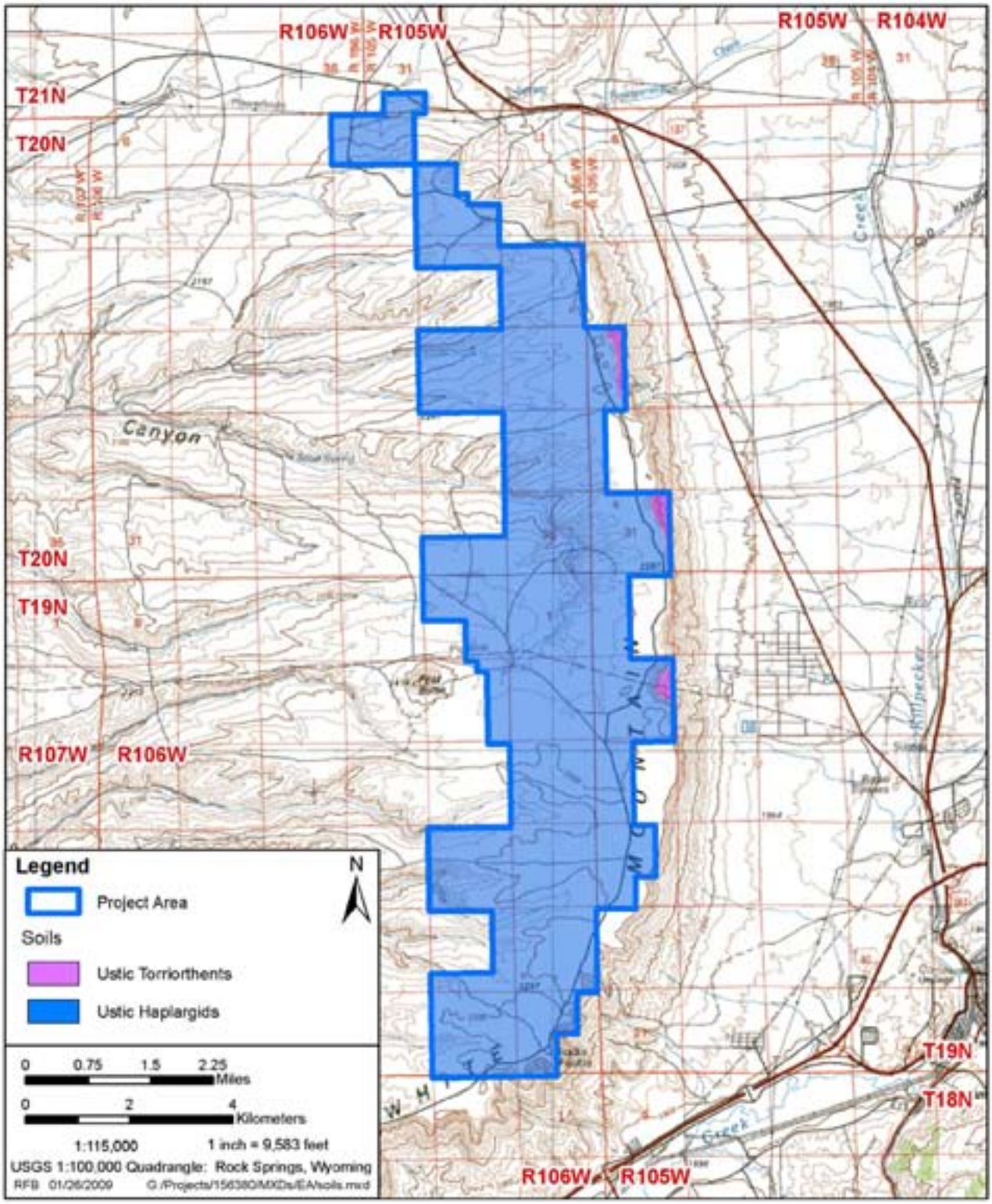

Figure 3.4 Soil Types, WMWE Project.

Table 3.4 Federal Threatened, Endangered, Proposed, and Candidate Species and Their Potential Occurrence Within the Proposed Project Area, 2009.[1]

Common Name	Scientific Name	Federal Status[2]	Potential Occurrence Within the Proposed Project Area[3]
MAMMALS			
Black-footed ferret	*Mustela nigripes*	E	X
Canada lynx	*Lynx canadensis*	T	X
Gray wolf	*Canis lupus*	XN	R
BIRDS			
Yellow-billed cuckoo	*Coccyzus americanus*	C	R
FISH			
Bonytail (Roundtail chub)	*Gila elegans*	E	X
Colorado pikeminnow	*Ptychocheilus lucius*	E	X
Humpback chub	*Gila cypha*	E	X
Razorback sucker	*Xyrauchen texanus*	E	X
PLANTS			
Blowout penstemon	*Penstemon haydenii*	E	X
Ute ladies'-tresses	*Spiranthes diluvialis*	T	X

[1] Adapted from USFWS (2008) and BLM (2009b).

[2] Federal status (USFWS 2008):
C = candidate
E = listed as federally endangered
T = listed as federally threatened
XN = nonessential experimental population

[3] Species occurrence, based on WNDD (2009) and BLM (2009)
R = Rare; species may pass through or be in the project area for just a few days or hours (e.g., stopping over during migration). Encounters during project construction are unlikely.
U = Uncommon; species may be present in the project area but in such low numbers or in such small and widely scattered populations that an encounter during field development and operation is unlikely. The species could be present for a significant part of the year (e.g., breeding season and/or summer resident).
X = Unlikely; no habitat present; there has been no recent or historical records of the species occurrence in the project area (WNDD 2009); probability of encountering the species during project construction is very unlikely.

potentially occurring within the project area (USFWS 2008).

Black-footed ferret. The black-footed ferret, a federally endangered species, was once distributed throughout the high plains of the Rocky Mountain and western Great Plains regions (Clark and Stromberg 1987; Forrest et al. 1985). Prairie dogs are the main food of black-footed ferrets (Sheets et al. 1972); few black-footed ferrets have been historically collected away from prairie dog towns (Forrest et al. 1985). The last known wild population of black-footed ferrets was discovered in the Pitchfork area near Meeteetse in 1981. Due to the fear that canine distemper would wipe out this population, all remaining black-footed ferrets were captured from the Pitchfork area and placed into a captive breeding project in 1985 (WGFD 1997). WNDD has three records of black-footed ferrets occurring within 6.0 mi of the project area; however, these records date to 1965 on the Seedskadee Wildlife Refuge area. The nearest known currently viable population of black-footed ferrets is located in the Coyote Basin Black-footed Ferret Management Area, southwest of Dinosaur National Monument, approximately 110.0 mi southwest of the proposed project area. The *Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act* (USFWS 1989) defines potential black-footed ferret habitat as any white-tailed prairie dog town or complex greater than 200 acres. Although potential black-footed ferret habitat may occur within the WMWE project area, it is located outside any area requiring black-footed ferret surveys (USFWS 2004). In addition, no recent black-footed ferret observations have been recorded in the vicinity of the WMWE project area (WNDD 2009); therefore, it is unlikely that any black-footed ferrets would occur in the WMWE project area, and the species is not discussed further in this EA.

Canada Lynx. Canada lynx, a federally threatened species, are typically found at elevations above 4,000 ft in a mosaic of forest conditions ranging from early successional to mature coniferous and deciduous stands (Meaney and Beauvais 2004). Snowshoe hares are their primary prey, though tree squirrels, voles, and mice are also eaten. No potential habitat for Canada lynx occurs within the project area, and no known observations of Canada lynx within 6.0 mi of the project have been recorded (WNDD 2009); therefore, Canada lynx are not discussed further in this EA.

Gray Wolf. The gray wolf was re-introduced into the Greater Yellowstone ecosystem in 1995. Gray wolves in Wyoming are considered part of that nonessential experimental population (a nonessential experimental population designation refers to an experimental population whose loss would not be likely to appreciably reduce the likelihood of the survival of the species in the wild and is treated like proposed species under Section 7 of the *Endangered Species Act*), and they are managed as a proposed species outside of National Park Service or National Refuge System lands. Although those wolves remain listed and protected under the *Endangered Species Act*, additional flexibility is provided for their management under provisions of the final rule and special regulations promulgation for the nonessential experimental population on November 22, 1994 (published in 59 *Federal Register* 60252).

Gray wolves are large carnivores that are capable of living in a wide variety of habitats within specific established territories and depend on ungulates for food. The primary prey for wolves in the Yellowstone area is elk (87%), as well as moose, deer, antelope, and bison (Greater Yellowstone Winter Wildlife Working Group 1999; Clark and Stromberg 1987). At least 218 wolves in 25 packs were present within the greater Yellowstone ecosystem by the end of 2001 (Smith and Guernsey 2002). WNDD (2009) has a historic record of a gray wolf occurrence in the vicinity of the project area. While it is possible that gray wolf may pass through the project area, it is highly unlikely that the wolf would reside in the project area due to the lack of suitable habitat. In addition, based on regulatory status of the gray wolf as nonessential experimental population, the project would have no effect on this species; therefore, it is not discussed further in this EA.

Yellow-billed Cuckoo. Yellow-billed cuckoo is the only candidate species in Wyoming that may occur in the project area or vicinity (USFWS

2008). In Wyoming, the yellow-billed cuckoo is a rare summer breeder that arrives from wintering grounds in South America in late May and departs from September to October. The yellow-billed cuckoo is primarily found in open streamside deciduous woodland with low scrubby vegetation undergrowth bordering Wyoming's larger rivers. Cottonwood stands and willow thickets are preferred for nesting and foraging. The yellow-billed cuckoo has been identified as potentially occurring in the riparian areas west of the Continental Divide; however, it is highly unlikely that the yellow-billed cuckoo occurs in the project area since no riparian habitat is present and no observations have been recorded in the vicinity (WNDD 2009). The nearest potential yellow-billed cuckoo habitat is likely located along the Green River, approximately 6.5 mi southwest of the project area. Therefore, the yellow-billed cuckoo is not discussed further in this EA.

Colorado River Endangered Fish Species. The Recovery and Implementation Program (RIP) for Endangered Species in the Upper Colorado River Basin was initiated in January 1988 as a reasonable and prudent approach for projects to avoid jeopardizing the continued existence of the four species of Colorado River endangered fish--bonytail, Colorado pikeminnow, humpback chub, and razorback sucker. Under the program, any depletions of water from tributaries within the Colorado River drainage system (which includes the project area) are considered by the USFWS to jeopardize the continued existence of these species. The USFWS has determined that progress made under the RIP has been sufficient to merit a waiver of the mitigation fee for depletions of 100 acre-ft or less (Memorandum dated March 9, 1995, to Assistant Regional Director, Ecological Services, Region 6, from Regional Director 6, "Intra-Service Section 7 Consultation for Elimination of Fees for Water Depletions of 100 acre-feet or Less from the Upper Colorado River Basin").

Blowout Penstemon. Blowout penstemon, a federally endangered species, is a perennial herb associated with blowout depressions in sparsely vegetated active sand dunes. Individual plants have deep root systems and multiple stems that can survive shifting sands. This species is known to occur in the sandhills of western Nebraska and in the Ferris Mountains of south-central Wyoming (Fertig 1999). No suitable habitat occurs in the project area; therefore, blowout penstemon is not discussed further in this EA.

Ute Ladies'-tresses. Ute ladies'-tresses, a federal threatened species, is a perennial member of the orchid family that inhabits moist streambanks, wet meadows, and abandoned stream channels at elevations of 4,500-6,800 ft (Fertig 1994; Spackman et al. 1997). Although the species will tolerate mildly alkaline conditions, it is unlikely to be found in association with Gardner's saltbush, greasewood, or other alkaline vegetation. Where it occurs in ephemeral drainages, groundwater is typically shallow (i.e., within approximately 18 inches of the ground surface) (personal communication, March 16, 2000, with Pat Deibert, USFWS; personal communication, March 22, 2000, with Walt Fertig, WNDD).

The species has been documented in Goshen, Converse, and Niobrara counties in Wyoming (Wyoming Rare Plant Technical Committee 1997) and along the Front Range in northern and central Colorado (Spackman et al. 1997). It also has been reported below the dam at Flaming Gorge Reservoir (personal communication, March 22, 2000, with Walt Fertig, WNDD). Although, in recent years, much time has been devoted to determining areas in Wyoming where the species occurs, it has not been documented within or near the proposed project area or in Sweetwater County (WNDD 2009) or within the BLM RSFO (BLM 2009b). Based on visual observation of the project area and descriptions for vegetation communities in the project area, there is no suitable habitat for Ute ladies'-tresses within or near the proposed project area, and Ute ladies'-tresses are not discussed further in this EA.

3.8.2 BLM Sensitive Animal and Plant Species

Based on habitat preference and geographic location, numerous BLM sensitive species may potentially occur or have been documented in the proposed project area (email communication, February 2, 2009, with Teri Deakins, BLM RSFO;

WNDD 2009; TRC 2009b) (Table 3.5). Potential habitat for long-eared myotis, fringed myotis, spotted bat, Townsend's big-eared bat, white-tailed prairie dog, Wyoming and Idaho pocket gophers, bald eagle, ferruginous hawk, mountain plover, burrowing owl, midget faded rattlesnake, and Cedar Rim thistle occurs within or in the vicinity of the proposed project area (WNDD 2009). Sagebrush-obligate species on the BLM sensitive animal species list that might also occur in project area include pygmy rabbit, greater sage-grouse, sage thrasher, loggerhead shrike, Brewer's sparrow, and sage sparrow. BLM sensitive species observed (TRC 2009b) or recorded (WNDD 2009) in the project area include pygmy rabbit, ferruginous hawk, greater sage-grouse, sage thrasher, loggerhead shrike, Brewer's sparrow, and sage sparrow (refer to Table 3.5). Species listed on Table 3.5 as not having any potential habitat are not discussed further in this EA.

Pygmy Rabbit. Pygmy rabbits prefer areas of dense and tall sagebrush in predominantly sandy soils (Clark and Stromberg 1987). Burrows are typically located in areas with greater cover and shrub densities, taller vegetation, and high forb density (Ulmschneider 2004). Pygmy rabbit habitat occurs throughout the project area as inclusions of preferred vegetation densities and heights within Wyoming big sagbrush communities. Potential pygmy rabbit habitat also occurs in drainage bottoms where sagebrush and vegetation tend to be taller and denser and soils are deeper, thereby providing good cover and easier burrow excavation areas. Pygmy rabbits were observed by TRC during the 2008 avian migration studies and occur in the WMWE project area.

Wyoming Pocket Gopher. The Wyoming pocket gopher is exclusive to Wyoming. Specifically, it is only found in south-central Wyoming in Carbon and Sweetwater counties (Clark and Stromberg 1987). The WMWE Project is along the western-most edge of the known geographic range of this species. Two similar looking species of pocket gophers, the northern and Idaho pocket gopher, may occur within the range of the Wyoming pocket gopher, making field identification difficult. Positive identification requires karyotype (chromosomal) analysis, but morphological differentiating characteristics are being developed. Because the Wyoming pocket gopher is similar in appearance to more common and widely distributed northern pocket gopher, many earlier collections and observations of the Wyoming pocket gopher were misidentified; therefore, little is known about the population status of this species. Studies have recently been conducted to determine the distribution and population of this species, as well as the development of predictive models to determine potential habitat (Keinath and Beauvais 2006; Hayden-Wing Associates, LLC 2008; Keinath and Griscom 2009). The Wyoming pocket gopher prefers to inhabit dry gravelly ridges as opposed to valley bottoms with deeper soils, areas where other gophers prefer (Hayden-Wing Associates, LLC 2008). Recent studies have found Wyoming pocket gophers in small islands of low vegetation within a sagebrush matrix with cushion plants, grass, rabbitbrush, and low shrubs. Wyoming pocket gophers have not been found in flats dominated by greasewood, valley bottoms, sand dunes, or areas where medium to high Wyoming big sagebrush dominated the vegetation community (Keinath and Griscom 2009). Pocket gophers in general spend most of their life underground and are important in soil development, soil aeration, and promoting water storage in soil during spring runoff (Keinath and Beauvais 2006). No recorded occurrences of Wyoming pocket gopher are documented in the WMWE project area (WNDD 2009). The nearest known records of the Wyoming pocket gopher are east of Rock Springs (Hayden-Wing Associates, LLC 2008). Predictive models developed by Keinath and Griscom (2008) indicate that the WMWE project area is in a "predicted absent-marginal" and "predicted present-marginal" area for Wyoming pocket gopher.

Idaho Pocket Gopher. The Idaho pocket gopher is endemic to southwestern Wyoming and southeastern Idaho, extending slightly into southwestern Montana and northern Utah (Beauvais and Dark-Smiley 2005). This species prefers shallow stony soils in open sagebrush, grassland plains, and subalpine meadow habitats.

Table 3.5 Wyoming BLM Sensitive Species, Habitat Preference, and Occurrence of Habitat and Observational Data, WMWE Project, 2009. [1, 2]

Common Name	Scientific Name	Habitat	Potential Habitat in or in Vicinity of Project Area	Observed ?/ Occurrence Data
MAMMALS				
Grizzly bear	*Sorex nanus*	Forest, basin prairie, and meadows	No	No/No known data of occurrence
Long-eared myotis	*Myotis evotis*	Conifer and deciduous forests, caves, and mines	Yes	Yes/2008 bat field survey, WNDD 2009 data within 6.0 mi of project area
Fringed myotis	*Myotis thysanodes*	Conifer forests, woodland-chaparral, caves, and mines	Yes	Yes/2008 bat field survey
Spotted bat	*Euderma maculatum*	Cliffs over perennial water, basin-prairie shrub	Yes	Yes/2008 bat field survey
Townsend's big-eared bat	*Corynorhinus townsendii*	Forests, basin-prairie shrub, caves, and mines	Yes	Yes/2008 bat field survey, WNDD 2009 data within project area
Pygmy rabbit	*Brachylagus idahoensis*	Basin-prairie and riparian shrub	Yes	Yes/2008 avian migration studies, WNDD 2009 data within 6.0 mi of project area
White-tailed prairie dog	*Cynomys leucurus*	Basin-prairie shrub, grasslands	No	No towns observed/ WNDD 2009 has records in area
Wyoming pocket gopher	*Thomomys clusius*	Dry gravelly shallow soil, ridgetops rather than deeper soiled swales and valley bottoms	Yes	No/No known data of occurrence
Idaho pocket gopher	*Thomomys idahoensis*	Dry gravelly shallow soil, ridgetops rather than deeper soiled swales and valley bottoms	Yes	No/No known data of occurrence
Swift fox	*Vulpes velox*	Grasslands	No	No/No known data of occurrence
BIRDS				
Bald eagle	*Haliaeetus leucocephalus*	Cliffs, large trees, or sheltered canyons for nesting, near water sources for foraging	No	No/No known data of occurrence
White-faced ibis	*Plegadis chihi*	Marshes, wet meadows	No	No/No known data of occurrence
Trumpeter swan	*Cygnus buccinator*	Lakes, ponds, rivers	No	No/WNDD 2009 data within 6.0 mi of project area
Northern goshawk	*Accipter gentilis*	Conifer and deciduous forests	No	No/WNDD 2009

Table 3.5 (Continued)

Common Name	Scientific Name	Habitat	Potential Habitat in or in Vicinity of Project Area	Observed ?/ Occurrence Data
Ferruginous hawk	*Buteo regalis*	Basin-prairie shrub, grassland, rock outcrops	Yes	Yes/2008 avian migration studies, WNDD 2009 data
Peregrine falcon	*Falco peregrinus*	Tall cliffs	No	No/No known data of occurrence
Greater sage-grouse breeding habitat	*Centrocercus urophasianus*	Basin-prairie shrub, mountain-foothill shrub	Yes	Yes/2008 avian migration surveys
Greater sage-grouse wintering habitat	*Centrocercus urophasianus*	Basin-prairie shrub, mountain-foothill shrub	Yes	Yes/2008 winter greater sage-grouse surveys
Long-billed curlew	*Numenius americanus*	Grasslands, plains, foothills, wet meadows	No	No/No known data of occurrence
Mountain plover	*Charadrius montanus*	Grassland and desert shrub/grasslands with level areas (<3% slope) with at least 30% bare ground	Yes	No/No known data of occurrence; none observed during 2008 avian surveys
Burrowing owl	*Athene cunicularia*	Grasslands, basin-prairie shrub	Yes	No/No known data of occurrence
Sage thrasher	*Oreoscoptes montanus*	Basin-prairie shrub, mountain-foothill shrub	Yes	Yes/2008 avian migration studies, WNDD 2009 data
Loggerhead shrike	*Lanius ludovicianus*	Basin-prairie shrub, mountain-foothill shrub	Yes	Yes/2008 avian migration studies
Brewer's sparrow	*Spizella breweri*	Basin-prairie shrub	Yes	Yes/2008 avian migration studies
Sage sparrow	*Amphispiza belli*	Basin-prairie shrub, mountain-foothill shrub	Yes	Yes/2008 avian migration studies
FISH				
Roundtail chub	*Gila robusta*	Colorado River drainage, mostly large rivers, also streams and lakes	No	No/WNDD 2009 has record within 6.0 mi of project area
Leatherside chub	*Gila copei*	Bear, Snake, and Green rivers' drainages, clear, cool streams and pools	No	No/No known data of occurrence
Bluehead sucker	*Catostomus discobolus*	Bear, Snake, and Green rivers' drainages, all waters	No	No/WNDD 2009 has record within 6.0 mi of project area
Flannelmouth sucker	*Catostomus latipinnis*	Colorado River drainage, large rivers, streams and lakes	No	No/No known data of occurrence
Colorado River cutthroat trout	*Oncorhynchus clarki pleuriticus*	Colorado River drainage, clear mountain streams	No	No/No known data of occurrence
REPTILES				
Midget faded rattlesnake	*Crotalus viridis concolor*	Mountain foothills shrub, rock outcrop	Yes	No/No known data of occurrence

Table 3.5 (Continued)

Common Name	Scientific Name	Habitat	Potential Habitat in or in Vicinity of Project Area	Observed ?/ Occurrence Data
AMPHIBIANS				
Northern leopard frog	*Rana pipiens*	Beaver ponds, permanent water in plains and foothills	No	No/No known data of occurrence
Great basin spadefoot	*Spea intermontana*	Spring seeps, permanent and temporary waters	No	No/WNDD 2009 has record within 6.0 mi of project area
Boreal (Northern Rocky Mountain population) toad	*Bufo boreas boreas*	Pond margins, wet meadows, riparian areas	No	No/No known data of occurrence
Spotted frog	*Ranus pretiosa (lutieventris)*	Ponds, sloughs, small streams	No	No/No known data of occurrence
PLANTS				
Meadow pussytoes	*Antennaria arcuata*	Moist, hummocky meadows, seeps or springs surrounded by sage/grasslands, 4,950-7,900 ft	No	No/No known data of occurrence
Small rock cress	*Arabis pusilla*	Cracks/crevices in sparsely vegetated granite/pegmatite outcrops within sage/grasslands, 8,000-8,100 ft	No	No/No known data of occurrence
Mystery wormwood	*Artemisia biennis* var. *diffusa*	Clay flats and playas, 6,500 ft	No	No/No known data of occurrence
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 ft	No	No/No known data of occurrence
Precocious milkvetch	*Astragalus proimanthus*	Cushion plant communities on rocky clay soils mixed with shale on summits and slopes of white shale hills, 6,800-7,200 ft	No	No/No known data of occurrence
Cedar Rim thistle	*Cirsium aridum*	Barren, chalky hills, gravelly slopes, and fine textured, sandy-shaley draws, 6,700-7,200 ft	Yes	No/BLM personal communication
Ownbey's thistle	*Cirsium ownbeyi*	Sparsely vegetated shaley slopes in sage and juniper communities, 6,440-8,400 ft	No	No/No known data of occurrence
Wyoming tansymustard	*Descurainia torulosa*	Sparsely vegetated sandy slopes at base of cliffs of volcanic breccia or sandstone, 8,300-10,000 ft	No	No/No known data of occurrence

Table 3.5 (Continued)

Common Name	Scientific Name	Habitat	Potential Habitat in or in Vicinity of Project Area	Observed ?/ Occurrence Data
Large-fruited bladderpod	*Lesquerella macrocarpa*	Gypsum-clay hills and benches, clay flats, and barren hills, 7,200-7,700 ft	No	No/No known data of occurrence
Stemless beardtongue	*Penstemon acaulis* var. *acaulis*	Cushion plant or Black sage grassland communities on semi-barren rocky ridges, knolls, and slopes at 5,900-8,200 ft	No	No/No known data of occurrence
Beaver Rim phlox	*Phlox pungens*	Sparsely vegetated slopes on sandstone, siltstone, or limestone substrates, 6,000-7,400 ft	No	No/No known data of occurrence
Tufted twinpod	*Physaria condensata*	Sparsely vegetated shale slopes and ridges, 6,500-7,000 ft	No	No/No known data of occurrence
Green River greenthread	*Thelesperma caespitosum*	White shale slopes and ridges of Green River Formation, 6,300 ft	No	No/WNDD 2009 has record with 6.0 mi of project area
Uinta greenthread	*Thelesperma pubescens*	Sparsely vegetated benches and ridges on coarse cobbly soils of Bishop Conglomerate, 8,200-8,900 ft	No	No/No known data of occurrence

[1] Based on BLM (2009).
[2] Based on WNDD (2009) and TRC (2009b).

Population status is unknown due to the lack of field data, but the species is assumed to be rare with a limited distribution. The Idaho pocket gopher is very similar in appearance to other pocket gophers such as the Wyoming and northern pocket gophers; therefore, a reliable identification requires a karyotype analysis. In Wyoming, the Idaho pocket gopher is known to occur in Uinta, Lincoln, and Sublette counties whereas the Wyoming pocket gopher is limited to Sweetwater and Carbon counties. The northern pocket gopher occurs throughout Wyoming (Beauvais and Dark-Smiley 2005). There are no known occurrences of the Idaho pocket gopher in or in the vicinity of the WMWE project area (WNDD 2009; WGFD 2004), and this species will not be discussed further in this EA.

Greater Sage-grouse. The IAA for greater sage-grouse is the area north of Bitter Creek, east of the Green River, south of the Big Sandy River to Farson, then east to Killpecker Sand. A total of 10,401 (1.91%) of the 545,351-acre IAA has been disturbed, primarily by roads.

As indicated, the WMWE project area occurs within Upland Game Bird Management Area (UGBMA) #7 (Eden) and is approximately 1.0 mi northwest of the adjacent UGBMA #6 (Flaming Gorge) (Figure 3.5). UGBMA #7 encompasses approximately 4,541 mi^2 and generally is bounded on the south by I-80 from Green River east to approximately Superior, then north to midway between Pinedale and Lander, then southwest to Big Piney and southeast back to Green River. UGBMA #6 generally encompasses approximately 3,615 mi^2 in the western approximately two-thirds of the south half of Sweetwater County. It includes the Flaming Gorge area and is bounded on the south by the Wyoming/Colorado border.

Greater sage-grouse are a BLM sensitive species that are being considered for listing under the *Endangered Species Act*. During the spring and fall avian surveys, 226 grouse observations were recorded as part of the continuous raptor and other large bird (RLB) surveys, and passerine and other small bird (PSB) surveys. A total of 50 observations (22%) were made during the spring, and 176 observations (78%) were made during the fall. Sixty-two percent of the greater sage-grouse were seen flying or flushed to flying, and 38% of the sightings stayed on the ground (i.e., did not flush or fly). For those greater sage-grouse that did fly, 100% were observed flying within the 0 to 35-m flight height category (i.e., below the rotor-swept area), and these birds would not be at risk for collision with a wind turbine (i.e., risk index of 0.0) (TRC 2009b).

Based on the WNDD (2009) data for the WMWE project area, 1,812 greater sage-grouse observations have been documented within the project area, based on 23 years of observation between 1973 and 2006. These data indicated that there were 1,545 observations of adults and 267 observations of juveniles or yearlings.

As a result of concern for the current and future population status of greater sage-grouse and their habitat, Wyoming Governor Dave Fruedenthal requested a Sage-grouse Implementation Team (SGIT) to identify actions and measures that would be useful in managing greater sage-grouse and their habitats in Wyoming. As a result of this effort, initial Core Population Areas for greater sage-grouse were identified within the state of Wyoming. Those Core Habitat Areas encompass habitats and existing populations for at least two-thirds of the greater sage-grouse in Wyoming (SGIT 2008). SGIT predicted that approximately 83% of the peak males attending leks in Wyoming are within core areas, as are approximately 61% of the occupied leks in the state. The SGIT recommends that management within the core areas focus on maintenance and enhancement of grouse habitats and populations in those areas. An ongoing mapping and ground-truthing effort is being conducted by Wyoming Geographic Information System Center (WYGISC) in cooperation with SGIT to further evaluate and refine the core management areas.

Approximately 515 acres (3.9%) of the WMWE project area are within the identified 2.5-million acre South Pass Core Habitat Area for greater sage-grouse. The entirety of this specific Core Habitat Area occurs in the northernmost portion of the project area (refer to Figure 3.5).

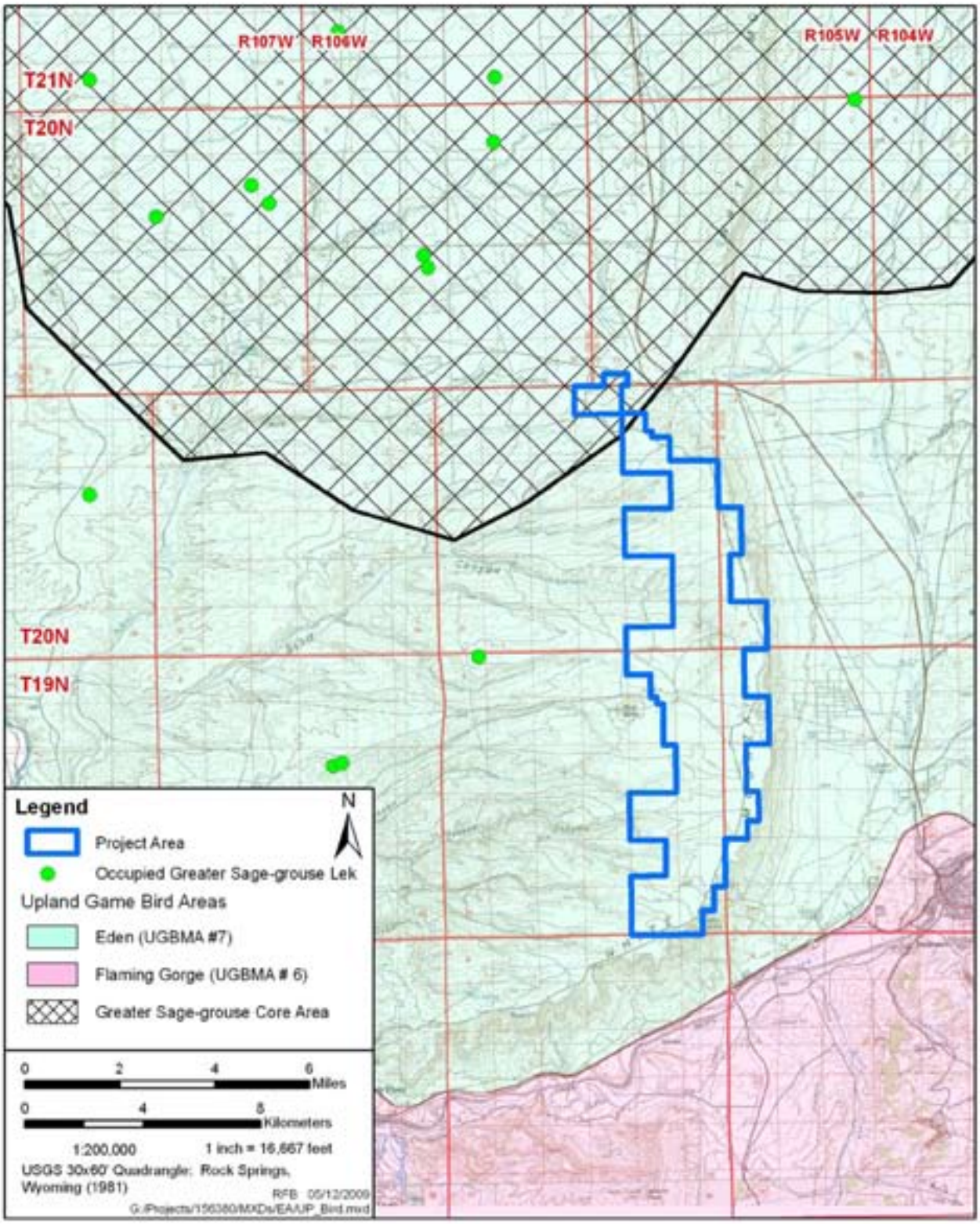

Figure 3.5 Upland Game Bird Areas and Greater Sage-grouse Core Habitat Area, WMWE Project.

The project area and vicinity provide suitable nesting, brood-rearing, and wintering habitat for greater sage-grouse, which rely heavily on sagebrush for food, as well as thermal and hiding cover during all seasons and throughout all age classes. On February 29, 2008, an aerial survey was conducted for wintering greater sage-grouse within the WMWE project area and an adjacent 213-mi^2 survey area as requested by BLM RSFO (TRC 2008a). Eighty-four greater sage-grouse were observed during that winter survey; however, none were observed within the WMWE project area. The project area, as well as much of the rest of the eastern two-thirds of the surveyed area, had fairly high snow cover relative to available forage at the time of the survey, and numerous golden eagles (which prey on greater sage-grouse) were observed during the survey. These two factors may explain the scarcity of greater sage-grouse recorded in the project area and immediately adjacent areas during the winter survey (TRC 2008a).

An aerial greater sage-grouse lek survey of the 213-mi^2 above-referenced area was conducted from April 4 through April 6, 2008 (TRC 2008b). The BLM identified a new lek on May 10, 2009, and this is located approximately 3.1 mi west of the WMWE project area (personal communication, May 11, 2009, with Nick Kaczor, BLM RSFO Biologist). Based on results of that survey, and BLM and WGFD data, the lek nearest to the WMWE project area is approximately 3.1 mi west, and only one other lek is located within 4.0 mi of the project area.

Greater sage-grouse likely breed and raise their broods in or adjacent to the project area. Fifty (22%) greater sage-grouse were recorded during spring 2008 surveys conducted in conjunction with this project (TRC 2009b). Observations occurred throughout all three months (April-June) of the spring surveys. One hundred and seventy-six (78%) individuals were observed during similar surveys in the fall (August-October). The majority of grouse observations during the spring and fall surveys were recorded in October (117 individuals), followed by September (35) and August (27) (TRC 2009b).

Mountain Plover. Mountain plovers are documented as breeding throughout Wyoming (WGFD 1999). Graul and Webster (1976), Parrish et al. (1993), and Knopf (1996) noted that mountain plover nests were found in areas with at least 30% bare ground, vegetation was short (<4 inches) in spaced clumps or mats (e.g., cushion plants), and terrain was flat or less than 3% slope. Mountain plovers in the general project area are found in cushion plant communities and on windswept ridges (personal communication, June 10, 2002, with Lorraine Keith, BLM RSFO). Mountain plover breeding/nesting habitat is often associated with active prairie dog towns (Dinsmore 2003). In Colorado, the mountain plover diet is composed of 99.7% arthropods, with beetles, grasshoppers, crickets, and ants as the most important food items (Baldwin 1971).

A portion of proposed project area is composed of greasewood fans and flats and basin exposed rock with areas that are relatively void of vegetation. These areas could provide suitable nesting and foraging habitat for mountain plover; however, no mountain plovers were observed during 21+ weeks of diurnal and nocturnal avian migration studies conducted in 2008 (TRC 2009b), and no mountain plover observations have been recorded in the vicinity of the proposed WMWE project area (WNDD 2009).

Bald Eagle. Bald eagles require cliffs, large trees, or sheltered canyons associated with concentrated food sources (e.g., fisheries or waterfowl concentration areas) for nesting and/or roosting areas (Edwards 1969; Snow 1973; Call 1978; Steenhof 1978; Peterson 1986). Bald eagles forage over wide areas during the nonnesting season (i.e., fall and winter) and scavenge on animal carcasses such as pronghorn, deer, and elk.

No bald eagle nests or winter roosts are known to occur in the proposed project area or immediate project area, and no observations were made during avian studies conducted in 2008 (TRC 2008c, 2009b; WNDD 2009). However, the Green River, approximately 6.5 mi southwest of the proposed project, provides favorable nesting, roosting, and foraging habitat for bald eagles, and

it is likely that individuals occasionally forage in or fly through the WMWE project area.

Midget Faded Rattlesnake. The midget faded rattlesnake is currently considered a subspecies of the common western rattlesnake (*Crotalus viridis*). This species mainly occupies the Colorado Plateau of eastern Utah, western Colorado, and southwestern Wyoming on the Green River formation, typically below 7,000 ft in elevation. The midget faded rattlesnake is shy and inhabits rocky and arid basins. Exposed rocky outcrops and ledges are important habitat features because they provide safe hibernacula, escape cover, and thermal cover and have been identified as the main environmental limit to distribution and abundance (Travsky and Beauvais 2004). There are recorded occurrences of midget faded rattlesnake within the WMWE project area and vicinity (WNDD 2009).

Cedar Rim Thistle. The Cedar Rim thistle is a perennial tap-rooted herb with stems up to 30 cm tall. The flowering and fruiting period for this species is June through July. This species occurs on barren slopes, fans, and draws on whitish-gray sandstone, chalk, tufaceous colluvium, or clay substrates derived from the split Rock, White River, Wagon Bed, Wind River, Green River, and Wasatch formations. Populations are found in sparsely vegetated openings within Wyoming big sagebrush grasslands at 5,800 to 7,500 ft (WNDD 2000). There are no recorded occurrences within the WMWE project area, and the nearest known population of Cedar Rim thistle is approximately 40.0 mi south of the WMWE project area (WNDD 2009). However, the BLM has a historic record indicating an observation within 1.5 mi of the WMWE project area (personal communication, August 31, 2009, with Jim Glennon, BLM, RSFO).

It should be noted that other BLM sensitive species such as ferruginous hawks, sagebrush obligate species, and BLM sensitive bat species are addressed in Section 3.12 of this EA.

3.9 VEGETATION (INCLUDING INVASIVE SPECIES AND WETLANDS)

The IAA for vegetation resources is the boundary of the level 12 HUC. A total of 19,828 acres (7.43%) of the 268,613-acre IAA has been disturbed, primarily by cities.

The occurrence of individual species and plant communities depend on factors such as topography, parent rock material, elevation, aspect, and slope. These in turn influence moisture levels and solar radiation (Knight 1994; Young and Singleton 1977).

Based on Wyoming Gap Analysis 1:100,000 scale mapping (Figure 3.6), three vegetation types occur within the proposed project area. Vegetation types include 11,452 acres (87%) of Wyoming big sagebrush community, 1,097 acres (8%) of greasewood fans and flats community, and 616 acres (5%) of basin exposed rock/soil communities (Wyoming Gap Analysis 1996). These vegetation communities and species occurring in the proposed project area are common throughout the region. Vegetation within the Wyoming big sagebrush community consists primarily of Wyoming big sagebrush and rabbitbrush, with scattered bitterbrush, horsebush, and winterfat and an understory of grasses and forbs such as western wheatgrass, prairie junegrass, needle-and-thread grass, Sandberg bluegrass, broom snakeweed, and phlox. The greasewood fans and flats vegetation community is associated with drainages that flow west out of the project area (refer to Figure 3.6). Species occurring within this type are predominantly composed of greasewood and Gardener's saltbush, with an understory of western wheatgrass, needle-and-thread grass, alkali sacaton, Sandberg bluegrass, and cushion plant communities. The basin exposed rock areas are associated with the rim along White Mountain where the ground is windblown and vegetation is sparse. Gardner saltbush and cushion plant species such as phlox, sandwort, and buckwheats are the primary species occurring in this type. Pockets of mountain mahogany and antelope bitterbrush and scattered junipers occur in areas downslope of the rim

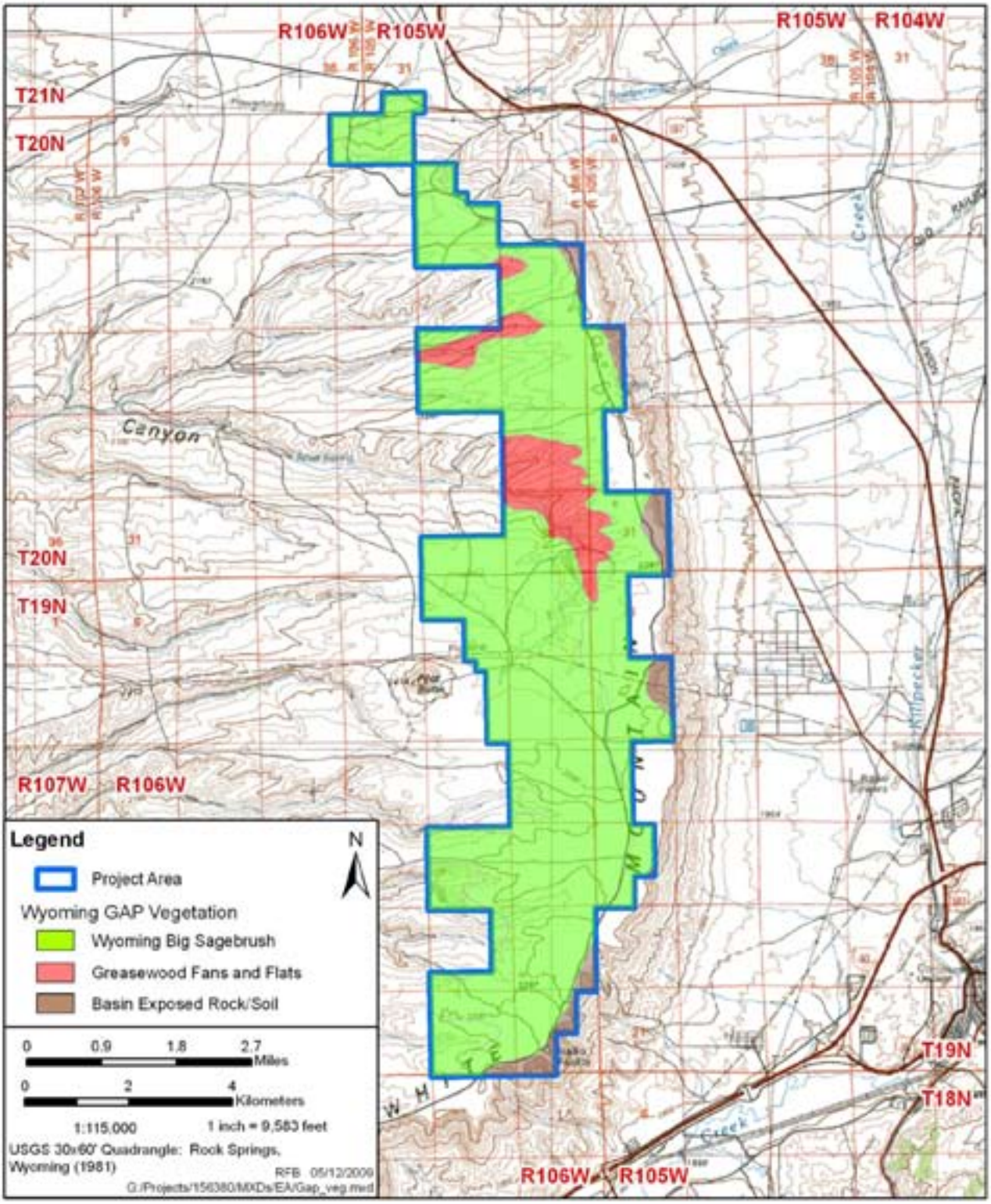

Figure 3.6 Vegetation, WMWE Project.

where snow collects and provides additional moisture to support more mesic species.

No riparian communities are identified by the Wyoming Gap Analysis; however, a review of digital NWI information (USFWS 2003) show the occurrence of a linear palustrine seasonally flooded wetland (PEMC) and two intermittent streams (R4SBA) located in the project area that could potentially support seasonal riparian areas (Figure 3.7). In addition, NWI data indicate the occurrence of several small playa areas (PUSA) (refer to Figure 3.7) scattered within the project area. The Green River Resource Management Plan (BLM 1997) stipulates a 500-ft protection buffer for riparian areas and a 100 ft-buffer for ephemeral channels.

Federal agencies are directed by Executive Order 13112, Invasive Species, to expand and coordinate efforts to prevent the introduction and spread of invasive plant species (noxious weeds) and to minimize the economic, ecological, and human health impacts that invasive species cause. Weed populations are generally found along main dirt roads and two-track roads, in areas of livestock concentration, and in areas of intense recreational use. The BLM says that recent rangeland health monitoring in the RSFO has documented significant increases in invader species throughout the uplands (BLM 2007). Motorized vehicles transporting seeds can be a major source of new infestations of weed species. Noxious weed and other invasive species have not been documented in the project area nor has the Sweetwater Weed and Pest Control sprayed for weeds along County Road 53 in 2008. The closest known area of noxious weeds (*Lepidium latifolium*), hoary cress (*Cardaria* spp.), and Canada thistle (*Cirsium arvense*) occurs along county roads near the Green River located 6.5 mi west of the project area (personal communication, February 5, 2009, with Gale Lamb, Supervisor, Sweetwater County Weed and Pest Control, McKinnon, Wyoming).

3.10 VISUAL RESOURCES

The IAA for visual resources is the project boundary plus a 20-mi buffer. A total of 38,289 acres (3.26%) of the 1,175,515-acre IAA has been disturbed, primarily by cites.

The BLM has initiated visual resource management (VRM) on the lands under its management in the proposed project area, with the overall objective to minimize visual resource impacts resulting from human activities. The VRM inventory process considers the scenic quality of the landscape, viewer sensitivity, and the distance from the viewer to the landscape. VRM relative value of the visual resource is indicated by one of four assigned classes. According to the BLM VRM objectives, areas with VRM Classes I and II are the most valued areas, Class III areas are of moderate value, and Class IV areas are of least value (Table 3.6). VRM Class I and II areas are managed with more restrictions on modification of the existing natural character than are the other VRM classes.

The entire BLM RSFO, including the proposed project area, has been mapped for VRM (BLM 1997). While the project area has been evaluated for VRM classifications, these classifications do not apply to private or state-managed lands. Approximately 85% (11,249 acres) of the proposed project area is within a Class IV VRM area. The remaining 15% (1,916 acres) of the proposed project area--the extreme southeastern portion and the northern portion of the proposed project area--is within an area mapped as a Class III VRM area (Figure 3.8).

The project area is a feature landscape with Pilot Butte as the prominent landform. Feature landscapes are dominated by a feature or a group of feature objects in the distance to which the eye is drawn. Such landscapes are vulnerable to modification if located near the feature. The remainder of the project area consists of gently rolling hills with moderate visual variety in the surrounding landscape. It is a classic panoramic Wyoming landscape that creates a feeling of vastness and open space. It is framed by a backdrop of snow-covered mountains to the northeast and southwest, which enhance the scenic value of the lands in the project area.

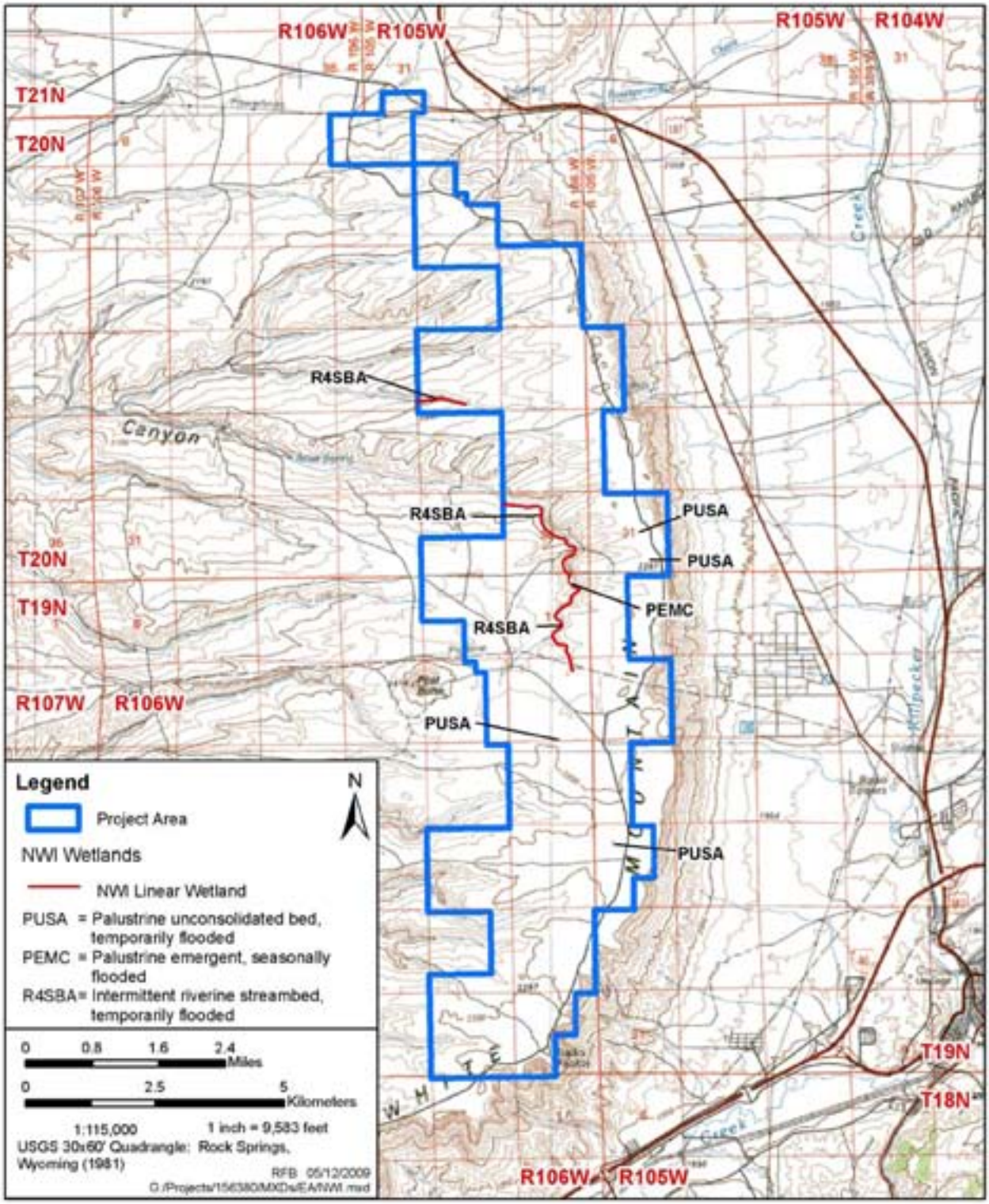

Figure 3.7 National Wetland Inventory Information, WMWE Project.

Table 3.6 BLM Visual Resource Management Class Objectives. [1]

Class	Description
I	The objective of this class is to maintain a landscape setting that appears unaltered by humans. It is applied to wilderness areas, some natural areas, wild portions of the wild scenic rivers, and other similar situations where management activities are to be restricted.
II	The objective of this class is to design proposed alterations so as to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
II	The objective of this class is to design proposed alterations so as to partially retain the existing character of the landscape. Contrasts to the basic elements (form, line, color, and texture) caused by a management activity may be evident and begin to attract attention in the characteristic landscape. However, the changes should remain subordinate to the existing characteristic landscape. Structures located in the foreground distance zone (0-1/2 mile) often create a contrast that exceeds the VRM class, even when designed to harmonize and blend with the characteristic landscape. This may be especially true when a distinctive architectural motif or style is designed. Approval by the District Manager is required on a case-by-case basis to determine whether the structure(s) meet the acceptable VRM class standards, and if not, whether they add acceptable visual variety to the landscape.
IV	The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. Contrasts may attract attention and be a dominant feature of the landscape in terms of scale; however, the change should repeat the basic elements (form, line, color, and texture) inherent in the characteristic landscape. Structures located in the foreground distance zone (0-1/2 mile) often create a contrast that exceeds the VRM class, even when designed to harmonize and blend with the characteristic landscape. This may be especially true when a distinctive architectural motif or style is designed. Approval by the District Manager is required on a case-by-case basis to determine whether the structure(s) meet the acceptable VRM class standards, and if not, whether they add acceptable visual variety to the landscape.

[1] Source: BLM (1997).

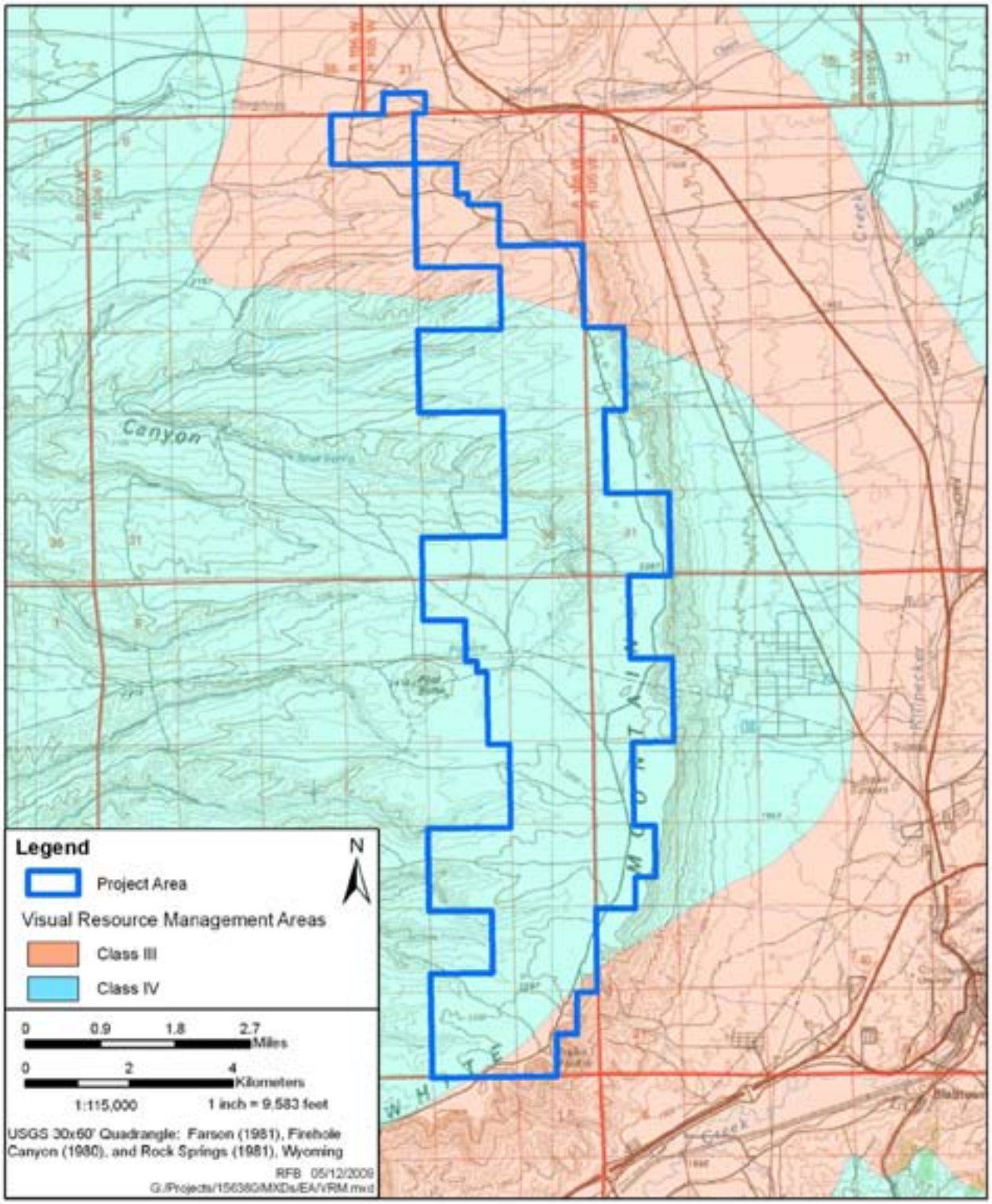

Figure 3.8 Visual Resource Management Areas (Public Lands Only), WMWE Project.

The Pilot Butte feature introduces a strong vertical line in an otherwise horizontal landform. This change in line is what makes the feature landscape most fragile. Apart from the Pilot Butte feature, the lines in the landscape are strongly horizontal in nature. They are formed by the shape of the hills and differences in concentrations of the vegetation.

Vegetation on Pilot Butte is sparse, short, and minimal to nonexistent. Vegetation of the surrounding landscape is predominately sagebrush and short grasses. Sagebrush is by far the dominant vegetative species. For most of the year, the landscape has a strong gray color. There are subtle variations in color resulting from different concentrations, heights, and densities of the vegetation. During the spring and early summer, the sagebrush is a light gray-green color but usually by early August the vegetation matures and takes on a characteristic gray color that is dominant until the following spring.

The texture of the land features of the landscape is mostly smooth with the exception of Pilot Butte, which introduces an extremely coarse point. Texture of the vegetation is coarse in the immediate foreground and medium to smooth at the middle distances.

The area is substantially natural in character with few manmade structures. Within and immediately adjacent to the project area, there are existing gas pipeline and well facilities, three large 345-kV) transmission power lines with metal structures that run east to west through the northern section of the proposed project area, as well as one smaller (230-kV) transmission power line with wooden structures that runs east to west through the center of the project area (and just north of Pilot Butte), a microwave reflecting tower, TV and radio broadcasting towers, two unpaved county roads, and numerous two-track roads/trails.

3.11 WILD HORSES

The IAA for wild horses is the project boundary plus a 6.0-mi buffer. A total of 18,013 acres (9.13%) of the 197,273-acre IAA has been disturbed, primarily by cites.

The proposed project is within the Rock Springs WHHMA, which encompasses approximately 391,409 acres (Figure 3.9).

The White Mountain WHHMA encompasses an area from I-80 north to the Big Sandy River and from U.S. Highway 191 west to the Green River. The estimated population of the White Mountain herd is approximately 306 horses based on direct counts of horses from flights conducted in May 2009 followed by the June 2009 gather. The wild horses in the WHHMA were gathered to the low range Appropriate Management Level (AML) of 215 horses in November 2007 (BLM 2007). The genetic diversity in the White Mountain herd is relatively high as long as herd populations are maintained at a level of greater than 100 animals (BLM 2007).

The AML range for the WHHMA is 215 to 305 wild horses as described in the Green River RMP. In addition, there is a Consent Decree for gathering wild horses above the AML. The range was utilized moderately to heavy by wild horses before they were gathered to the low range AML. Range conditions appear to be static in most areas that are inhabited by wild horses, and the population of wild horses in the herd unit has remained at or above objectives since the institution of wild horse gathering.

3.12 WILDLIFE

3.12.1 Big Game

Three big game species--pronghorn antelope, mule deer, and elk--occur within the proposed project area. The population estimates for big game herds provided below are based on WGFD model estimates from the 2007 big game job completion reports (WGFD 2007).

3.12.1.1 Pronghorn Antelope

The IAA for pronghorn antelope is Hunt Area 96 within the Sublette Herd Unit. A total of 17,409 acres (2.84%) of the 612,496-acre cumulative IAA has been disturbed, primarily by roads and cites.

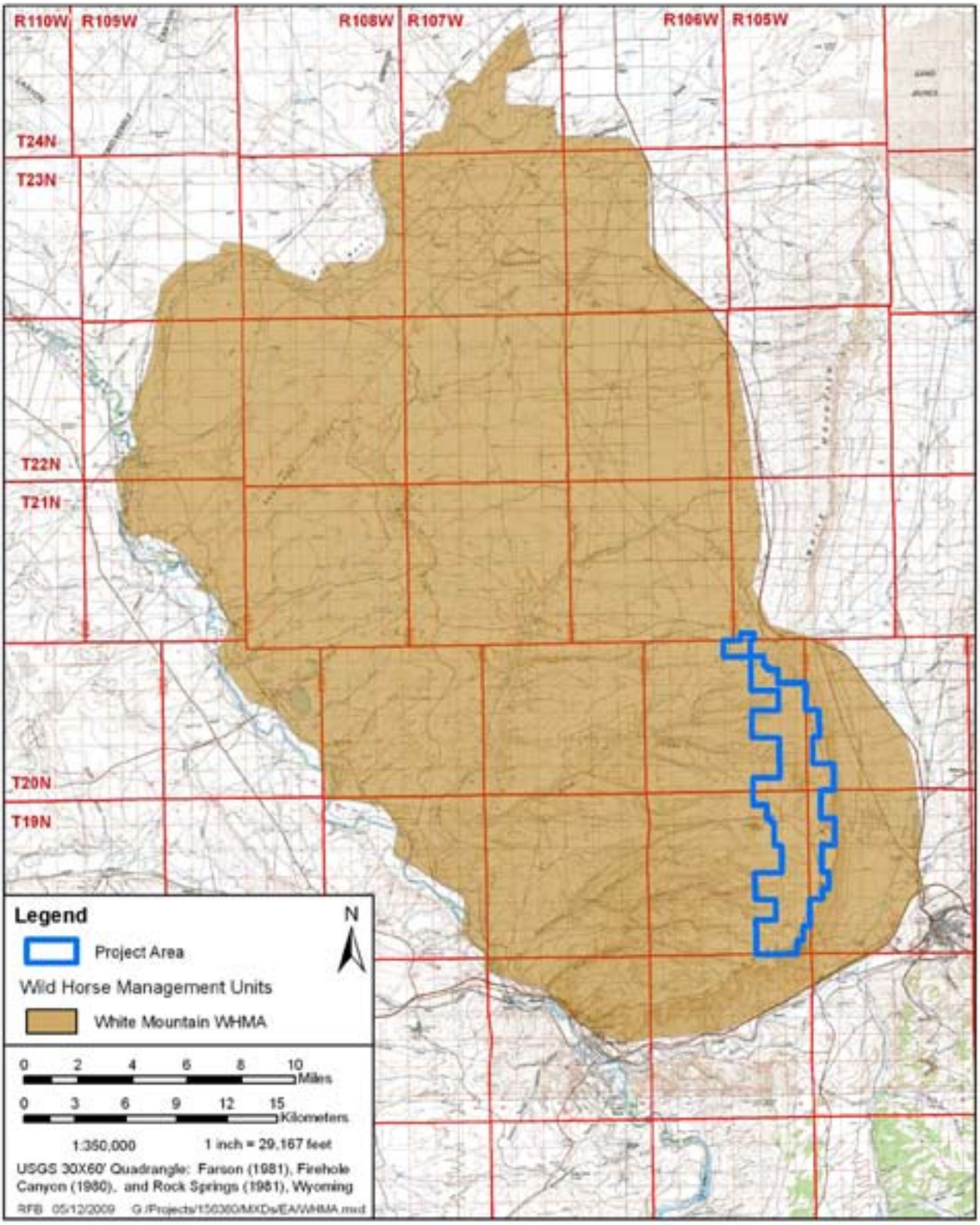

Figure 3.9 Wild Horse Management Areas, WMWE Project.

Pronghorn antelope in the proposed project area belong to the Sublette Pronghorn Antelope Herd (Herd Unit 401, Hunt Area 96). The WGFD population objective for the Sublette Pronghorn Antelope Herd is 48,000 animals, and the 10-year average is 50,210 animals. The 2007 population was estimated at 62,200 animals, approximately 29% above the population objective for this herd (WGFD 2007). Approximately 12,144 acres (92%) of the project area occurs in habitat the WGFD has designated as yearlong habitat, 1,021 acres (8%) of the proposed project area occurs in habitat the WGFD has designated as crucial winter/ yearlong antelope range, which is located near the eastern ridge of the project boundary and the rim of White Mountain (Figure 3.10) (WGFD 2006). The nearest pronghorn antelope severe winter relief habitat is located 4.0 mi southeast of the project area and east of Rock Springs (refer to Figure 3.10). There are no known migration corridors for pronghorn antelope in the WMWE project area. However, there are two corridors north of the WMWE project area (refer to Figure 3.10).

3.12.1.2 Mule Deer

The IAA for mule deer is the Steamboat Herd Unit. A total of 27,191 acres (1.03%) of the 2,554,688-acre IAA has been disturbed, primarily by roads and major facilities.

Mule deer in the proposed project area belong to the Steamboat Mule Deer Herd (Herd Unit 430, Hunt Area 131). The WGFD population objective for the Steamboat Mule Deer Herd is 4,000 animals, and the 10-year average is 4,246 animals. The 2007 population was estimated at 4,540 animals, approximately 13% above the population objective for this herd (WGFD 2007). Approximately 12,028 acres (91%) of the proposed project area occurs in habitat the WGFD has designated as yearlong mule deer range, and 1,029 acres (8%) is designated as winter yearlong. The remaining 108 acres (1%) located in the northwest corner of the project area is designated as "out" under the WGFD habitat designations, meaning that this area is not part of any herd unit; this area does not contain enough animals to be important habitat or the habitats are of limited importance to this species (WGFD 2006) (Figure 3.11). No mule deer crucial winter ranges or parturition areas occur within the proposed project area. The nearest mule deer crucial range is located approximately 11.0 mi south of the proposed project (WGFD 2006).

3.12.1.3 Elk

The IAA for elk is the Steamboat Herd Unit. A total of 23,452 acres (0.93%) of the 2,529,717-acre IAA has been disturbed, primarily by roads and major facilities.

Elk in the proposed project area belong to the Steamboat Elk Herd (Herd Unit 426, Hunt Area 100). The WGFD population objective for the Steamboat Elk Deer Herd is 1,200 animals, and the 10-year average is 1,555 animals. The 2007 population was estimated at 1,300 animals, approximately 8% above the population objective for this herd (WGFD 2007). Approximately 11,559 acres (88%) of the project area occurs in habitat the WGFD has designated as spring/summer/fall habitat, 1,097 acres (8%) of the proposed project area occurs in habitat the WGFD has designated as winter/yearlong elk range (Figure 3.12). Approximately 509 acres (4%) of the western project area intersects the boundary of habitat designated as crucial winter/yearlong range (WGFD 2006) (refer to Figure 3.12). An elk parturition area is located 0.5 to 2.0 mi west of the project boundary.

3.12.2 Small Mammals

Typical predators known to occur or potentially occurring in the proposed project area are coyote, red fox, raccoon, long-tailed weasel, badger, mink, striped skunk, mountain lion, and bobcat. Lagomorph species include desert cottontail, mountain (Nuttall's) cottontail, pygmy rabbit, and white-tailed jackrabbit. Squirrels known to occur or potentially occurring include least chipmunk, Richardson/Wyoming ground squirrel, golden-mantled ground squirrel, and thirteen-lined ground squirrel. Porcupine may also occur. Other rodents include four species of pocket gopher (northern, plains, Merriam's, and Great Basin), two species of pocket mouse (olive-backed and northern),

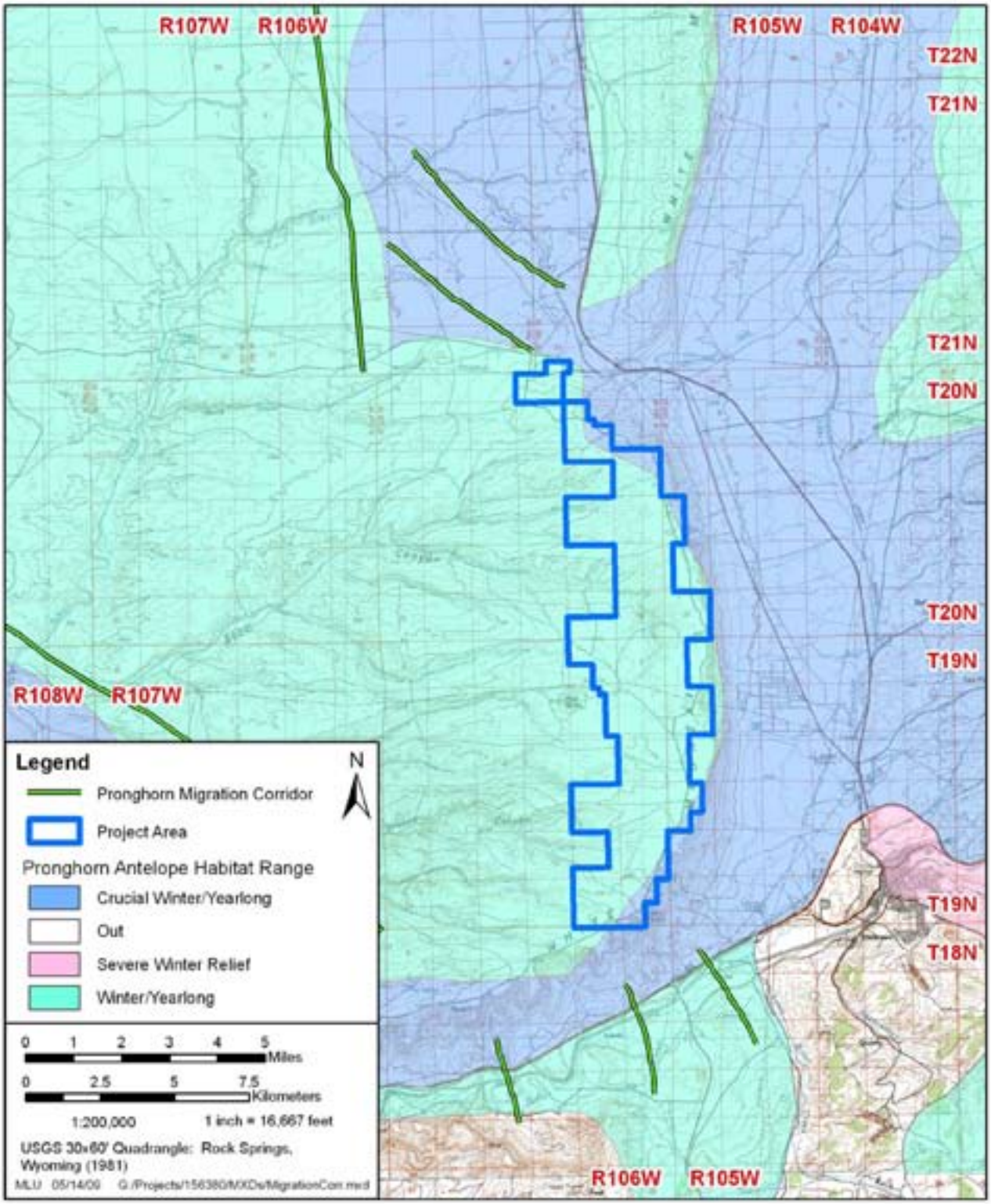

Figure 3.10 Pronghorn Antelope Habitat Ranges, WMWE Project.

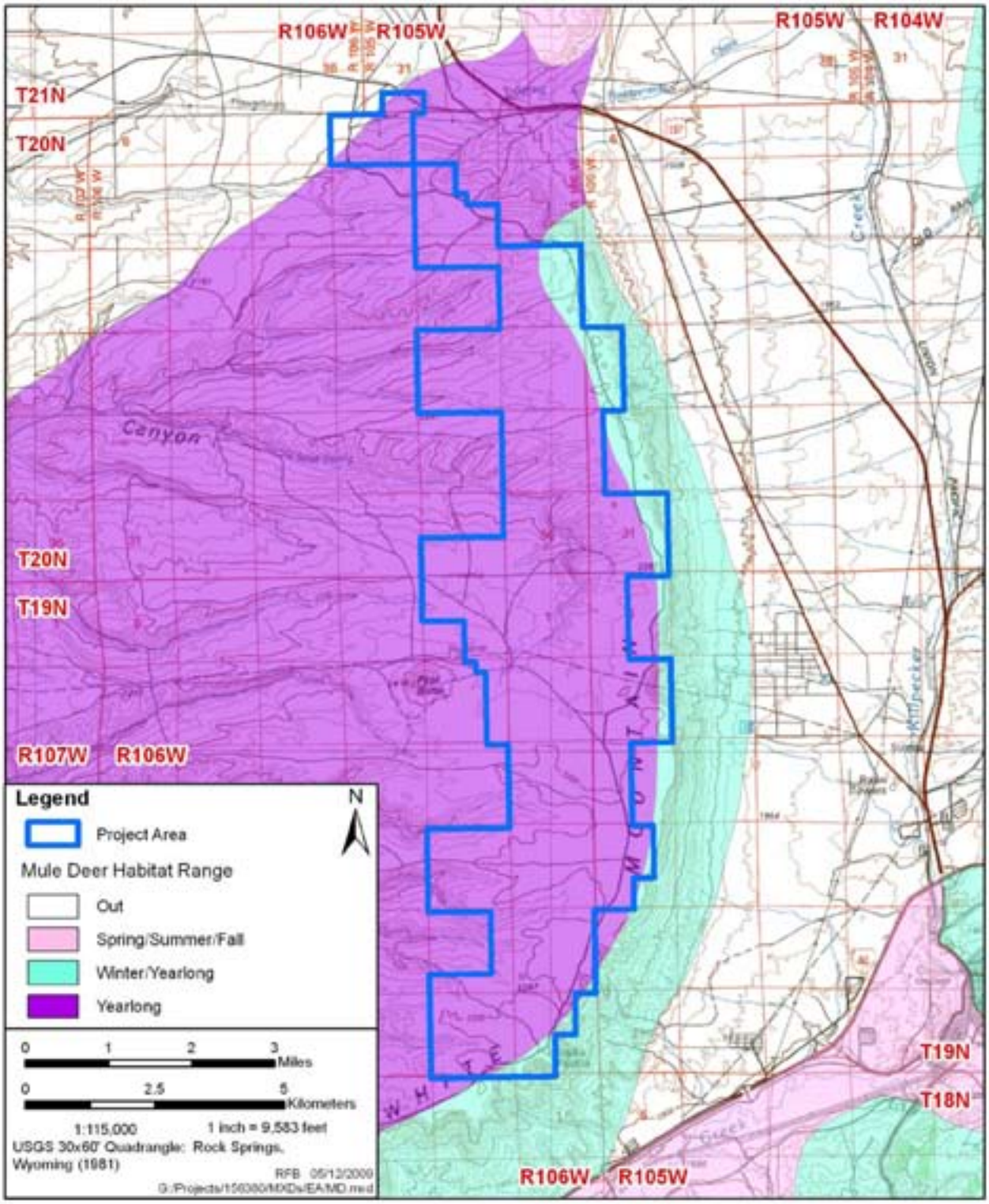

Figure 3.11 Mule Deer Habitat Ranges, WMWE Project.

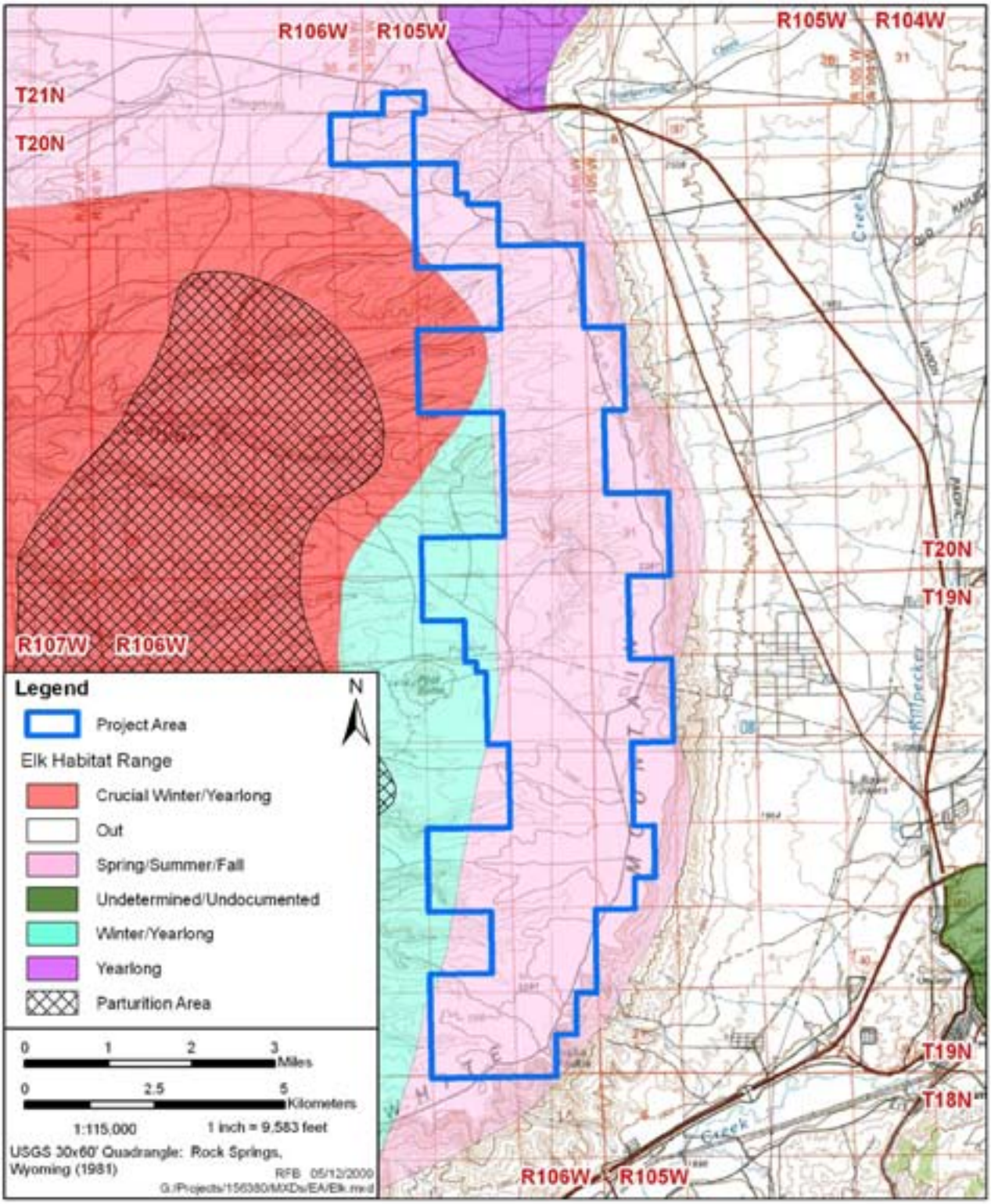

Figure 3.12 Elk Habitat Ranges, WMWE Project.

Ord's kangaroo rat, beaver, deer mouse, northern grasshopper mouse, bushy-tailed woodrat, six species of vole (western, heather, meadow, long-tailed, prairie, and sagebrush), and western jumping mouse (WGFD 2004).

3.12.3 Bats

The IAA for bats is the boundary of the level 12 HUC. A total of 19,954 acres (7.43%) of the 268,613-acre IAA has been disturbed, primarily by cities. Bats species potentially occurring or that may pass through the project area include western small-footed, long-legged, little brown, and silver-haired bats, and the BLM sensitive species long-eared myotis, fringed myotis, spotted bat, and Townsend's big-eared bat (WGFD 2004). An acoustical bat monitoring survey was conducted during late summer and early fall of 2008 within the proposed WMWE project area (TRC 2008d). The purpose of the acoustical bat monitoring study was to document bat migration in the project area and to provide baseline data that can be used to evaluate potential impacts to bats due to wind energy development in the project area. Species documented in the project area included hoary, silver-haired, and big brown bats; however, other species of bats with high-frequency calls (i.e., greater than 35 kilohertz [kHz]) that may occur are listed in Table 3.7 (TRC 2008d).

There are no known winter hibernacula, diurnal roosting sites, or other features that are likely to attract bats located within or immediately adjacent to the proposed WMWE project area (TRC 2008d). In addition, surveys were conducted near the project area, and no winter hibernacula, diurnal roosting sites, or other features that are likely to attract bats are located within or immediately adjacent to the proposed WMWE project area (TRC 2008d). In addition, the WMWE project area does not contain topographic features likely to funnel migrating bats, and the project area lacks large tracts of forest cover, unlike high-mortality sites in the eastern U.S. However, the relatively large numbers of bat fatalities recently reported in northern Iowa (Jain 2005) and southwestern Alberta (Baerwald 2006) indicate that an open landscape is no guarantee of low mortality. Based on the topography and habitats of the WMWE project area, it is expected that a majority of bat mortalities associated with operation of the wind energy facility would occur as individuals migrate through the area.

Table 3.7 Bat Species Determined from Range Maps as Likely to Occur Within the WMWE Project Area, Sorted by Call Frequency.[1]

Bat Species with High-frequency Calls (≥35 kHz)		Bat Species with Low-frequency Calls (<35 kHz)	
Common Name	Scientific Name	Common Name	Scientific Name
Western small-footed bat	*Myotis ciliolabrum*	Townsend's big-eared bat	*Corynorhinus townsendii*
Western long-eared bat	*Myotis evotis*	Silver-haired bat [2, 3]	*Lasionycteris noctivagans*
Little brown bat	*Myotis lucifugus*	Hoary bat [2, 3]	*Lasiurus cinereus*
Long-legged bat	*Myotis volans*	Fringed bat	*Myotis thysanodes*
		Big brown bat [3]	*Eptesicus fuscus*

1 From Harvey et al. (1999) and Bat Conservation International, Inc. (2002).
2 Long-distance migrant.
3 Species documented in fatality studies at other U.S. wind energy facilities.

3.12.4 Raptors

The IAA for raptors is the project area plus a 14.5-mi buffer. A total of 29,676 acres (4.28%) of the 693,604-acre IAA has been directly disturbed, primarily by the cities of Rock Springs, Green River, and surrounding developments.

Raptor species most likely to occur or potentially occurring within the WMWE project area and immediate vicinity include (based on habitat preferences) golden eagle; northern harrier; Swainson's, red-tailed, ferruginous, and rough-legged hawks; American kestrel; prairie falcon; and great horned, burrowing, and short-eared owls. However, osprey; bald eagle; sharp-shinned and Cooper's hawks; northern goshawk; merlin; and barn, long-eared, and northern saw-whet owls also occur within the project area latilong and may occasionally pass through the project area (WGFD 2004).

In conjunction with the WMWE Project, a raptor nest survey was conducted within a 213-mi^2 survey area that includes the project area and surrounding vicinity, particularly to the west and south (TRC 2008c). The survey was conducted by helicopter between April 24 and 26, 2008. During the survey, 245 raptor and corvid nests were recorded, including 10 American kestrel, 27 common raven, 19 ferruginous hawk, 67 golden eagle, three great horned owl, 18 prairie falcon, 18 red-tailed hawk, and 83 nests of unidentified species, most of which likely were golden eagle or red-tailed hawk nests. Fifty (20%) of the nests were occupied in 2008, and an additional seven nests were recorded as having an unidentified activity status (TRC 2008c). Figure 3.13 illustrates the general locations of the 2008 active raptor nests and the season buffers for each nest.

The project area and surrounding vicinity provide suitable foraging habitat for the raptor species nesting in the area, as well as for migrants that may pass through. In addition, bald eagles and rough-legged hawks may winter in and/or adjacent to the area, with small mammals and road- or winter-killed big game providing a food source for those species, as well as resident raptor species.

3.12.5 Upland Game Birds

The IAA for upland game birds is the area north of Bitter Creek, east of the Green River, south of the Big Sandy River to Farson, then east to Killpecker Sand. A total of 10,401 (1.91%) of the 545,351-acre IAA has been disturbed, primarily by roads.

The WMWE project area is located entirely within the Eden UGBMA #7, and the Flaming Gorge UGBMA #6 extends to within approximately 1.0 mi of the southeastern corner of the project area (WGFD 2009) (refer to Figure 3.4). WGFD (2004) lists chukar and BLM sensitive species (refer to Figure 3.4) blue grouse, mourning dove, and greater sage-grouse as breeding within the WMWE project area latilong, and gray partridge and ruffed grouse are listed as occasional visitors within the latilong. However, based on the habitat preferences of these species, only chukar, greater sage-grouse, and mourning dove were close and within the project area in 2008 (TRC 2009b).

Chukar was observed in the rocky shrublands west of the project area during raptor nesting surveys conducted for this project (TRC 2008c, 2009b). Although their presence in the project area is likely to be infrequent based on their preferred habitat of rocky shrublands and foothills, chukar may frequent areas to the west and may occasionally fly through the project area.

Mourning doves are found in a wide variety of habitats ranging from urban and disturbed areas to deserts (near water), agricultural areas, and open woodlands (Erlich et al. 1988). They are summer residents in Wyoming and are considered abundant throughout the state (WGFD 2004). During spring and fall point count surveys conducted in conjunction with this project, only two mourning doves were observed; however, the species is common in the general area and are known to occur within or adjacent to the project area (TRC 2009b).

Greater sage-grouse is a BLM sensitive species and is discussed in Section 3.8.2.

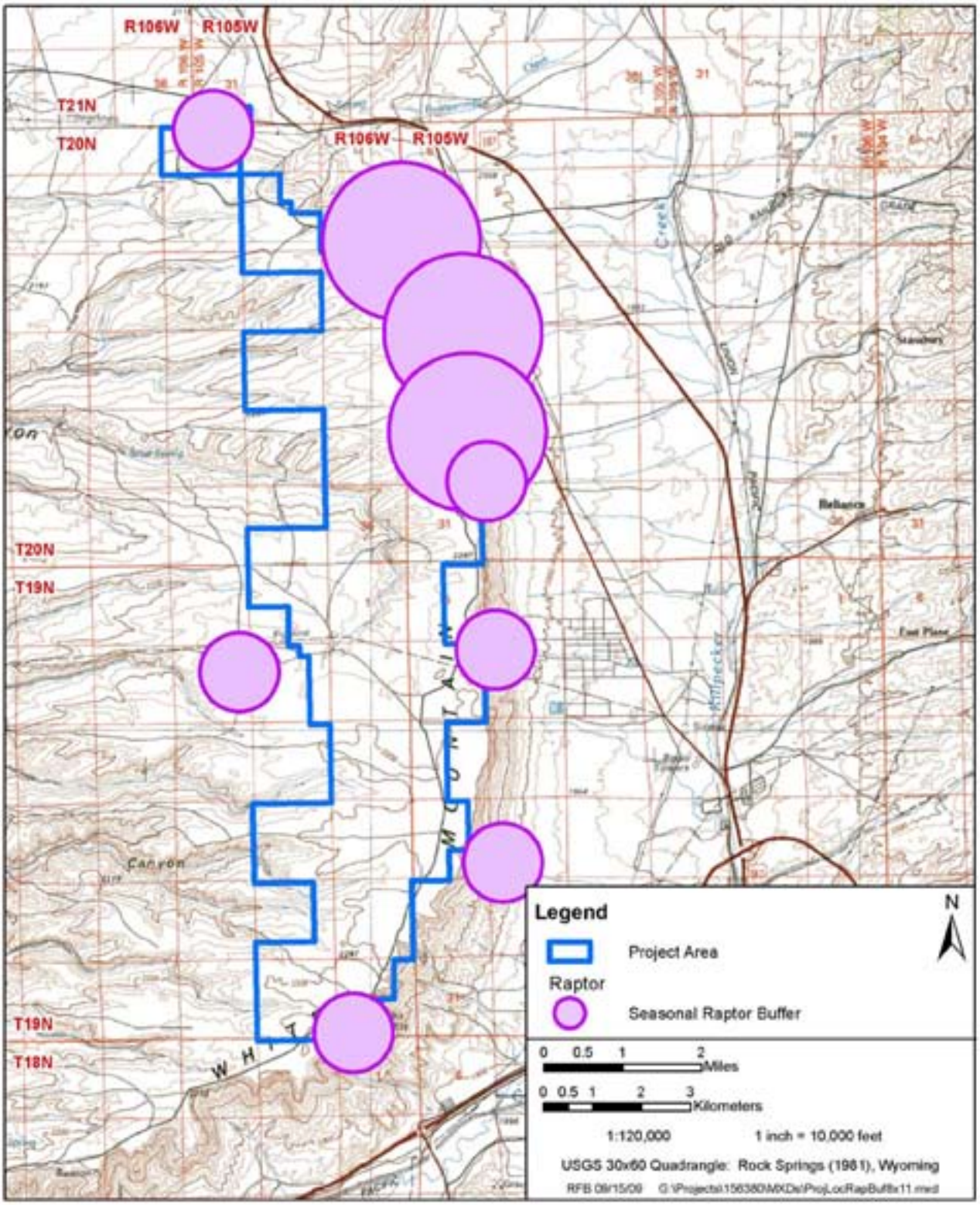

Figure 3.13 General Location of 2008 Active Raptor Nests and Seasonal Buffers.

3.12.6 Migratory Birds

The IAA for migratory birds is the boundary of the level 12 HUC. A total of 19,954 acres (7.43%) of the 268,613-acre IAA has been disturbed, primarily by cities.

During the spring and fall of 2008, avian point count and use surveys of the WMWE project area were conducted in conjunction with the proposed project. Avian surveys were conducted 2 days each week for 10 weeks during the spring survey period (April 14 through June 17, 2008) and for 11 weeks during the fall survey period (August 17 through October 27, 2008). Nine survey plots for RLB and 18 survey plots for PSB were established in the WMWE project area. Flight heights of each species were recorded at each of the avian survey plots. Nocturnal observation surveys were conducted at seven of the nine RLB point count plots. The nocturnal surveys were conducted once a week from May 6, 2008, through June 16, 2008, during spring surveys and from August 17, 2008, through October 26, 2008, during the fall surveys. A comprehensive description of survey methods and results can be found in TRC (2009b). Table 3.8 provides a list of all bird species observed during those studies and their likely occurrence classification within the latilong. Although the list is not comprehensive for all birds that might use or fly through the vicinity, it is indicative of the species that most likely and commonly occur in the project area. Since there are no permanent water bodies within the project area, it is unlikely that waterfowl and shorebirds typically would nest in the area, although birds nesting along the Green River to the east, as well as migrating birds, may occasionally pass through the area. Avian diversity for the WMWE project area was slightly higher during the fall than spring (at least 14 species vs. 12 species). Equal numbers of PSB species were recorded in the WMWE project area for spring and fall (30 species each season). Horned lark was the most abundant of the species documented in the WMWE project area during both spring and fall. PSB use in the project area for all birds combined in the spring averaged 250.65 birds/km^2/8-minute observation period compared to 123.67 in the fall (TRC 2009b). Use for both seasons combined was 182.49 birds/km^2/8-minute observation period.

Based on the 2008 avian daytime surveys, the project area did not appear to serve as a migratory corridor for birds, and the paucity of birds heard and observed during the nocturnal surveys may indicate a relatively low risk posed to night-migrating birds that may fly over the project area; however, in the absence of calling, small birds flying would have been difficult to detect during the nocturnal surveys given their small size and the limitations of the equipment used. The project area did not appear to serve as a major migratory stopover site. During spring, the highest numbers of birds were recorded in May with the peak survey occurring during the week of May 13. During the fall surveys, the highest number of birds occurred during the first week of surveys (August 18), and both the numbers of individuals and the numbers of species dropped notably thereafter. This suggests that many of the migrants may have moved out of the area before or concurrent with the initiation of the fall surveys in mid-August. All migratory birds are protected by the *Migratory Bird Treaty Act* (16 U.S.C. 701-715).

Table 3.8 Avian Species Recorded Within the WMWE Project Area and Vicinity During 2008 Project-related Studies.

Common Name	Scientific Name	Dorn and Dorn (1999) Classification[1]	WGFD (2004) Classification[2]
Chukar	*Alectoris chukar*	R	B
Double-crested cormorant	*Phalacrocorax auritus*	Y	B
Turkey vulture	*Cathartes aura*	b	B
Canada goose	*Branta canadensis*	R	B
Northern harrier	*Cyrcus cyaneus*	R	B
Red-tailed hawk	*Buteo jamaicensis*	R	B
Ferruginous hawk	*Buteo regalis*	B	B
Rough-legged hawk	*Buteo lagopus*	W	O
Golden eagle	*Aquila chrysetos*	r	B
American kestrel	*Falco sparverius*	R	B
Merlin	*Falco columbarius*	R	B
Prairie falcon	*Falco mexicanus*	B	B
Greater sage-grouse	*Centrocercus urophaisianus*	B	B
Mourning dove	*Zenaida macroura*	B	B
Great horned owl	*Bubo virginianus*	r	B
Common nighthawk	*Chordeiles minor*	b	B
Common poorwill	*Phalaenoptilus nuttallii*	b	B
Broad-tailed hummingbird	*Selasphorus platycercus*	b	b
Northern flicker	*Colaptes auratus*	R	B
Olive-sided flycatcher	*Contopus cooperi*	b	b
Western wood-pewee	*Contopus sordidulus*	b	B
Least flycatcher	*Empidonax minimus*	--	--
Say's phoebe	*Sayornis saya*	B	B
Loggerhead shrike	*Lanius ludovicianus*	b	B
Black-billed magpie	*Pica pica*	R	B
Common raven	*Corvus corax*	r	b
Horned lark	*Eremophila alpestris*	R	B
Tree swallow	*Tachycineta bicolor*	B	B
Cliff swallow	*Petrochelidon pyrrhonota*	B	B
Mountain chickadee	*Poecile gambeli*	R	B
Red-breasted nuthatch	*Sitta canadensis*	B	b
Rock wren	*Salpinctes obsoletus*	b	B
Bewick's wren	*Thryomanes bewickii*	B	B
House wren	*Troglodytes aedon*	B	B
Ruby-crowned kinglet	*Regulus calendula*	B	b
Blue-gray gnatcatcher	*Polioptila caerulea*	B	B

Table 3.8 (Continued)

Common Name	Scientific Name	Dorn and Dorn (1999) Classification[1]	WGFD (2004) Classification[2]
Mountain bluebird	*Sialia currucoides*	B	B
Townsend's solitaire	*Myadestes townsendi*	W	b
Hermit thrush	*Catharus guttatus*	b	B
American robin	*Turdus migratorius*	R	B
Sage thrasher	*Oreoscoptes montanus*	b	B
Virginia's warbler	*Vermivora virginiae*	b	B*
Yellow-rumped warbler (Audubon's)	*Dendroica coronata auduboni*	b	B
Common yellowthroat	*Geothlypis trichas*	b	b
Western tanager	*Piranga ludoviciana*	b	b
Green-tailed towhee	*Pipilo chlorurus*	B	B
Chipping sparrow	*Spizella passerina*	B	B
Brewer's sparrow	*Spizella breweri*	B	B
Vesper sparrow	*Pooecetes gramineus*	b	B
Sage sparrow	*Amphispiza belli*	B	B
Grasshopper sparrow	*Ammodramus savannarum*	b	b
Fox sparrow	*Passerella iliaca*	B	B
Song sparrow	*Melospiza melodia*	r	B
Dark-eyed junco (slate-colored)	*Junco hyemalis hyemalis*	M	B
Dark-eyed junco (gray-headed)	*Junco hyemalis caniceps*	B	B
Western meadowlark	*Sturnella neglecta*	B	B
Brewer's blackbird	*Euphagus cyanocephalus*	b	B
Brown-headed cowbird	*Molothrus ater*	b	B

[1] Based on Dorn and Dorn (1999) classifications for the project area latilong. R = observed in summer and winter, breeding confirmed; r = observed in summer and winter, breeding suspected but unconfirmed; B = observed in summer, breeding confirmed; b = observed in summer, breeding suspected but unconfirmed; Y = observed in winter and summer, probably nonbreeding; W = observed in winter; m = observed in migration season; -- = no classification.

[2] Based on WGFD (2004) classifications for the project area latilong. B = nest or young dependent on parent birds was observed; b = circumstantial evidence of nesting; * = record has been reviewed and accepted by the Wyoming Bird Records Committee; O = the species has been observed, but there was no evidence of nesting. The observation may have been recorded during any season of the year, but observations are most likely to correspond with seasonal status listed in Table 1 of WGFD (2004).

4.0 ENVIRONMENTAL CONSEQUENCES

In accordance with NEPA (40 CFR 1502.16), this chapter of the EA discusses the potential environmental consequences of each phase (i.e., construction, O&M, and decommissioning) of the Proposed Action, Alternative A, and the No Action Alternative on each of the affected resources. An environmental impact is defined as a change in the quality or quantity of a given resource due to a modification in the existing environment resulting from project related activities. Impacts may be beneficial or adverse, may be a primary result (direct) or secondary result (indirect) of an action, and may be permanent and long term or temporary and of short duration. Impacts may vary in degree from a slightly discernible change to a total change in the environment. This impact assessment assumes that all 240 wind turbines would be constructed and all design features described in the Proposed Action would be successfully implemented. If such measures were not implemented, additional adverse impacts may occur.

Residual impacts are impacts resulting from the Proposed Action after application of appropriate design features and/or BMPs (BLM 2008). These impacts would remain for some period of time but would eventually be ameliorated by natural conditions and would not be permanent. For example, increased soil erosion would be reduced as disturbed soils are stabilized and native vegetation is planted and becomes re-established.

Cumulative impacts result from the incremental effects of an action added to other past, present, and reasonably foreseeable future actions (RFFAs), regardless of who is responsible for such actions. Cumulative impacts may result from individually minor but collectively significant actions occurring over a period of time (40 CFR 1508.7). The boundaries of individual IAAs for this EA are based on the specific resource being discussed and evaluated.

Disturbance due to existing and authorized activities, as well as RFFAs, have been quantified using data input into a computerized geographic information system. RFFAs considered in the general area include the TransWest Express, Gateway West, and Gateway South Transmission Line Projects; the Aspen Mountain and Lonesome Bronco Wind Energy Projects; Questar Overthrust Loop Expansion Project; one possible route of the Regional Watershed Supply Pipeline Project; currently approved oil and gas development; and the Proposed Action (Figure 4.1). For the purpose of the analysis, cumulative disturbance is based on estimated life-of-project disturbances (189 acres for the Proposed Action and for RFFAs).

4.1 AIR QUALITY AND CLIMATE

4.1.1 Proposed Action

4.1.1.1 Introduction

Project sources of air emissions, pollutants emitted, and factors contributing to the magnitude of project emissions are presented in Table 4.1.

Construction, operation, and decommissioning activities would be required to comply with the provisions of *Wyoming Environmental Quality Act* (W.S. 35-11-201 et seq.) and the Wyoming State Implementation Plan and other applicable state and county regulations.

Possible impacts to air quality as a result of the project would occur during the construction, O&M, and decommissioning phases due to short-term increases in particulates (e.g., dust from the excavation of wind turbine foundations and collector system, construction of access roads, operation of the mobile concrete batch plant and rock crusher, vehicle traffic) and tailpipe emissions from construction and O&M vehicles and combustion emissions from generators and engines.

4.1.1.2 Construction Phase

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, and backhoes. Delivery of turbine components and

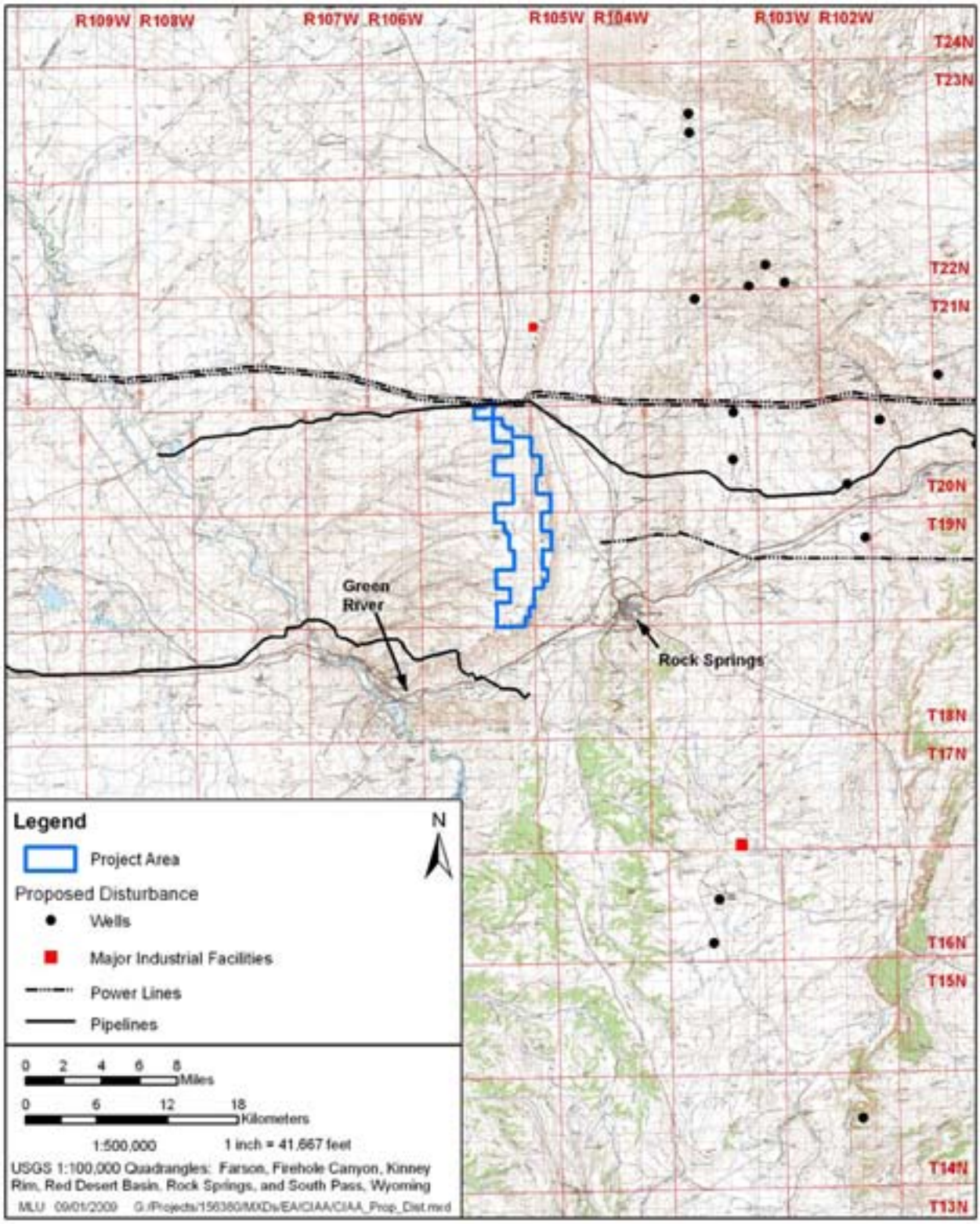

Figure 4.1 Location of Proposed Action and RFFAs.

Table 4.1 Project Emission Profile.

Source/Activity	Pollutant	Basis for Emission Factors
Vehicular traffic and construction and reclamation equipment operation	CO, NO_x, VOCs, $PM_{2.5}$ and PM_{10}, SO_2, air toxics	Vehicle-mile traveled (VMT)
Fugitive dust from vehicles traveling on unpaved roads	$PM_{2.5}$ and PM_{10}	VMT, wet days, control factor, road conditions, tire adjustment
Fugitive dust from operation of construction equipment	$PM_{2.5}$ and PM_{10}	Volume of fuel used
Operation of concrete batch plant	$PM_{2.5}$, PM_{10}, CO, NO_x, VOCs, SO_2, HAP	Volume of fuel used or hours of operations

transmission line components, as well as electrical cable and other ancillary equipment and supplies, would involve the use of delivery trucks, semis, and assembly cranes over the same time frame. Emissions from these activities include fugitive dust (e.g., $PM_{2.5}$ and PM_{10}) and tailpipe emissions (CO, NO_x, VOCs, particulates, SO_2, and HAPs).

Approximately 865 acres of soil would be initially disturbed for construction of the WMWE Project. Fugitive dust from construction activities and travel on project roads would be controlled. In general, water would be used for dust suppression. In the event that additional dust control is necessary, other commercially available dust suppressants may be utilized, including chloride compounds, lignin compounds, or tree resin emulsion products.

Activities associated with foundation installation include grading, excavating, and concrete batch plant installation and operation. The concrete batch plant would not have electrical service, so an on-site diesel generator would supply power. This stage of construction is anticipated to last for approximately 6 months for each of the 3-4 phases. Emissions from these activities include fugitive dust, tailpipe emissions, concrete batch plant emissions (particulates), and on-site diesel generator emissions. Emissions from the mobile concrete batch plant are detailed in Table 4.2 and would be permitted through the WDEQ/AQD. The air quality permit would provide enforceable air pollution mitigation measures to reduce air emission impacts from operation of the mobile concrete batch plant. Tailpipe emissions, the relatively small emission levels from the batch plant, and fugitive dust emissions would not cause a violation of ambient air quality standards or degradation of regional air quality.

Implementation of environmental protection measures during construction, including the utilization of dust abatement techniques, posting and enforcing speed limits, and covering or watering batch plant storage piles, would minimize impacts on air quality due to fugitive dust.

Teton is committed to controlling air quality emissions; however, some localized increases in dust levels would be unavoidable. To minimize these levels, Teton would use water or other dust control measures on heavily used roads and areas. Traffic speed would also be held to appropriate levels. In addition, disturbed areas would be revegetated as soon as possible following disturbance. To limit tailpipe emissions, engines would be maintained in accordance with manufacturer recommendations.

In addition to the regulated criteria pollutants, minor quantities of GHG gases would be emitted as a result of fuel combustion from vehicles and other mobile equipment. GHG emissions from these sources would primarily be in the form of CO_2. CO_2 is not a currently regulated pollutant

Table 4.2 Potential Air Quality Emissions from Mobile Concrete Batch Plant Emissions, Proposed Action.

Pollutant	Mobile Concrete Patch Plant [1] (tons)	Generator Set [2] (tons)	Total Emissions (tons)
VOCs	N/A	0.74	0.74
NO_x	N/A	13.68	13.68
CO	N/A	5.78	5.78
PM_{10}	3.03	0.74[3]	3.77
TSP [4]	10.08	0.74[3]	10.82
SO_2	N/A	0.42	0.42
HAP [5]	n/a	<0.1	<0.1

1 Mobile concrete batch plant output for the entire project is estimated at 72,000 yd^3 of concrete. Emission estimates utilizing EPA's AP-42, Volume 1, 5th edition, Chapter 11.12, Concrete Batching, Batch Plant Emissions life of project calculated as Truck Mix Loading with no controls.

2 Mobile concrete batch plant generator emissions calculated based on EPA's AP-42, Volume 1, 5th Edition, Chapter 3.4 Large Stationary Diesel and All Stationary Dual-fuel Engines life of project. Teton anticipates that a 600-kilowatt diesel engine would supply power to the batch plant. Emissions calculated for 2,324 hours for a 905-British horsepower diesel engine.

3 For a mobile concrete batch plant diesel generator, it is assumed that 100% of the particulate emissions will be PM_{10} size.

4 TSP = total suspended particles.

5 HAP = hazardous air pollutants.

and methods for quantifying and assessing GHG impacts are not readily available. GHG emissions from the construction phase of this project, primarily CO_2, would be short in duration (3-4 years) and of such minor quantities as to have no measurable effect on climate change.

4.1.1.3 O&M Phase

Daily O&M activities that would contribute to a limited amount of air emissions include personnel access, occasional road maintenance activities, ongoing reclamation/revegetation activities, and infrequent turbine replacement activities.

In addition to the regulated criteria pollutants, minor quantities of GHG gases would be emitted as a result of fuel combustion from vehicles and mobile equipment. GHG emissions from these sources would primarily be in the form of CO_2. CO_2 is not a currently regulated pollutant and methods for quantifying and assessing GHG impacts are not readily available. On an annual basis, GHG emissions during the O&M phase of this project, primarily CO_2, would be of such minor quantities as to have no measurable effect on climate change.

4.1.1.4 Decommissioning Phase

Decommissioning activities are anticipated to be similar to construction activities for vehicle traffic, and a limited amount of heavy equipment operation such as the lifting crane would be used. Only a limited amount of construction activity would occur compared to the initial construction activity. The decommissioning effort may need to re-establish access roads to haul out facility components. Additional decommissioning air quality impacts could be driven by site reclamation activities. Decommissioning air quality impacts are expected to be similar in nature to construction activities, but of a much lesser magnitude.

In addition to the regulated criteria pollutants, minor quantities of GHG gases would be emitted

as a result of fuel combustion from vehicles and mobile equipment. GHG emissions from these sources would primarily be in the form of CO_2. CO_2 is not a regulated pollutant and methods for quantifying and assessing GHG impacts are not readily available. GHG emissions from the decommissioning phase of this project, primarily CO_2, would be short in duration (3-4 years) and of such minor quantities as to have no measurable effect on climate change.

4.1.2 Alternative A - Development Only on Privately Owned Lands

Potential impacts to air quality resources under Alternative A during the construction, O&M, and decommissioning phases would be similar in the type of impacts (e.g., fugitive dust and tail pipe emissions from construction activities and vehicle traffic and operation of the mobile concrete batch plant). However, because this alternative would involve the installation of 170 wind turbines on privately owned land, it is expected that only about 70% of the total air quality emissions expected under the Proposed Action would result from implementation of Alternative A. This also applies to potential emissions from the mobile concrete batch plant under Alternative A, and the potential emissions from the mobile concrete batch plant are presented in Table 4.3. The potential air quality emissions under Alternative A would also occur in the same sequence and timing as described under the Proposed Action (e.g., construction, O&M, and decommissioning phases).

4.1.3 No Action Alternatives

Under the No Action Alternative, the proposed wind energy facility would not be authorized nor approved. No ground would be disturbed, and no impacts to the existing physical or biological environment would take place beyond those that already exist.

Table 4.3 Potential Air Quality Emissions from the Mobile Concrete Batch Plant, Alternative A.

Pollutant	Mobile Concrete Patch Plant[1] (tons)	Generator Set[2] (tons)	Total Emissions (tons)
VOCs	N/A	0.52	0.52
NO_x	N/A	9.58	9.58
CO	N/A	4.05	4.05
PM_{10}	2.12	0.52[3]	2.64
TSP [4]	7.06	0.52[3]	7.58
SO_2	N/A	0.29	0.29
HAP [5]	n/a	<0.1	<0.1

1 Mobile concrete batch plant output for the entire project estimated at 50,400 yd^3 of concrete. Emission estimates utilizing EPA's AP-42, Volume 1, 5th edition, Chapter 11.12, Concrete Batching, Batch Plant Emissions life of project calculated as Truck Mix Loading with no controls.

2 Mobile concrete batch plant generator emissions calculated based on EPA's AP-42, Volume 1, 5th Edition, Chapter 3.4 Large Stationary Diesel and All Stationary Dual-fuel Engines. Teton anticipates that a 600-kW diesel engine would supply power to the batch plant. Emissions life of project calculated for 1,627 hours for a 905-British horsepower diesel engine.

3 For a mobile concrete batch plant diesel generator, it is assumed that 100% of the particulate emissions will be PM_{10} size.

4 TSP = total suspended particles.

5 HAP = hazardous air pollutants.

As discussed in Chapter 1 of this EA, the DOE predicts that the demand for the electrical energy will continue to rise (DOE 2009). If the No Action Alternative is selected and the WMWE project is not constructed, the electricity that would have been produced by this project would eventually have to be produced by other electric generation facilities such a fossil fuel plant (fueled by coal, natural gas, or petroleum), nuclear power plants, or other forms of renewable power plants (e.g., hydroelectric, solar, or other wind energy). As a result, it is important to consider that if the No Action Alternative is selected and the WMWE project is not constructed, it is possible that air quality could be adversely impacted if a fossil fuel source of electric generation is eventually constructed as the form of replacement electricity production. Table 4.4 illustrates, air pollutant emissions from typical electric generating facilities in Wyoming. This table also illustrates that air pollutant emissions from electric generation using fossil fuels are orders of magnitude greater than emissions from electric generation from renewable wind power.

The Proposed Action would actually result in offsetting emissions of criteria pollutants, HAPs, aerosols, and GHG emissions when compared to other forms of energy production. The proposed project would provide a maximum of 360 MW of electric generating capacity (approximately 1 million MW-hours annually) with essentially zero air emissions. If this energy demand is not met by nuclear power or other forms of renewable energy (such as wind, solar, or hydroelectric generation) then the demand would likely be met through other electric generating facilities fueled by coal or natural gas fired power plants and there would be a corresponding increase in air pollutant emissions.

4.1.4 Residual Impacts

Under the Proposed Action, the single largest pollutant would likely be particular matter (i.e., dust) in the form of total suspended particulates and particulate matter (<10µg) (PM_{10} and $PM_{2.5}$) generated by vehicle traffic, excavations, and other ground disturbing activities. In addition, there would be tailpipe emissions such as CO, NO_x, VOCs, PM_{10}, $PM_{2.5}$, SO_2, and HAPs from vehicles and the operation of the mobile concrete batch plant. Teton is committed to controlling air quality emissions; however, some localized increases in dust levels would be unavoidable. To minimize these levels, Teton would use water or other dust control measures on heavily used roads and areas. Traffic speed would also be held to appropriate levels. In addition, disturbed areas would be revegetated as soon as possible following disturbance. To limit tailpipe emissions, engines would be maintained in accordance with manufacturer recommendations.

In addition to the regulated criteria pollutants, minor quantities of GHG gases would be emitted as a result of fuel combustion from vehicles and other mobile equipment. GHG emissions from these sources would primarily be in the form of CO_2. CO_2 is not a currently regulated pollutant and methods for quantifying and assessing GHG impacts are not readily available. GHG emissions from the construction, O&M, and decommissioning phases of this project, primarily CO_2, would be of such minor quantities as to have no measurable effect on climate change.

4.1.5 Cumulative Impacts

Potential cumulative emissions identified as a concern for the Proposed Action include emissions of PM, CO, SO_2, NO_x, VOCs, and HAPs from sources that are located within approximately 31 mi of the Proposed Action and for which emissions information is available.

The largest concentrations of PM, CO, SO_2, NO_x, VOCs, and HAP emissions would likely occur during the construction phase of this project (a 3- to 4-year period of time) and would be associated with ground-disturbing activities and the operation of mobile equipment, including the temporary concrete batch plant. Emissions would then be reduced during the subsequent O&M phase and decommissioning phase. The cumulative impacts of changes in these pollutant concentrations are likely to have minimal effect on the near-field, far-field, and cumulative concentrations of these pollutants.

Table 4.4 Comparison of Annual Air Emissions from Wyoming Electric Generation Sources.

Facility Name	Source/Unit Type	Fuel Type	Gross Load (MW-hr)	SO_2 (tons/yr)	NO_x (tons/yr)	CO_2 (tons/yr)
Dave Johnston [1]	Electric Utility / Cell burner boiler	Coal	1.9 million	7,476	5,302	2,172,269
Naughton [1]	Electric Utility / Tangentially fired	Coal	1.3 million	7,268	3,606	1,369,757
Wygen II [1]	Electric Utility / dry bottom wall fired boiler	Coal	778,955	221	270	911,362
Neil Simpson II [1]	Electric Utility / Combustion turbine	Natural gas	35,292	0.1	13.8	21,075
Teton (WMWE)	*Proposed* electric generation / wind turbine	Wind	1.0 million	Negligible	Negligible	Negligible

[1] Source for coal and gas emissions: USEPA Clean Air Markets website: http://camddataandmaps.epa.gov/gdm/

Far-field cumulative effects have been previously presented utilizing the extensive modeling results performed for the Jonah Infill Drilling Project (TRC 2006). The cumulative impacts assessment for the Jonah Infill Drilling project reported that:

- Far-field cumulative pollutant concentrations are all below NAAQS and WAAQS, as well as PSD Class I and II increments.
- Cumulative visibility impacts on PSD Class I and sensitive Class II areas are projected to impact visibility in the Bridger Wilderness Area (BLM 2006).
- Contributions to cumulative far-field visibility impacts from the Proposed Action are anticipated to be insignificant due to the distance between the project area and the Bridger Wilderness.

Cumulative impacts on air quality with the addition of this project to the airshed, are likely to be negligible over the life of the project. The impacts of emissions from fugitive dust and combustion sources during the construction, O&M, and decommissioning phase are minor and air emissions from wind generation of electricity are near zero.

4.2 CULTURAL RESOURCES (INCLUDING NATIVE AMERICAN CONCERNS)

Direct and/or indirect impacts to historic properties (NRHP-eligible or listed cultural resources) can result in one of three possible effects as defined by 36 CFR 800 and implemented under the State Protocol between the BLM Wyoming and the Wyoming SHPO (2006):

- A "No Effect" determination is made if there are no historic properties present, or if they are present but would not be affected by the undertaking, or if a proposed project would not be visible from the historic property and there is no contrast between the project and the setting.

- A "No Adverse Effect" determination is made if a proposed project would cause effects to a historic property, but the effects would not diminish the aspects of integrity nor the characteristics that make the property eligible for listing on the NRHP as defined in 36 CFR 800.5(b). If a proposed project would be visible, but there is weak contrast, a determination of

"No Adverse Effect" is made. A "Weak Contrast" occurs when the proposed project elements, or portions of the elements, can be seen but would not dominate the setting or attract the attention of the casual observer because the basic elements of form, line, color and texture found in the setting are repeated in the project's physical elements (BLM and SHPO 2006, Appendix C).

- An "Adverse Effect" determination is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration is given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the NRHP. If a proposed project would be visible and there is moderate or strong contrast, a determination of "Adverse Effect" is made. A "Moderate Contrast" occurs when the proposed project elements, or portions of the elements, begin to attract attention and begin to dominate the characteristic landscape. A "Strong Contrast" occurs when the proposed project elements, or portions of the elements, demand attention, cannot be overlooked, and are dominant on the landscape. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5(a)(1)).

Resolution of adverse effects would occur through a BLM/SHPO-approved Data Recovery Plan and/or with a Programmatic Agreement (PA) between Teton, the BLM, the SHPO, and other interested parties. A Data Recovery Plan is typically used if the historic property is eligible for inclusion in the NRHP under Criterion D only, and the adverse effect would be minimized by data recovery. A PA is used if there are historic properties within the APE that would be adversely affected and are eligible under National Register Criteria A, B, or C.

4.2.1 Proposed Action

4.2.1.1 Effects to Cultural Resources Within the APE for Direct Effects

A Class III cultural resource inventory of 2,650 acres of BLM-administered surface, preceded by background research, indicates that there is one prehistoric site eligible for the NRHP under Criterion D and two NRHP-unevaluated sites within the inventoried portion of the project area (Fleming et al. 2009a). Project effects to the one known NRHP-eligible prehistoric site within the inventoried area would be negligible because effects would be avoided or mitigated. The two unevaluated sites within the inventoried area, whose NRHP-eligibility status has not been determined, would be treated as if they were eligible for the NRHP, and would be avoided or mitigated.

However, because only 20% of the total 13,165 acres within the project area has been inventoried, additional cultural resources may be discovered on state-owned or private property or public land outside the ROW. Therefore, additional cultural resource inventories would be conducted on those lands that will be directly disturbed by the Proposed Action. If eligible or listed cultural resources, including portions of any rural historic or traditional cultural landscapes cannot be avoided, Teton would resolve the adverse effects through a BLM/SHPO-approved Data Recovery Plan and/or a PA. Teton, the BLM, the SHPO, and other interested parties would complete the Section 106 process before authorizing surface-disturbing activities.

Direct Effects to Linear Historic Sites

Pursuant to the BLM Green River Resource Management Plan/Record of Decision, "Management of historic roads and trails (on public land) that are eligible for the NRHP but are

not Congressionally designated will generally be the same as for designated trails including a 0.25 mi protective setback on either side of the trails….These trails include the Overland Trail, the Cherokee Trail, and Point of Rocks to South Pass Road" (1997). Specifically, contributing segments of these historic sites should be avoided by 0.25 mi or the immediate viewshed, whichever is less.

The shared route of the Cherokee Trail and the Old Bryan Stage Road trends through the northern portion of the project area on private land, but would not be directly impacted by project construction because it occurs within an area with no proposed project activities.

4.2.1.2 Effects to Cultural Resources Within the APE for Visual Effects

The Proposed Action may indirectly impact cultural resources within the APE for visual effects by altering the existing viewshed. The viewshed alterations may weaken and/or contribute to a loss of integrity of setting to sites where setting is considered to be an important aspect of site integrity.

The importance of setting and determination of project effect to potentially affected prehistoric sites will be determined through ongoing consultation between the BLM and Native American tribes. For historic sites, the setting assessments and visual contrast rating analyses for potentially affected sites were not conducted on an individual site basis. The BLM determined that setting is an important aspect of integrity for each of the potentially affected historic sites.. As a result of this broad visual contrast rating, the proposed project would produce a moderate to strong visual contrast for all potentially affected historic sites up to a distance of 20 miles.

A total of 163 sites was identified for visual effects analysis and consist of 35 prehistoric sites and 128 historic sites. Distances from the sites to the proposed project area range from 0 mi (within the proposed project area) to the outer limit of the 20-mile visual APE.

Prehistoric Sites

A total of 35 prehistoric sites were identified for visual affect analysis within areas from which the project would be visible. A table summarizing the potentially affected sites is provided in Appendix D. Project effects to these sites will be determined by the BLM through ongoing consultation with Native American tribes. Setting is considered to be an important aspect of each site's integrity and although the degree of contrast would likely vary from site to site, a moderate to strong contrast is assumed for all 35 prehistoric sites. The moderate to strong visual contrast would result in the project having an adverse effect on the setting of each site.

Historic Sites

A total of 128 eligible and unevaluated historic sites were identified for visual affect analysis within areas from which the project would be visible and could be potentially affected by the project (see Appendix D). The 128 historic sites include 51 buildings located within the city of Rock Springs (see Appendix D). Setting is considered to be an important aspect of each site's integrity and although the degree of contrast would likely vary from site to site, a moderate to strong contrast is assumed for all historic sites. The moderate to strong visual contrast would result in the project having an adverse effect on the setting of each site.

4.2.1.3 Native American Concerns

Consultation between the BLM and the four Native American tribes with regard to potential direct and indirect impacts to properties of traditional, religious, or cultural importance is ongoing. Consultation has indicated that there are direct and indirect adverse effects to places of cultural importance to Native Americans. Impacts to these resources will be resolved through a PA.

4.2.1.4 Summary of Project Effects

Under the Proposed Action (construction, O&M, and decommissioning phases), no NRHP-eligible or NRHP-listed cultural resources within the currently inventoried portions of the project area

would be physically impacted by the proposed WMWE Project due to avoidance. However, additional cultural resource inventories would be conducted on state-owned land and private property and public lands outside of the ROW that would be disturbed by the Proposed Action. If NRHP-eligible cultural resources are discovered, they would be avoided. If they cannot be avoided, the direct adverse effects would be mitigated. As a result, physical project effects to cultural resources would be negligible because adverse effects would be avoided or mitigated.

To avoid additional direct impacts to cultural resources, Teton personnel would be instructed that they are not allowed to search for cultural resources (i.e., arrowhead hunting) while working on this project. If any cultural resources are discovered on project-disturbed lands, all project-related activities within the immediate area would be suspended and the appropriate BLM Authorized Officer would be immediately notified. Work in the area would not resume until a Notice to Proceed is issued by the BLM.

Based on the discussion presented above, 163 sites within the APE for visual effects may be indirectly impacted by the proposed project. Following the determination of project effects, any adverse effects to these sites would be reduced or resolved through implementation of the PA. In addition, any adverse effects to visually sensitive cultural resources identified during the inventories of the state-owned land and private property and public lands outside the ROW would be resolved.

Teton would resolve all adverse effects to directly or indirectly impacted cultural resources through a BLM/SHPO-approved Data Recovery Plan and/or a PA. Once the PA has been executed through signature of all consulting parties, Section 106 of the NHPA is concluded, and the PA would be implemented.

4.2.2 Alternative A - Development Only on Privately Owned Lands

Under Alternative A (construction, O&M, and decommissioning phases), Teton would not construct turbines on BLM-administered lands but would still construct access roads and buried cable lines on public lands. This would reduce the probability of impacts to sites by approximately 30% but would not eliminate the potential effects/impacts to some off-site cultural resources. Currently, the occurrence and density of cultural resources on private land is unknown, pending further inventories. However, in the event that cultural resources are identified, impacts to these properties would be similar to those for the Proposed Action due to avoidance or mitigation through a BLM/SHPO-approved Data Recovery Plan and/or PA. Teton, the BLM, the SHPO, and other interested parties would complete the Section 106 process before authorizing surface-disturbing activities. If any cultural resources are discovered during construction operations, all construction activities within the immediate area would be suspended and the appropriate BLM Authorized Officer would be immediately notified.

4.2.3 No Action Alternative

Under the No Action Alternative, the proposed wind energy facility would not be authorized nor approved, and no impacts to cultural resources would occur.

4.2.4 Residual Impacts

The Proposed Action or Alternative A would not result in any unavoidable adverse impacts to identified cultural resources. Additionally, the site density in the project area is low; however, some loss of unidentified cultural resources or artifacts may occur. If any cultural resources are discovered during construction operations, all activities within the immediate area would be suspended and the appropriate BLM Authorized Officer would be immediately notified.

4.2.5 Cumulative Impacts

Based on the disturbance calculations presented in Chapter 3.0, approximately 38,289 acres are currently disturbed within the IAA. This represents 3.26% of the total area within the IAA. RFFA (including the Proposed Action) within the IAA would result in an additional 2,035 acres of disturbance--189 acres of disturbance due to the

Proposed Action and 1,846 acres from other RFFAs. This represents 40,324 acres of the total within the IAA or 3.43% based on the total disturbance due to past, present, and RFFAs.

Because predisturbance inventory surveys and resolution of effects are required for all developments with a federal nexus, adverse cumulative effects would be either avoided, mitigated, or resolved in accordance with the Section 106 process. Cumulative impacts may include reduced use by Native Americans of Traditional Cultural Properties in the area because development may reduce the utility of these places for ceremonial purposes. In addition, increased visitation from survey and construction crews and from the general public may lead to increased vandalism of archaeological sites; however, the level of impact would be minimal due to the low site density on White Mountain.

Beneficial cumulative effects would consist of the scientific discovery of archaeological sites and accumulated evidence of prehistoric lifeways such as social organization, subsistence strategies, and tool making technologies.

4.3 GEOLOGY AND PALEONTOLOGICAL RESOURCES

4.3.1 Proposed Action

4.3.1.1 Construction Phase

The Proposed Action would not impact the area's physiography or geology. However, minor impacts to topography would include temporary or permanent changes in the land surface and slope due to cut-and-fill activities required to excavate foundations and build roads. Following the completion of construction activities, open cut-and-fill areas would be regraded to the approximate original contour and reclaimed in accordance with the reclamation operations presented in Chapter 2.0 for the Proposed Action. During the construction, temporary drainage structures such as ditches, culverts, waterbars, and/or check-dams would be used, as needed, to divert runoff around wind project facilities, but overall drainage patterns would be preserved.

Direct impacts to important paleontological resources (i.e., vertebrate fossils) could include the inadvertent destruction of scientifically important fossils during excavation/construction for the wind turbine pads, access roads, substation, and the collector lines. The loss of scientifically important fossils would be an adverse effect. However, no fossil localities are known to occur within the WMWE project area; however, several important localities are known to occur in the surrounding area (Uinta Paleontological Associates, Inc. 2009). Even though there are no known vertebrate fossil localities within the project area, the presence of rock units that have yielded important vertebrate fossils elsewhere in the general area indicate that the probability of construction impacting vertebrate fossils is relatively high. However, most of the wind turbine pads would be placed on the massive sandstone of the Laney Shale Member of the Green River Formation. While the Green River Formation as a whole has a PFYC Rating Class 5, the Laney Shale Member, a massive sandstone layer that caps most of White Mountain, is not likely to produce important vertebrate fossils (Uinta Paleontological Associates, Inc. 2009). Other parts of the Laney Shale Member, east of the WMWE project area particularly on the west slopes of White Mountain where exposure of the Wilkins Peak Member occur in gullies, may contain fossil resources; however, no disturbance is proposed in these areas.

Under the Proposed Action, construction of the project would initially disturb approximately 866 acres, and the potential for notable fossils to occur and be disturbed is low; therefore, the potential for loss of important fossils is low.

If wind turbines are placed on the Wilkins Peak Member located below the massive sandstone layer of the Laney Shale Member, fossil resources, particularly fish fossils, might be impacted. The Wilkins Peak Member on the east side of White Mountain is exposed on slopes too steep for turbine sites and would therefore not be impacted. However, exposures of the Wilkins Peak Member in some of the gullies on the western slopes of White Mountain have the potential to be impacted. Installation of underground cable lines between turbines may result in impact to fossil resources.

Some monitoring such as a pedestrian reconnaissance survey of the staked access routes, turbine base sites, and any underground connections in the exposed areas of the Wilkins Peak Member would reduce the possibility of impacts to fossils that might occur during the construction of new access roads or the widening of older ones. In addition, depending on the location of the turbine bases, some monitoring during construction might be warranted and directed by the BLM. If paleontological resources are discovered during construction operations, the find would be reported to the BLM Authorized Officer immediately, and construction operations would be suspended within 250 ft of said find. An evaluation of the paleontological discovery would be made by a BLM-approved professional paleontologist within 5 working days, weather permitting, to determine the appropriate action(s) to prevent the potential loss of any significant paleontological value. Operations within 250 ft of such discovery would not be resumed until written authorization to proceed is issued by the BLM Authorized Officer. By implementing monitoring during the construction phase of the project, the loss of scientifically important fossils would be minimized.

Indirect impacts to paleontological resources could occur from the loss of important fossil material due to private collection or vandalism of newly exposed areas. To minimize any indirect effects, Teton employees would be informed not to collect or remove any fossils. Beneficial impacts could result from the discovery and analysis of vertebrate fossils located during project implementation.

4.3.1.2 O&M Phase

No additional impacts beyond those discussed under construction impacts are expected to occur during the O&M phase of this project. No new ground-disturbing activities would be associated with the O&M phase of the project; therefore, there would be no impact to geology or paleontological resources during the O&M phase of the Proposed Action.

4.3.1.3 Decommissioning Phase

All ground-disturbing activities required for decommissioning would occur in previously disturbed areas. Therefore, there would be no new impacts to geology or paleontological resources during the decommissioning phase of the project.

4.3.2 Alternative A - Development Only on Privately Owned Lands

4.3.2.1 Construction Phase

Impacts of the implementation of Alternative A would be similar to those identified and discussed under the Proposed Action. However, implementation of this alternative would involve the construction of 170 wind turbines on privately owned land; therefore, direct impacts to paleontological resources could include the inadvertent destruction of scientifically important fossils during excavation of the turbine pads, access roads, the substation, and the collector lines on 619 acres of privately owned land. The loss of scientifically important fossils would be an adverse effect; however, the wind turbines would likely be placed on the massive sandstone of the Laney Shale Member of the Green River Formation where the fossil potential is low. The same mitigation measures discussed in the Proposed Action would be implemented under Alternative A.

Beneficial impacts under Alternative A could result from the discovery and analysis of previously unidentified fossils during project implementation.

4.3.2.2 O&M Phase

Under Alternative A, no additional impacts beyond those discussed under construction impacts are expected to occur during the O&M phase of this project.

4.3.2.3 Decommissioning Phase

No additional impacts beyond those discussed under the Proposed Action during the

decommissioning phase of this project would be expected under Alternative A.

4.3.3 No Action Alternative

Under the No Action Alternative, the proposed wind energy facility would not be authorized nor approved. No ground would be disturbed, and no impacts to the existing geological and paleontological resources would take place beyond those that already exist.

4.3.4 Residual Impacts

Some previously unidentified fossils could be damaged or destroyed by project construction activities.

4.3.5 Cumulative Impacts

There are no known vertebrate fossil localities within the WMWE project area. Implementation of the Proposed Action (with the appropriate mitigation measures) would not be expected to increase cumulative impacts associated with the loss of such vertebrate fossils. Mitigation efforts included in the Proposed Action would minimize any additional adverse impacts and would likely add to the knowledge of fossils within the general Rock Springs area.

Based on the disturbance calculations presented in Chapter 3.0, approximately 420 acres are currently disturbed within the IAA. This represents 3.23% of the total area within the IAA. RFFA (including the Proposed Action) within the IAA would result in an additional 259 acres of disturbance--189 acres of life-of-project disturbance due to the Proposed Action and 70 acres from other RFFAs. This represents 679 acres of the total with the IAA or 5.22% based on the total disturbance due to past, present, and RFFAs.

Therefore, cumulative impacts to geology and paleontological resources would not be important because there are no past, present, or RFFAs that, when combined with the Proposed Action, would result in impacts beyond those that already exist or have already been identified and discussed in Chapter 4.0 of this EA. In addition, the impacts presented here do not exceed the level of impacts outlined in the Wind Energy PEIS (BLM 2005).

4.4 LAND USE (INCLUDING GRAZING, RECREATION, AND TRANSPORTATION)

4.4.1 Proposed Action

4.4.1.1 Construction Phase

Grazing

Construction under the Proposed Action would have temporary and minor impacts on livestock grazing within the affected BLM Rock Springs grazing allotment. Livestock may be disturbed by construction traffic, equipment activity, and noise. Such disturbance may cause poor livestock distribution within that part of the allotment located with the WMWE project area, which could lead to negative impacts to vegetation and soils related to localized overgrazing and trampling. The operation of construction equipment and vehicles during project construction could also increase the potential for accidental wildfire, and some livestock could be struck by construction vehicles. If an accident occurs, the party responsible for the accident will be liable to provide appropriate compensation to the livestock owner.

The Proposed Action would have little impact on the available AUMs within the WMWE project area. Construction would initially disturb 866 acres of rangeland in the Rock Springs grazing allotment and based on an average 11.4 acres per AUM, 76 AUMs would initially be unavailable in the Rock Springs grazing allotment as a result of the construction of the Proposed Action.

Most impacts to grazing (e.g., decrease in quantity and quality of forage due to dust accumulation as a result of increased vehicle traffic, equipment use, invasion of noxious/invasive plant species due to surface disturbance, livestock safety) would be minimal and short-term in nature if proposed environmental protection measures for vegetation and soil resources are implemented. Such potential impacts would not affect grazing

resources in a manner that would cause the allotments to be out of compliance with Rangeland Health Standards or to not conform to the Guidelines for Grazing Management. Revegetation of disturbed areas would be designed on a site-specific basis in consultation with the BLM to maintain or enhance the value of grazing allotments.

Teton would also install speed limit signs in cooperation with Sweetwater County officials, and construction personnel would also be informed that they are working in an area with open livestock grazing and to drive the posted speed limit and to watch for livestock that might be on the road. It is also possible that livestock could be involved in an accident with O&M vehicles. Should an accident occur, the party responsible will be liable to provide appropriate compensation to the livestock owner. In addition, open trenches or excavations that are left unattended overnight will be fenced for safety, and existing cattle guards will be left in place.

Initial reclamation efforts would be conducted immediately following the completion of construction activities, and approximately 703 acres of initial disturbance would be revegetated in accordance with the reclamation plan presented in the Proposed Action.

Recreation

Construction, noise, dust, the presence of equipment, and associated human activities would change the character of the WMWE project area and recreational experiences, such as backcountry hiking and camping, wildlife observation, horseback riding, nature photography, big game hunting, and OHV use. Because of the visual changes likely to occur during the construction phase of the project, the aesthetic sense of a rural undeveloped recreational area would be reduced for some people. Other individuals could be attracted in order to observe construction activities. However, public lands would remain open during construction unless a public safety hazard is determined. Any closure would be temporary and limited in duration.

Transportation

Under the Proposed Action, impacts to transportation would include construction-related activities on existing two-track roads located within the WMWE project area that would be improved and increased traffic on the existing roads (including U.S. Highway 191 from I-80 to Fourteenmile Road and on County Road 53 from Fourteenmile Road to the southern end of the WMWE project area). All traffic associated with the Proposed Action would enter the project area from U.S. Highway 191, and most of the vehicle traffic would travel north to the project area on U.S. Highway 191 because most of the construction workers are expected to reside in Rock Springs, North Rock Springs, Reliance, or Green River.

Improvements to the existing roads and construction of the new access roads within the project area would likely occur in a phased approach in conjunction with project phases over a 3- to 4-year period. In order to minimize construction-related impacts to the environment, Teton would also use as many of the existing two-track roads as possible instead of constructing new roads within the project area. Impacts to vegetation, soil, air quality, and noise are specifically addressed in those specific sections of this EA and will not be repeated here. Improvements to the existing two-track roads and the new access roads within the project area would be designed to accommodate the number and size of vehicles and equipment that would be used during the construction phase of the project, and these road construction/ improvements would be designed in accordance with BLM 9113 Manual or the design standards suitable for wind energy developments approved by the BLM and other authorizing agencies.

The increase in construction-related vehicle traffic on County Road 53 and U.S. Highway 191 would likely last throughout the 3- to 4-year construction phase of the project. These roads are currently designed to handle large and heavy vehicles that would be used to transport project components to the construction sites. Currently, County Road 53 experiences a low amount of the industrial-type

traffic as there are limited commercial facilities (e.g., communication sites and transmission lines or land gas facilities, etc.) in the general WMWE project area. The increased construction-related traffic is not expected to create excessive traffic congestion with recreational traffic in the WMWE project area because construction traffic would be limited to nonweekend periods (i.e., Monday through Friday). There may be some increase in traffic congestion on U.S. Highway 191 during the construction phase of the Proposed Action. However, U.S. Highway 191 is designed to handle a large volume of traffic, and residents in the area are used to seeing large vehicles (e.g., oil field equipment) on this stretch of road. These impacts should be limited.

4.4.1.2 O&M Phase

Grazing

No additional grazing impacts beyond those discussed under construction impacts are expected to occur during the O&M phase of this project. A limited amount (189 acres and 14 AUMs) of rangeland would not be available for livestock grazing as a result of the construction of the project-related equipment, facilities, and structures. However, despite this loss of grazing vegetation, livestock are expected to adjust to the increased traffic during the O&M phase of the project, as well as the presence of the wind turbines and associated structures and facilities (BLM 2005).

Teton would also install speed limit signs in cooperation with Sweetwater County officials, and construction personnel would also be informed that they are working in an area with open livestock grazing and to drive the posted speed limit and to watch for livestock that might be on the road. It is also possible that livestock could be involved in an accident with O&M vehicles. Should an accident occur, the party responsible would be liable to provide appropriate compensation to the livestock owner.

Recreation

The operation and locations of the wind turbines would change the overall appearance of the landscape from a relatively undeveloped character to an industrial character and could change the recreational experience of the area for some individuals. The aesthetic sense of a rural undeveloped recreational area would be reduced for the life of the project for some individuals, potentially affecting the quality of some dispersed recreation experiences such as backcountry hiking and camping, wildlife observation, horseback riding, nature photography, big game hunting, and OHV use within the immediate area. Other individuals would not be adversely affected. In addition, areas close to the individual wind turbines and other project facilities may be avoided by hunters, and they may negatively affect the hunting experiences and hunting success within the project area. With improved access to portions of the WMWE project area, poaching and disturbance to big game and other wildlife may increase, as well as the potential for vandalism and litter. However accessibility to public and private lands throughout the WMWE project area would enhance opportunities for hunting and wildlife observation for some recreational users.

Transportation

No additional road construction activities would be conducted during the O&M phase of the Proposed Action, and vehicle traffic would be significantly reduced from the volume of traffic experienced during the construction phase. Vehicle traffic would be expected to use U.S. Highway 191 and County Road 53 during the O&M phase of the project, and a majority of the vehicle traffic would be pickup trucks and small maintenance vehicles. It is possible that during some major maintenance operations, some large and heavy vehicles may still travel to the project area, but these are expected to be an uncommon event.

4.4.1.3 Decommissioning Phase

Grazing

Decommissioning would result in similar impacts to grazing as those described for construction, and the same environmental protection measures would be implemented. Decommissioning and

final site restoration and permanent revegetation efforts on the 189 acres of life-of-project disturbance would eventually (within 10-20 years) restore vegetation cover to predisturbance levels.

Recreation

The presence of construction equipment during the decommissioning phase and associated human activities would likely decrease the recreational experience felt during the decommissioning phase and would be similar to the levels of activity and noise that occurred during the construction phase of the project. All project structures and roads would be removed and reclaimed, and other disturbed areas would be reclaimed to re-establish grazing lands and wildlife habitat and to restore the area for recreational use. Some roads may be retained upon completion, allowing increased use of the area subject to private landowner permission. The impacts to recreational use and level of individual's recreational experiences following decommissioning are unknown but would likely return to predisturbance levels following the completion of reclamation activities.

Transportation

During the decommissioning phase of the Proposed Action, wind turbines, towers, and associated facilities (the substation) would be dismantled and removed from the project area. Large trucks would transport the various project components from the site using County Road 53 and U.S. Highway 191, and the impacts would be similar to those discussed in the construction phase of the Proposed Action.

4.4.2 Alternative A - Development Only on Privately Owned Lands

4.4.2.1 Construction Phase

Grazing

Under Alternative A, no additional impacts to livestock grazing beyond those discussed under the Proposed Action are expected to occur during the construction phase of this project. Under Alternative A, construction would initially disturb 619 acres of rangeland in the Rock Springs grazing allotment. Based on an average 11.4 acres per AUM, 54 AUMs would be unavailable for livestock use in the Rock Springs grazing allotment as a result of Alternative A. Given that the Rock Springs grazing allotment has an estimated 180,234 available AUMs permitted, and current usage is approximately 107,902 AUMs (60%) annually, implementation of Alternative A would reduce the available AUMs by 54 AUM or 0.03% of the permitted AUMs.

Recreation

Potential recreational use impacts under Alternative A would be similar to the type of impacts as described under the Proposed Action (e.g., noise from construction activities and vehicle traffic and operation of the mobile concrete batch plant). However, because this alternative would involve the construction of 170 wind turbines on privately owned land, recreational use would be similar to those described under the Proposed Action.

Transportation

Impacts to transportation during the construction phase under Alternative A would be similar to those discussed under the Proposed Action. However, it is expected that impacts would be 30% less because 170 wind turbines would be constructed under this alternative.

4.4.2.2 O&M Phase

Grazing

Under Alternative A, no additional impacts to livestock grazing beyond those discussed under the Proposed Action are expected to occur during the O&M phase of this project. With successful revegetation following the construction phase, approximately 44 AUMs would become available for livestock grazing during the O&M phase of the project. The remaining 10 AUMs would not be available during the O&M phase of the project.

Recreation

Potential noise and visual impacts under Alternative A would be similar to the type of impacts as described under the Proposed Action during the O&M phase of the project. However, because this alternative would involve the construction of 170 wind turbines on privately owned land, it is expected that impacts to recreational use of the area would be similar to those described under the Proposed Action.

Transportation

Impacts to transportation during the O&M phase under Alternative A would be similar to those discussed under the Proposed Action. However, it is expected that impacts would be 30% less because 170 wind turbines would be constructed under this alternative.

4.4.2.3 Decommissioning Phase

Grazing

Decommissioning would result in similar impacts as those described for the construction phase, and the same environmental protection measures would be implemented. Decommissioning and final site restoration and revegetation would restore approximately 162 acres to grazing uses.

Recreation

Potential impacts under Alternative A to recreation would be similar in the type of impacts as described under the Proposed Action during the decommissioning phase of the project. However, because this alternative would involve the decommissioning of 170 wind turbines on privately owned land, it is expected that impacts to recreation use would be similar to those expected under the construction phase of the Proposed Action.

Transportation

Impacts to transportation during the decommissioning phase under Alternative A would be similar to those discussed under the Proposed Action. However, it is expected that impacts would be 30% less because 170 wind turbines would be constructed under this alternative.

4.4.3 No Action Alternatives

Under the No Action Alternative, the proposed wind energy facility would not be authorized nor approved. No ground would be disturbed, and no impacts to the existing physical or biological environment would take place beyond those that already exist.

4.4.4 Residual Impacts

The Proposed Action would result in the temporary loss of 76 AUMs in the short term and 14 AUMs for the life of the project. There would also be unavoidable impacts to some recreational users of the WMWE project area for the life of the project, and there would be an avoidable increase of vehicle traffic in the WMWE project area and along portions of U.S. Highway 191 near Rock Springs.

4.4.5 Cumulative Impacts

In order to assess potential cumulative impacts to livestock grazing, recreation, and transportation, various IAAs have been established to evaluate the Proposed Action, and quantitative data for the various IAAs are summarized in Table 4.5.

Grazing

Livestock grazing allotments within the IAA would experience only limited impacts due to past, present, and RFFAs. Most of the RFFAs would result in short-term impacts to vegetation and grazing, and the disturbed areas would be revegetated as soon as possible following completion of the project, and vegetation would eventually (within 10-20 years) return to predisturbance levels.

Recreation

Cumulative impacts to recreation resources due to past, present, and RFFAs (including the Proposed

Table 4.5 Cumulative Impacts for Land Use.

Resource	Description	Total IAA (acres)	Amount of Current Disturbance (acre and %)	Amount of Disturbance Related to RFFA (Including Proposed Action) (acre and %)	Total Amount of Current and RFFA Disturbance (acre and %)
Livestock grazing	Rock Springs grazing allotment west of U.S. Highway 191 and North of I-80	418,506	9,734 (2.33%)	1,017 (0.24%)	10,751 (2.57%)
Recreation and transportation	WMWE project area plus 20 mi	1,175,515	38,289 (3.26%)	2,035 (0.17%)	40,324 (3.43%)

Action) are expected to be limited because there would be no additional construction in the WMWE project area beyond those identified in the Proposed Action, and the identified RFFAs would be highly dispersed over a large area. There would be some localized impacts (e.g., displacement) to recreational activities (e.g., hunting, sightseeing, hiking, etc.) due to the individual projects, and these activities would possibly be displaced to other locations or not available in some specific locations. However, members of the public could still use a vast majority of the IAA, which would be available for outdoor recreational activities.

Transportation

Cumulative impacts to transportation due to existing and RFFAs (including the Proposed Action) are expected to be limited because there would be no additional construction in the WMWE project area (besides the Proposed Action) and the identified RFFAs would occur over many years, thereby reducing potential cumulative impacts. Many of the RFFAs would involve the proposed construction of structures or facilities (e.g., transmission lines), the substation that, once completed, would require fewer employees to operate and maintain, thereby reducing vehicle traffic on area roads. Major roads in the area are already improved and capable of handling the size and volume of potential vehicle traffic, and no damage to existing roads is anticipated as a result of existing and RFFAs.

Therefore, cumulative impacts to land use (including grazing, recreation, and transportation) would not be important because there are no past, present, or RFFAs that, when combined with the Proposed Action, would result in impacts beyond those that already exist or have already been identified and discussed in Chapter 4.0 of this EA. Additionally, impacts presented here do not exceed the level of impacts outlined in the Wind Energy PEIS (BLM 2005).

4.5 NOISE

4.5.1 Proposed Action

4.5.1.1 Construction Phase

Local noise levels in the immediate project area may be temporarily affected by construction activities such as the operation of mobile equipment and the mobile concrete batch plant. The project area is remote and unpopulated, and there are no residences or businesses located within the WMWE project area. The nearest occupied residence or sensitive noise receptor is located approximately 0.92 mi east and over 700 ft below the rim of White Mountain.

Noise impacts during construction are expected to be limited to on-site construction workers and wildlife and livestock in the immediate vicinity of the actual operation. Some livestock, wildlife, and wild horses may temporarily avoid the active portion of the project area during daylight hours due to construction noise, but for the most part,

they are expected to return to the area during nonworking hours or upon completion of construction operations. The largest source of sound during construction of the operation will be diesel powered equipment, including mobile equipment and the mobile concrete batch plant. Based on a discussion of noise resulting from the use of diesel-powered heavy equipment, noise levels would range from 80 to 92 dBA at a distance of 50 ft (Rau and Wooten 1980). In order to minimize sound impacts, all equipment will be operated with the manufacturer's suggested noise control systems (e.g., mufflers and noise dampening materials), and all construction operations will take place during daylight hours.

Through communications with the local communities, Teton will be kept informed of any noise complaints. If substantial noise complaints are received, noise measurements will be taken along the project boundary or near the complaint sources to ascertain the sources and level of the noise. If noise levels are found to be unsatisfactory, alternative mitigation measures would be explored.

Therefore, due to the remote nature of the project area and the temporary duration of construction operations, noise impacts are expected to be minimal and are not expected to affect any residences.

4.5.1.2 O&M Phase

During the O&M phase of the project, noise would be generated by the wind turbines, the substation, and maintenance equipment such as pickup trucks. Noise is typically defined as unwanted sound and typically has subjective effects, including annoyance, nuisance, and dissatisfaction.

There are two main sources of wind turbine sound. One is mechanical sounds associated with the relative motion of mechanical components and the dynamic responses. In the case of a wind turbine, this includes sound generated in the gearbox, generators, yaw drives, cooling fans, and auxiliary equipment. The second main source of sound from a wind turbine is aerodynamic sound that originates as a result of the flow of air around the wind turbine blades. Noise was an issue with some early wind turbine and blade designs, but it has been largely eliminated as a problem through improved engineering and manufacturing compliance with the International Electrotechnical Commission (IEC) standard 61400-11 (Rogers et al. 2006). According to General Electric (an IEC compliance manufacturer), the wind turbines identified for this project (the GE 1.5 SLE unit) are expected to have a maximum sound power level of less than 104 dBA (General Electric 2004).

According to the Wind Energy PEIS (BLM 2005), considering geometric spreading, a wind turbine with a sound power level of 104 dBA will have a resulting sound power level of 58 to 62 dBA at a distance of 164 ft from the turbine, which is about the same level as conversational speech at a distance of about 3 ft. At a receptor approximately 2,000 ft away, the equivalent sound pressure level would be approximately 36 to 40 dBA when the wind is blowing, which is typical of background sound levels of rural environment (BLM 2005). Based on this information, noise levels due to the operation of the wind turbines would not exceed 65 dBA outside of the project boundary, which complies with the performance standards outlined in the Sweetwater County wind farm regulations. According to information collected within the WMWE project area and discussed in Chapter 3.0 of this EA, ambient sound levels ranged from 28 to 68 dBA on a calm day and 47 to 90 dBA on a windy day.

Most modern wind turbines are pitch-controlled variable-speed, meaning (in part) that the turbine operates at slower speeds in low winds, resulting in much quieter operation in low winds compared to fixed-speed wind turbines (Mujadi and Butterfield 2000). As a result, as wind speed increases, the wind itself masks a portion of the increasing aerodynamic noise (described as blade "swishing" or "whooshing") of the wind turbine (BLM 2005; Rogers et al. 2006).

Therefore, based on this discussion, the sound generated during the operation of the WMWE Project is expected to have minimal noise impacts inside or outside of the project area. The project

site is remote and unpopulated, with the nearest residence located approximately 0.92 mi away from the eastern project boundary and 700 ft below the rim of White Mountain.

Through communications with the local communities, O&M staff will be kept informed of any noise complaints. If substantial noise complaints are received, noise measurements will be taken along the project boundary or near the complaint sources to ascertain the noise levels. If noise levels are found to be unsatisfactory, alternative O&M activities or mitigation measures would be evaluated.

Therefore, the sound generated during the O&M phase of the Proposed Action is expected to have limited noise impacts inside or outside of the project area and are not expected to affect any residences.

4.5.1.3 Decommissioning Phase

Sound levels in the project area will be affected temporarily by decommissioning activities such as equipment operation and movement, but due to the remote nature of the site, impacts are not anticipated to affect any residences or businesses. Some livestock, wildlife, and wild horses may temporarily avoid the active portion of the project area due to decommissioning noise, but, for the most part, they are expected to return to the area upon completion of decommissioning operations.

The largest source of noise during decommissioning operations will be diesel-powered equipment. Therefore, all equipment will be operated with the manufacturer's suggested noise control systems (e.g., mufflers and noise dampening materials), and all decommissioning operations will take place during daylight hours. Teton would also maintain communications with the local communities, and the construction staff would be kept informed of any noise complaints. If significant noise complaints are received, noise measurements will be taken along the project boundary or near the complaint sources to ascertain the noise levels. If noise levels are found to be unsatisfactory, alternative construction activities or mitigation measures would be evaluated.

Therefore, based on this discussion, the sound generated during the decommissioning phase of the WMWE Project is expected to have limited noise impacts inside or outside of the project area and are not expected to affect any residences.

4.5.2 Alternative A - Development Only on Privately Owned Lands

4.5.2.1 Construction Phase

Potential noise impacts under Alternative A would be similar to the type and level of impacts as described under the Proposed Action (e.g., noise from construction activities and vehicle traffic and operation of the mobile concrete batch plant). However, because this alternative would involve the construction of 170 wind turbines on privately owned land, it is expected that the duration of construction noise would be about 70% as long as the noise duration expected under the Proposed Action.

Therefore, the sound generated during the construction phase of Alternative A is expected to have limited noise impacts inside or outside of the project area and is not expected to affect any residences.

4.5.2.2 O&M Phase

Potential noise impacts under Alternative A would be similar to the type of impacts as described under the Proposed Action during the O&M phase of the project. However, because this alternative would involve the construction of 170 wind turbines on privately owned land, noise impacts may be reduced by 30% compared to those expected under the Proposed Action.

Therefore, the sound generated during the O&M phase of Alternative A is expected to have limited noise impacts inside or outside of the project area and is not expected to affect any residences.

4.5.2.3 Decommissioning Phase

Potential noise impacts during the decommissioning phase of Alternative A would be similar to the type and level of impacts as described under the Proposed Action. However, because this alternative would involve the construction of 170 wind turbines on privately owned land, it is expected that the duration of construction noise would be about 30% less when compared to the Proposed Action.

Therefore, the sound generated during the decommissioning phase of Alternative A is expected to have limited noise impacts inside or outside of the project area and is not expected to affect any residences.

4.5.3 No Action Alternatives

Under the No Action Alternative, the proposed wind energy facility would not be authorized nor approved and noise levels would remain at existing levels.

4.5.4 Residual Impacts

As a result of the Proposed Action, there would be some increased sound or noise within and near the WMWE project area. The highest sound levels would generally be limited to activity near the construction sites or operating wind turbine. Teton would comply with and implement all specified sound or noise reduction mitigation measures. Despite these efforts, some increased levels of sound will be generated by the Proposed Action. However, sound generating activities are not expected to affect any residences.

4.5.5 Cumulative Impacts

Sources of sound within the IAA are vehicular traffic on local land, county roads, I-80, and railroad operations (i.e., in the southern end of the IAA) and wind. Construction, O&M, and decommissioning operations under the Proposed Action would not greatly increase the level of noises within the IAA. Because of the remoteness of the project area, noise from these activities would generally be masked by the wind and noise from vehicle or train traffic, so cumulative overlapping noise impacts would not be likely.

During the construction and decommissioning phases of the Proposed Action, noise generating activities would be limited to specific locations where these operations occur, and members of the public traveling through the project area would notice some equipment noise in these areas. Sound from these sources would not likely be audible outside of the immediate project area. During the O&M phase of the Proposed Action, members of the public that travel through the project area may notice some levels of increased sound during moderate speed winds, but as wind speeds increases, the sound generated by the wind turbines will be masked by the increased sound of the wind. In addition, Teton would continue to comply with and implement all specified sound or noise reduction mitigation measures. No residences located within the IAA would likely be impacted by the Proposed Action.

Based on the disturbance calculations presented in Chapter 3.0, approximately 4,402 acres are currently disturbed within the IAA. This represents 7.13% of the total area within the IAA. RFFA (including the Proposed Action) within the IAA would result in an additional 418 acres of disturbance--189 acres of disturbance due to the Proposed Action and 229 acres from other RFFAs. This represents 4,820 acres of the total with the IAA or 7.81% based on the total disturbance due to past, present, and RFFAs.
Therefore, cumulative impacts from noise would not be important because there are no past, present, or RFFAs that, when combined with the Proposed Action, would result in impacts beyond those that already exist or have already been identified and discussed in Chapter 4.0 of this EA. Additionally, the impacts presented here do not exceed the level of impacts outlined in the Wind Energy PEIS for noise (BLM 2005).

4.6 SOCIOECONOMICS

4.6.1 Proposed Action

From a socioeconomic perspective, consequences are attributable primarily to changes in the area

economy related to the construction, O&M, and decommissioning phases of the proposed project. Economic activity attributable to implementation of the Proposed Action includes: increase in local employment; increase in taxes; purchase of materials and services from local sources; and expenditures in the local economy by nonlocal workers for items such as accommodations, food, and recreation. Project-related effects associated with the construction and decommissioning of the project would be short-lived, while those associated with the O&M phase of the project would have a longer duration.

An economic analysis of the proposed project has been completed using the Job and Economic Development Impact (JEDI) model for wind energy projects available from the DOE, National Renewable Energy Laboratory (2009), and this analysis examined the economic impacts of the proposed WMWE Project (Lloyd Levy Consulting, LLC [LLC] 2008). Based on the size and project life of the WMWE Project, the JEDI model predicted the number of direct and indirect and induced (secondary) jobs by year that would be created over the life of this project, and the total number of jobs is illustrated in Figure 4.2. The JEDI model also forecasts the number of jobs that would be created in the Rock Springs/Green River area, and this is illustrated in Figure 4.3. The forecast number of local jobs is a subset of the information presented in Figure 4.2.

4.6.1.1 Construction Phase

Employment and Income

During the construction phase of the Proposed Action, the JEDI model estimates that a maximum of approximately 357 full- and part-time jobs would be created. Approximately 187 direct temporary construction jobs and 170 indirect and induced (secondary) part- and full-time jobs would be created during the 3- to 4-year construction period of the WMWE Project (LLC 2008). It must also be noted that the JEDI model includes indirect and inducted jobs that would be created but located outside of Sweetwater County. During the peak construction years (2010-2012), it is expected that 166 part- or full-time jobs would be created outside of Sweetwater County. An additional four secondary part- or full-time jobs would be created in the project area, and it is expected that all of these workers would already reside in the immediate area. Figure 4.2 illustrates the employment related to the Proposed Action by year.

Most of the construction tasks require skilled workers with specialized wind turbine expertise, and many of these skilled workers would not be available locally. Thus, it is estimated that approximately 150 workers (an estimated 80% of the 187 wind turbine workers) (depending on skill level and function) would likely temporarily relocate from areas outside the immediate project area (LLC 2008). While most of the specialized wind turbine construction jobs would be filled by experienced employees from outside southwest Wyoming, the nonwind turbine construction jobs (the secondary jobs) would be filled by individuals that currently reside in the immediate project area (the Rock Springs and Green River area) (refer to Figure 4.3). In order to maximize the economic benefit to the local economy, Teton is committed to and would hire local companies and employees when the appropriate firms and employees are available. Based on the results of this model, it is estimated that the aggregate income of direct and indirect workers total approximately $39,090,000. Income from direct workers is expected to total approximately $25,850,000, and income from indirect and induced workers is expected to total approximately $13,240,000 during the 3- to 4-year construction phase of the Proposed Action (LLC 2008). A substantial portion of these earnings would be spent in the local economy and would provide an economic stimulus to the local and state economies.

Sales and Use Taxes

The JEDI model also provided the annual amount of sales and use tax revenue generated during the construction phase of the Proposed Action, and the results are presented in Table 4.6 (LLC 2008). The State of Wyoming levies a 4% sales and use tax, and Sweetwater County levies an additional 2%. During the 3- to 4-year construction phase of this project, it is estimated that a total of

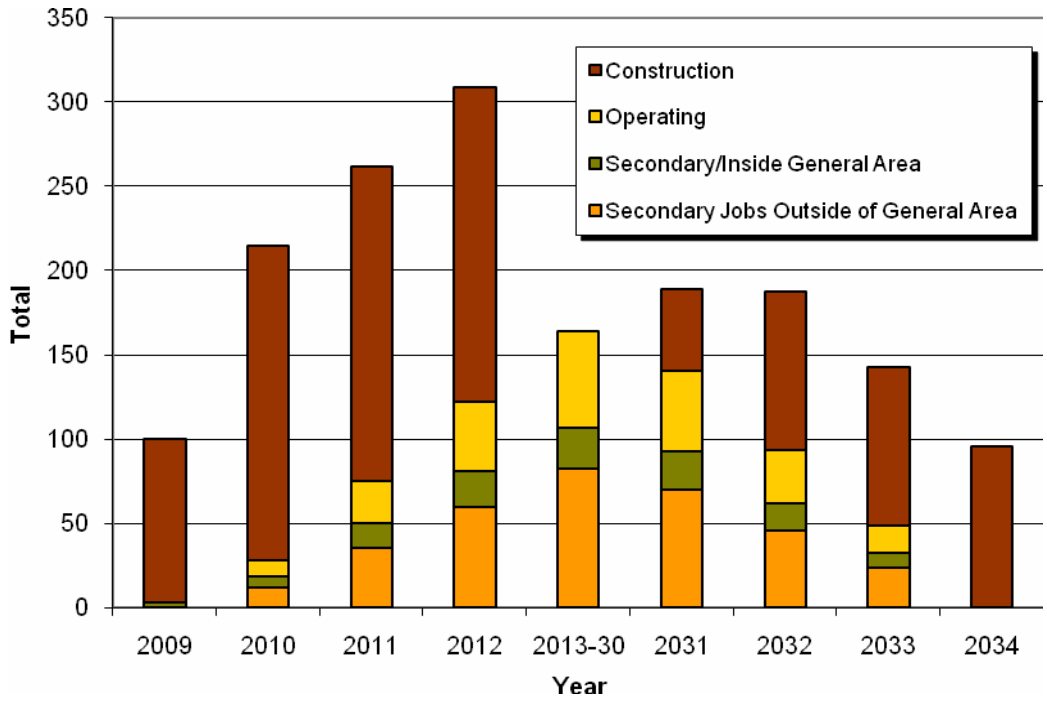

Figure 4.2 Total Number of Jobs Created, Proposed Action.

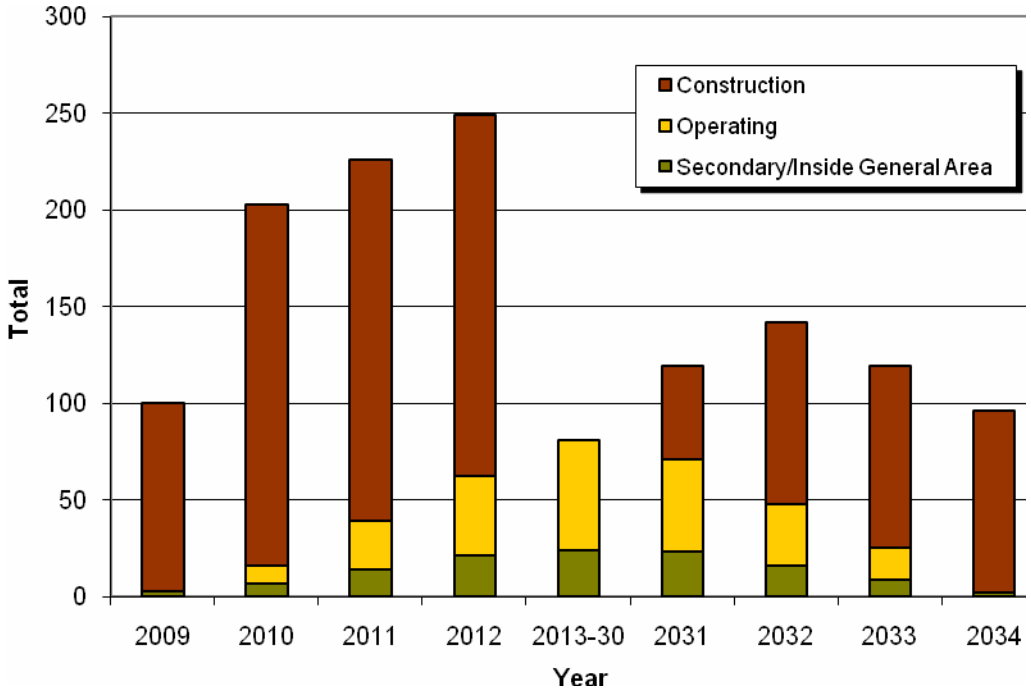

Figure 4.3 Jobs Created in Rock Springs/Green River, Proposed Action.

Table 4.6 Annual Sales and Use Tax Revenue Generated During the Construction Phase of WMWE Project, Proposed Action.[1]

Construction Year	Sweetwater County ($)	State of Wyoming ($)
Year 1 (2009)	15,817	211,827
Years 2-4 (2010-2012)	30,316	406,001
Total	46,133	617,828

[1] Source: LLC (2008).

approximately $46,000 in sales and use tax revenue would be generated for Sweetwater County, and approximately $618,000 in sales and use tax revenue would be generated for the State of Wyoming. The sales and use tax projects take into account the Wyoming state exemption on renewable generation projects, and this exemption applies to sales of equipment used to generate electricity from renewable resources, including equipment used in wind energy generation. It is a broad-based exemption that covers the items necessary to make the project operational, but it does not apply to the construction of access roads, to any purchases made once the project is operating, or to equipment not ultimately connected to the transmission grid such as a building that may be used to house grid-connected equipment. The sales and use tax estimated output from the JEDI model includes only revenue derived from the taxable spending attributable to the WMWE Project's direct effects, and it does not attempt to make estimates of the project's "multiplier effect," which generates some additional sales and use tax revenue as new money circulates in the regional economy. The sales and use tax revenue from the multiplier effect would be small compared to the direct sales and use tax revenue generated (LLC 2008).

Property Taxes

During the construction phase of the Proposed Action, property tax revenue would also be generated. Based on the results of the JEDI model, the WMWE Project is expected to generate at total of approximately $10,600,000 in property tax revenue during the 3 to 4 years of construction (LLC 2008). Annual property tax revenue generated during the construction phase is presented in Table 4.7. Projected property tax revenues would rise to the maximum amount over the life of the project during year 4 of construction after all project phases have been added to the tax roll. The total assessed value and tax revenue would decline thereafter during the operational phase because of the valuation method used in the JEDI model (LLC 2008).

Housing

It is estimated that approximately 150 specialized nonlocal wind turbine workers would temporarily relocate to the Rock Springs/Green River area to fill jobs not held by local workers (refer to Figure 4.3).

For the purpose of this discussion, the housing project area (the Rock Springs/Green River area) includes the U.S. Census Bureau designated communities of Rock Springs, North Rock Springs, Reliance, and Green River. Because of the relatively short duration of construction activity, it is unlikely that the nonlocal workers would be accompanied by family members, and the temporary relocation workers would peak during the second construction year of the project. The increase of 150 nonconstruction workers would comprise less than one-half of one percent of the approximate 33,155 residents in the Rock Springs/Green River area as of 2000 (U.S. Census Bureau 2003).

Table 4.7 Projected Property Tax Revenue Generated During the Construction Phase of the WMWE Project, Proposed Action.[1]

Year of Construction	Projected Property Tax Revenue
1 (2009)	$ 700,000
2 (2010)	$ 2,100,000
3 (2011)	$ 3,300,000
4 (2012)	$ 4,500,000
Total	$10,600,000

[1] Source: LLC (2008).

Nonlocal workers would likely temporarily reside in Rock Springs, North Rock Springs, Green River, or Reliance since these are the closest communities to the project area. Assuming a one-way commute time of less than 1 hour, there are a number of rental units/homes, hotels, motels, and campgrounds that could accommodate these nonlocal workers. The primary access into the project area is from U.S. Highway 191 near the closed Fourteenmile Rest Area, and it is approximately 11.0 mi north of Rock Springs, approximately 8.0 mi north of North Rock Springs, approximately 10.0 mi north of Reliance, and approximately 26.0 mi northeast of Green River.

The most current detailed housing data were obtained from the U.S. Census Bureau for the year 2000 (U.S. Census Bureau 2003). As of the 2000 census, there were 13,796 total housing units in the immediate project area (including the communities of Rock Springs, North Rock Springs, Reliance, and Green River), and approximately 1,324 units (9.6%) were vacant (Table 4.8). In addition, it should also be noted that new housing starts continued in Rock Springs in 2008 and 2009. This number does not include hotels/motels, mobile home and recreational vehicle (RV) spaces, and campgrounds.

As of the 2000 census, Sweetwater County had a total of 14,105 total housing units and 1,816 vacant housing units (a vacancy rate of 11.4%); however, the U.S. Census Bureau completed a 3-year community estimate for Sweetwater County and determined that as of 2005-2007, 16,480 total housing units were occupied in Sweetwater County with 1,373 units vacant (a vacancy rate of 8.3%) (U.S. Census Bureau 2008). This is an increase of 2,375 housing units over the 2000 census data (an approximate increase of 17%). It also appears that the vacancy rate decreased between when the 2000 census data were collected and when the 2005-2007 3-year estimate data were collected. The 2005-2007 census estimates were only available at the county level and were not available by community; however, it is assumed that a majority of the new housing units were in the Rock Springs/Green River area because this is the largest population area in Sweetwater County.

According to a rental agent in Rock Springs, they have seen a significant increase in the number of available rental units in the Rock Springs area in the past 6 months to 1 year. This increase appears partially related to the recent economic slowdown that has also been observed throughout Wyoming. The increase in rental units is attributed to the economic slowdown, the regular turnover of rental units, and an increase in the number of homes that were once for sale now being transferred into rental properties (personal communication, April 3, 2009, with Tina Linkenauger, Manager, Alpine Property Management, Rock Springs, Wyoming).

Table 4.8 Population and Housing for Communities in the Rock Springs/Green River Area.[1]

Community	Population	Total Housing Units	Vacant Housing Units	Percent Vacant
Rock Springs	18,708	8,359	1,011	12.1
North Rock Springs	1,974	739	41	5.5
Reliance	665	272	23	8.5
Green River	11,808	4,426	249	5.6
Total	33,155	13,796	1,324	31.7

[1] Source: U.S. Census Bureau (2003).

Therefore, based on current information, it appears that the housing of approximately 150 temporary construction workers would not result in any short-term housing shortages in the Rock Springs/Green River area. The temporary construction workers would utilize unoccupied apartments, mobile homes, rental house, mobile home/RV lots, and motel rooms in the Rock Springs/Green River area that appear to be available. It should also be noted that local residents filling the remaining temporary construction and indirect jobs created by the Proposed Action would already have housing and would not place any additional pressure on housing resources in the Rock Springs/Green River area.

Community Facilities and Services

In the absence of sizeable increases in the number of temporary workers that might relocate to the Rock Springs/Green River area during the construction phase of the Proposed Action, adverse impacts to community facilities and services are expected to be minimal.

4.6.1.2 O&M Phase

Employment and Income

Starting in 2010 of the O&M phase of the Proposed Action, Teton expects that nine full-time wind plant specialists would be required to operate and maintain the WMWE facility (refer to Figure 4.1). This includes field technicians, administrators, and management personnel. These positions would be expected to generate an additional nine indirect and induced positions in the general project area. As the various phases of the wind plant become operational, more O&M personnel would be required, reaching a peak of employment of approximately 57 wind maintenance specialists in 2013. A total of 107 indirect and induced (secondary) part- and full-time jobs would be required, and the level of employment would be expected to remain constant until 2030. It must also be noted that the JEDI model includes indirect and inducted jobs that would be created but located outside of Sweetwater County. During the O&M phase (2013-2030), it is expected that 83 part- or full-time jobs would be created outside of the Rock Springs/Green River area. An additional 24 secondary part- or full-time jobs would be created in the project area, and it is expected that all of these workers would already reside in the immediate project area. Starting in 2031, the wind plant will begin the decommissioning phase, and the project would be taken off-line and operational personnel would no longer be needed by 2034 (LLC 2008).

In summary, the number of direct O&M jobs and secondary jobs required in the Rock Springs/ Green River area would start in 2010 with 12 jobs and would increase to 35 in 2011, 59 in 2012, and would reach the maximum of 81 in 2013 and continue through to 2030. Then, starting in 2031,

the various phases would start to be taken off-line, and the facility would start to be decommissioned. Only 69 direct O&M jobs and secondary jobs would be required. In 2032, this number would decrease to 46, and in 2033, this number would decrease to 23 jobs. There would not be any O&M jobs in 2034 (refer to Figure 4.3).

Teton expects that during the full O&M phase of the WMWE Project (during 2013-2030), approximately 80% of the maximum number of direct O&M jobs (46 jobs) would be filled by individuals that currently reside outside of Sweetwater County, and these individuals and related families would relocate to the Rock Springs/Green River area. The remaining 11 direct O&M jobs and the 24 secondary jobs would be filled by individuals that currently reside in the Rock Springs/Green River area. In order to maximize the economic benefit to the local economy, Teton is committed to and would hire local companies and employees when the appropriate firms and employees are available.

Based on the results of the JEDI model, it is estimated that the aggregate income of direct and indirect workers during the O&M phase of this project (24 years) would total approximately $113,190,000. Income from direct and secondary workers residing in the Rock Springs/Green River area is expected to total approximately $81,270,000, and income from secondary workers that reside outside of the project area is expected to total approximately $31,925,000 during the O&M phase (LLC 2008). A substantial portion of these earnings would be spent in the local economy and would provide an economic stimulus to the local, county, and state economies.

Sales and Use Taxes

As discussed above, the JEDI model also provided the annual amount of sales and use tax revenue generated during the O&M phase of the Proposed Action, and the results are presented in Table 4.9 (LLC 2008). The State of Wyoming levies a 4% sales and use tax, and Sweetwater County levies an additional 2%. During the 24-year O&M phase of this project, it is estimated that a total of approximately $465,000 in sales and use tax revenue would be generated for Sweetwater County, and approximately $2,780,000 in sales and use tax revenue would be generated for the State of Wyoming. The sales and use tax estimated output from the JEDI model includes only revenue derived from the taxable spending attributable to the WMWE Project's direct effects, and it does not attempt to make estimates of the project's "multiplier effect," which generates some additional sales and use tax revenue as new money circulates in the regional economy. The sales and use tax revenue from the multiplier effect would be small compared to the direct sales and use tax revenue generated (LLC 2008).

Property Taxes

During the O&M phase of the Proposed Action, property tax revenue would also be generated. Based on the results of the JEDI model, the WMWE Project is expected to generate a total of approximately $45,200,000 in property tax revenue during the O&M phase of this project from 2014 through 2033, and this revenue projection is calculated in 2008 dollars (LLC 2008). This analysis assumes straight-line depreciation throughout the O&M phase of the project. Therefore, annual property tax revenue would be expected to decrease starting in 2014 as no new facilities would be constructed and existing facilities are depreciated.

Housing

As discussed above, the O&M phase of the Proposed Action is expected to require a maximum of approximately 81 jobs in the local Rock Springs/Green River area, and these jobs would be needed from 2013-2034 (LLC 2008). As discussed above, 57 of these jobs would be direct O&M positions, and the remaining 24 jobs would be secondary. It is estimated that approximately 46 jobs (an estimated 80% of the 57 direct O&M wind turbine workers) (depending on skill level and function) would likely permanently relocate from other areas to the Rock Springs/Green River area and would require permanent housing in the form of a single family house, apartment, condominium, or mobile home. Temporary housing options such as hotels, motels, or campgrounds may be required initially, but

Table 4.9 Annual Sales and Use Tax Revenue Generated During the O&M Phase of WMWE Project, Proposed Action.[1]

Operational Year	Sweetwater County ($)	State of Wyoming ($)
2010	3,280	19,644
2011	9,567	57,296
2012	15,855	94,947
2013-2030	398,556 (22,142 per year)	2,386,764 (132,598 per year)
2031	18,861	112,954
2032	12,574	75,303
2033	6,287	37,651
Total	$464,980	$2,784,559

[1] Source: LLC (2008).

these options would not be needed long-term because most permanent workers would avoid these types of housing options.

While it is difficult to forecast housing trends in the Rock Springs/Green River area in 2013 through 2034, the number of direct O&M jobs where employees would relocate to the Rock Springs/Green River area would start with seven jobs in 2010 and would increase to 20 in 2011, 33 in 2012, and would reach the maximum of 46 in 2013, and continue through to 2030. Starting in 2031, the various phases of the project would start to be decommissioned, and the O&M jobs would eventually be eliminated by 2034. With the expected slow ramp up of housing needs during the O&M phase and the current availability of housing, the Proposed Action would be expected to have a minimum impact on the overall housing market in the Rock Springs/Green River area.

While most of the specialized wind turbine construction jobs would be filled by experienced employees from outside of southwest Wyoming, the remaining 11 O&M jobs and all 24 of the secondary jobs would likely be filled by individuals that currently reside in the Rock Springs/Green River area. Therefore, these individuals are assumed to already have housing, and no additional housing accommodations would be required.

Community Facilities and Services

In the absence of sizeable increases in the number of O&M workers that might relocate to the Rock Springs/Green River area during the O&M phase of the Proposed Action, adverse impacts to community facilities and services are expected to be minimal.

Property Values

To address the concern that wind energy development projects could have an adverse impact on residential property values, three recent studies from the U.S. were reviewed. In the first study published in 2003 by the Renewable Energy Policy Project, commercial-scale wind turbines do not harm “viewshed” property values (Sterzinger el al. 2003). The study systematically analyzed property values data in 10 states across the U.S., including over 25,000 transactions of properties in view of wind energy projects over 10 MW in size from 1998 to 2001. The Renewable Energy Policy Project study found no evidence that property values were harmed by the presence of wind energy facilities (Sterzinger et al. 2003).

In a second nation-wide study published in 2002, researchers interviewed county tax assessors in 13 different counties in seven states that had recently experienced multiple-turbine wind energy developments. The study addressed a total of 19 specific wind projects that had a total of 1,722 wind turbines and that been constructed within the past 10 years. While not all the locations chosen had wind turbines that were visible from residential areas, and some development projects had been constructed too recently for their full impact to be properly assessed, the study found no evidence that wind turbines decreased property values (ECONorthwest 2002).

In the third study published in 2006, an analysis of 280 home sales within 5 mi of the Fenner wind energy project in Madison County, New York, failed to identify any statistically significant relationships between either proximity to or visibility of the wind energy project and the sale price of homes (Hoen 2006). In addition, the study failed to uncover any relationship even when concentrating on homes within 1 mi of the wind energy project or that sold immediately following the announcement and construction of the wind energy project. Based on the results of this study, the view of the wind energy project did not produce either a widespread or localized adverse effect (Hoen 2006).

Property values are affected by many variables, and empirically isolating the impacts of one variable (a wind energy project) is difficult (National Research Council 2007). However, based on the results of these studies, there is no evidence that residential property values would be adversely impacted by the Proposed Action.

4.6.1.3 Decommissioning Phase

Employment and Income

Decommissioning of the WMWE Project is expected to start in 2031 and would be completed by the end of 2034. Based on the number of direct construction jobs required to construct this project, it is estimated that approximately one-half of the number of direct and secondary jobs required during the construction phase would be required during the decommissioning phase. Based on this assumption, approximately 70 total jobs would be created in 2031, and a total of 136 jobs would be required in 2032-2034. In 2031, 48 direct construction-related jobs and one secondary job would be required in the Rock Springs/Green River area, and 21 secondary jobs located outside of Sweetwater County would be required. In 2032-2034, the number of required direct construction-related jobs in Sweetwater County would increase to 94, with two required secondary jobs in Sweetwater County and 40 required secondary jobs located outside of Sweetwater County.

Teton expects that during the decommissioning phase of the WMWE Project, approximately 80% of the direct decommissioning construction jobs would be filled by individuals that currently reside outside of Sweetwater County. The remaining direct construction-related, and the few secondary jobs, would be filled by individuals that currently reside in the Rock Springs/Green River area. The remaining secondary jobs would remain located outside of the Rock Springs/Green River area. In order to maximize the economic benefit to the local economy, Teton is committed to and would hire local companies and employees when the appropriate firms and employees are available.

Based on the results of the JEDI model for the construction phase of the Proposed Action, it is estimated that the aggregate income of direct and indirect workers during the decommissioning phase of this project (4 years) would total approximately $19,550,000. Income from direct workers is expected to total approximately $12,540,000, and income from indirect workers is expected to total approximately $7,010,000 for the decommissioning phase (LLC 2008). A substantial portion of these earnings would be earned and spent in the local economy and would provide an economic stimulus to the local, county, and state economies.

Sales and Use Taxes

Based on the results of the JEDI model for the construction phase, the annual amount of sales and use tax revenue generated during the

decommissioning phase of the Proposed Action and the results are presented in Table 4.10. The State of Wyoming levies a 4% sales and use tax, and Sweetwater County levies an additional 2%.

The sales and use tax projections take into account the Wyoming state exemption on renewable generation projects, and this exemption applies to sales of equipment used to generate electricity from renewable resources, including equipment used in wind energy generation. It is a broad-based exemption that covers the items necessary to make the project operational, but it does not apply to the construction of access roads, to any purchases made once the project is operational, or to equipment not ultimately connected to the transmission grid, such as a building that may be used to house grid-connected equipment. The sales and use tax estimated output from the JEDI model includes only revenue derived from the taxable spending attributable to the WMWE Project's direct effects, which are expected to be only 25% of that generated during the construction phase of the project. In addition, this estimate does not attempt to make estimates of the project's "multiplier effect," which generates some additional sales and use tax revenue as new money circulates in the regional economy. The sales and use tax revenue from the multiplier effect would be small compared to the direct sales and use tax revenue generated (LLC 2008).

Property Taxes

Based on the results of the JEDI model, there will be no additional property taxes generated during the decommissioning phase of this project (LLC 2008).

Housing

It is estimated that in 2031, approximately 38 specialized nonlocal construction workers would temporarily relocate to the Rock Springs/Green River area to fill jobs not held by local workers. In 2032-2034, the number of required specialized nonlocal construction workers that would temporarily relocate to the Rock Springs/Green River area would increase to 75. The maximum increase of 75 nonconstruction workers would comprise less than one-half of one percent of the approximate 33,155 residents in the Rock Springs/Green River area as of 2000 (U.S. Census Bureau 2003).

Nonlocal workers would likely temporarily reside in Rock Springs, North Rock Springs, Green River, or Reliance since these are the closest communities to the project area. Assuming a one-way commute time of less than 1 hour, there are a number of rental units/homes, hotels, motels, and campgrounds that could accommodate these nonlocal workers. The primary access into the project area is from U.S. Highway 191 near the closed Fourteenmile Rest Area, and it is approximately 11.0 mi north of Rock Springs, approximately 8.0 mi north of North Rock Springs, approximately 10.0 mi north of Reliance, and approximately 26.0 mi northeast of Green River.

Table 4.10 Annual Sales and Use Tax Revenue Generated During the Decommissioning Phase of the WMWE Project, Proposed Action.

Construction Year	Sweetwater County ($)	State of Wyoming ($)
2031	3,955	52,955
2032-2034	7,580	101,500
Total	$11,535	$154,455

Based on the most current available housing data obtained from the U.S. Census Bureau for the year 2000 (U.S. Census Bureau 2003), there were 13,796 total housing units in the immediate project area (which included the communities of Rock Springs, North Rock Springs, Reliance, and Green River), and approximately 1,324 units (9.6%) were vacant. This number does not include hotels/motels, mobile home and RV spaces, and campgrounds. It should also be noted that while decommissioning efforts are underway, there will also be a decrease in the number of O&M workers from 57 to 0 over the same period of time (2031-2034). Therefore, while it is difficult to forecast the number of available housing units in 2030, it is likely that the addition of a maximum of 75 temporary works moving into the area during the decommissioning phase would have minimal impacts on the overall housing market in the Rock Springs/Green River area.

Community Facilities and Services

In the absence of sizeable increases in the number of construction workers that might relocate to the Rock Springs/Green River area during the decommissioning phase of the Proposed Action, adverse impacts to community facilities and services are expected to be minimal.

4.6.2 Alternative A - Development Only on Privately Owned Lands

4.6.2.1 Construction Phase

Employment and Income

Under the construction phase of Alternative A, the impacts to employment and income would be similar to those identified under the Proposed Action. Based on the number of wind turbines presented under Alternative A, there would be an estimated maximum of approximately 250 full- and part-time jobs created. Approximately 131 direct temporary construction jobs and 119 indirect and induced (secondary) part- and full-time jobs would be created during the 3- to 4-year construction period of the WMWE Project. Of the 119 secondary jobs, it is expected that three jobs would be created in Sweetwater County, and the remaining 116 secondary jobs would be created outside of Sweetwater County.

It is estimated that the aggregate income of direct and indirect workers under Alternative A would total approximately $27,300,000. Income from direct workers is expected to total approximately $18,100,000, and income from indirect and induced workers is expected to total approximately $9,200,000 during the 4-year construction phase of Alternative A.

Sales and Use Taxes

It is expected that during the 3- to 4-year construction phase of Alternative A, a total of approximately $32,000 in sales and use tax revenue would be generated for Sweetwater County, and approximately $433,000 in sales and use tax revenue would be generated for the State of Wyoming.

Property Taxes

During the construction phase of Alternative A, property tax revenue would also be generated. It is estimated that a total of approximately $7,420,000 in property tax revenue would be generated during the 4 years of construction. Projected property tax revenues would rise to the maximum amount over the life of the project during year 4 of construction after all project phases have been added to the tax roll. The total assessed value and tax revenue would decline thereafter during the O&M phase because of the valuation method used to estimate property taxes.

Housing

It is estimated that a maximum of approximately 105 of the 131 (80%) specialized nonlocal wind turbine workers would temporarily relocate to the Rock Springs/Green River area to fill jobs not held by local workers. As outlined under the Proposed Action, it is unlikely that the nonlocal workers would be accompanied by family members, and the temporary relocation workers would peak during the second construction year of the project. The increase of 105 nonconstruction workers would comprise less than one-half of one percent

of the approximate 33,155 residents in Rock Springs/Green River area as of 2000 (U.S. Census Bureau 2003).

Nonlocal workers would likely temporarily reside in Rock Springs, North Rock Springs, Green River, or Reliance since these are the closest communities to the project area. Assuming a one-way commute time of less than 1 hour, there are a number of rental units/homes, hotels, motels, and campgrounds that could accommodate these nonlocal workers. The primary access into the project area is from U.S. Highway 191 near the closed Fourteenmile Rest Area, and it is approximately 11.0 mi north of Rock Springs, approximately 8.0 mi north of North Rock Springs, approximately 10.0 mi north of Reliance, and approximately 26.0 mi northeast of Green River.

The most current detailed housing data were obtained from the U.S. Census Bureau for the year 2000 (U.S. Census Bureau 2003). As of the 2000 census, there were 13,796 total housing units in the immediate project area (including the communities of Rock Springs, North Rock Springs, Reliance, and Green River), and approximately 1,324 units (9.6%) were vacant. This number does not include hotels/motels, mobile home and RV spaces, and campgrounds.

Therefore, based on current information presented under Alternative A, it appears that the housing of approximately 105 temporary construction workers will not result in any short-term housing shortages in the Rock Springs/Green River area. The temporary construction workers would utilize unoccupied apartments, mobile homes, rental house, mobile home/RV lots, and motel rooms in the Rock Springs/Green River area that are available. It should also be noted that local residents filling the remaining temporary construction jobs and indirect jobs created by Alternative A would already have housing and would not place any additional pressure on housing resources in the Rock Springs/Green River area.

Community Facilities and Services

In the absence of sizeable increases in the number of temporary workers that might relocate to the Rock Springs/Green River area during the construction phase of Alternative A, adverse impacts to community facilities and services are expected to be minimal.

4.6.2.2 O&M Phase

Employment and Income

Under the O&M phase of Alternative A, the impacts to employment and income would be similar to those identified under the Proposed Action. Based on the number of wind turbines presented under Alternative A, an estimated maximum of approximately 114 full- and part-time jobs would be created inside and outside of Sweetwater County. Approximately 39 direct O&M jobs and 75 indirect and induced (secondary) part- and full-time jobs would be created during the 24-year O&M phase of Alternative A. Of the 75 secondary jobs, it is expected that 17 jobs would be created in Sweetwater County and the remaining 58 secondary jobs would be created outside of Sweetwater County.

It is estimated that the aggregate income of direct and indirect workers under Alternative A would total approximately $79,200,000. Income from direct workers is expected to total approximately $57,300,000, and income from indirect and induced workers is expected to total approximately $21,900,000 during the 24-year O&M phase of Alternative A.

Sales and Use Taxes

During the 24-year O&M phase of Alternative A, it is estimated that a total of approximately $325,500 in sales and use tax revenue would be generated for Sweetwater County, and approximately $1,940,000 in sales and use tax revenue would be generated for the State of Wyoming.

Property Taxes

During the O&M phase of Alternative A, it is expected that a total of approximately $31,600,000 in property tax revenue would be generated from 2014 through 2033, and this revenue projection is calculated in 2008 dollars. This analysis assumes straight-line depreciation throughout the O&M phase of the project. Therefore, annual property tax revenue would be expected to decrease starting in 2014 because no new facilities would be constructed and existing facilities would depreciate.

Housing

The O&M phase of Alternative A is expected to require a maximum of approximately 56 direct and secondary jobs in the local Rock Springs/Green River area, and these jobs would be needed from 2013-2034. As discussed above, 39 of these jobs would be direct O&M positions and the remaining 17 jobs would be secondary (indirect and induced). It is estimated that approximately 31 jobs (an estimated 80% of the 39 direct O&M wind turbine workers) (depending on skill level and function) would likely permanently relocate from other areas to the Rock Springs/Green River area and would require permanent housing in the form of a single family house, apartment, condominium, or mobile home. Temporary housing options such as hotels, motels, or campgrounds may be required initially, but these options would not be needed long term because most permanent workers would avoid these types of housing options.

While it is difficult to forecast housing trends in the Rock Springs/Green River area in 2013 through 2034, the number of direct O&M jobs where employees would relocate to the Rock Springs/Green River area would start with approximately five jobs in 2010 and would slowly increase to maximum of 31 in 2013 and continue through to 2030. Starting in 2031, the various phases of the project would start to be decommissioned, and the O&M jobs would eventually be eliminated by 2034. With the decline of housing needs during the O&M phase and the current availability of housing, Alternative A would be expected to have a minimum impact on the overall housing market in the Rock Springs/Green River area.

While most of the specialized wind turbine O&M jobs would be filled by experienced employees from outside of southwest Wyoming, the remaining eight O&M jobs and all 17 of the secondary jobs would likely be filled by individuals that currently reside in the Rock Springs/Green River area. Therefore, these individuals are assumed to already have housing, and no additional housing accommodations would be required.

Community Facilities and Services

In the absence of sizeable increases in the number of temporary workers that might relocate to the Rock Springs/Green River area during the O&M phase of Alternative A, adverse impacts to community facilities and services are expected to be minimal.

4.6.2.3 Decommissioning Phase

Employment and Income

Under the decommissioning phase of Alternative A, the impacts to employment and income would be similar to those identified under the Proposed Action. Based on the number of wind turbines presented under Alternative A, an estimated maximum of approximately 96 full- and part-time jobs would be created. Approximately 66 direct temporary construction jobs and 30 indirect and induced (secondary) part- and full-time jobs would be created during the 4-year decommissioning phase of the WMWE Project. Of the 30 secondary jobs, it is expected that two jobs would be created in Sweetwater County and the remaining 28 secondary jobs would be created outside of Sweetwater County.

It is estimated that the aggregate income of direct and indirect workers under Alternative A would total approximately $13,650,000. Income from direct workers is expected to total approximately $9,050,000, and income from indirect and induced workers is expected to total approximately

$4,600,000 during the 4-year decommissioning phase of Alternative A.

Sales and Use Taxes

It is expected that during the 4-year decommissioning phase of Alternative A, a total of approximately $16,000 in sales and use tax revenue would be generated for Sweetwater County, and approximately $216,000 in sales and use tax revenue would be generated for the State of Wyoming.

Property Taxes

As with the Proposed Action, there will be no additional property taxes generated during the decommissioning phase of this project.

Housing

Under Alternative A, it is estimated that in 2031, approximately 27 specialized nonlocal construction workers would temporarily relocate to the Rock Springs/Green River area to fill jobs not held by local workers. In 2032-2034, the number of required specialized nonlocal construction workers would increase to 53. The maximum increase of 53 nonconstruction workers would comprise less than one-half of one percent of the approximate 33,155 residents in the Rock Springs/Green River area as of 2000 (U.S. Census Bureau 2003).

Nonlocal workers would likely temporarily reside in Rock Springs, North Rock Springs, Green River, or Reliance since these are the closest communities to the project area. Assuming a one-way commute time of less than 1 hour, there are a number of rental units/homes, hotels, motels, and campgrounds that could accommodate these nonlocal workers. The primary access into the project area is from U.S. Highway 191 near the closed Fourteenmile Rest Area, and it is approximately 11.0 mi north of Rock Springs, approximately 8.0 mi north of North Rock Springs, approximately 10.0 mi north of Reliance, and approximately 26.0 mi northeast of Green River.

Based on the most current housing data (U.S. Census Bureau 2003), there were 13,796 total housing units in the immediate project area (including the communities of Rock Springs, North Rock Springs, Reliance, and Green River), and approximately 1,324 units (9.6%) were vacant. This number does not include hotels/motels, mobile home and RV spaces, and campgrounds. It should also be noted that while decommissioning efforts are underway, there would be a decrease in the number of O&M workers from 39 to 0 over the same period of time (2031-2034). Therefore, while it is difficult to forecast the number of available housing units from 2030-2034, it is likely that the addition of a maximum of 53 temporary construction workers moving into the area during the decommissioning phase would have minimal impacts on the overall housing market in the Rock Springs/Green River area.

While most of the specialized wind turbine construction required for decommissioning would be filled by experienced employees from outside of southwest Wyoming, the remaining 13 construction jobs and both of the secondary jobs would likely be filled by individuals that currently reside in the Rock Springs/Green River area. Therefore, these individuals are assumed to already have housing, and no additional housing accommodations would be required.

Community Facilities and Services

In the absence of sizeable increases in the number of temporary workers that might relocate to the Rock Springs/Green River area during the decommissioning phase of Alternative A, adverse impacts to community facilities and services are expected to be minimal.

4.6.3 No Action Alternative

Under the No Action Alternative, the proposed wind energy facility would not be authorized or approved. No jobs would be created, and there would be no impacts to socioeconomic resources beyond those that already exist.

4.6.4 Residual Impacts

There would be some unavoidable changes in employment and housing in the Rock Springs/Green River area as a result of the Proposed Action. While impacts to housing could be seen as detrimental, these impacts would be limited given the current availability of housing in the area. Other impacts such as tax revenue would be positive and beneficial to the local, state, and national economies.

4.6.5 Cumulative Impacts

The BLM has defined the IAA for socioeconomic resources as Sweetwater County. Wind energy development associated with the Proposed Action within the IAA would add to the economic viability of Sweetwater County, the State of Wyoming, and the U.S. As described in the property tax and sales and use tax sections, the various phases of the Proposed Action would be a source of tax revenue for municipal, county, state, and federal governments--a desirable outcome from an economic development perspective--in addition to the other ongoing and RFFAs that are anticipated within Sweetwater County. The Proposed Action would add to the economic stability for the various government entities.

Starting in 2010, the Proposed Action would provide approximately 100 part- and full-time jobs in Sweetwater County. In 2012, this number would steadily increase to a maximum of 249 part- and full-time jobs in Sweetwater County for all direct and secondary construction and O&M jobs. Total employment in Sweetwater County related to the Proposed Action would remain steady from 2013-2030 with approximately 81 direct and secondary O&M jobs. The total number of jobs would increase slightly from 2031-2032 with 142 jobs as the Proposed Action is decommissioned. The total number of jobs in Sweetwater County would then decrease because all decommissioning and reclamation work would be completed by the end of 2034.

As discussed above, specialized wind construction or O&M workers would relocate to the area, and are expected to live in the Rock Springs/Green River area and the communities of Rock Springs, North Rock Springs, Reliance, or Green River since these communities are located within a short commute of the WMWE project area. The number of combined construction and O&M workers that would relocate to the Rock Springs/Green River area would increase from 78 in 2009 to a maximum of 188 in 2012 during the construction phase, decrease to 46 during the 24-year O&M phase of the project 2013-2030, increase slightly to 101 in 2032, and then decreasing to 75 in 2034 during the decommissioning phase. As of the 2000 census, there were 13,796 total housing units in the Rock Springs/Green River area, and approximately 1,324 units (9.6%) were vacant. This number does not include hotels/motels, mobile home and RV spaces, and campgrounds. Therefore, based on the most recent housing numbers for the Rock Springs/Green River area, the Proposed Action would result in limited impacts to the Sweetwater County housing market, and there would be minimal impacts to community facilities and services.

From an employment perspective, the WMWE Project itself is a relatively small project and would likely contribute little to cumulative impacts to socioeconomics. More monies would also be available to the Sweetwater County school districts. In addition, there would be no impact on residential property values.

4.7 SOILS

4.7.1 Proposed Action

4.7.1.1 Construction Phase

Construction activities associated with the Proposed Action would result in the initial disturbance of 866 acres of land within the 13,165 acres of project area, and 162 acres of land would remain occupied by roads, turbine foundations, and facilities for the life of the project.

Construction activities, including topsoil salvage, grading, cut-and-fill activities, and construction of access roads, would compact or destabilize the soil surface and increase the potential for soil erosion

by water or wind. The most likely time for erosion to occur is after initial disturbance and before re-establishment of vegetative cover or placement of concrete foundations. An increase in erosion can result in an increase in runoff and sedimentation into receiving waters. In addition, erosion can cause a number of problems, including damage to foundations, roadways, and other structures, loss of topsoil, slowed restoration rates, and loss of structure in soils that are disturbed or driven on during construction. Impact to soils from excavation activities include a mixing of soil horizons, susceptibility to wind and water erosion, and reduced range productivity.

Equipment travel throughout the project area would result in increased soil compaction. Moderate or severe soil compaction would affect soil productive potential. The extent of compaction would depend in large part on soil moisture content and the physical characteristics of a particular soil type. Compaction tends to be less severe when soils are dry and more severe when soils are moist to wet.

The project area includes soil types that are categorized as either sandy or erosive (BLM 1996). In order to minimize potential erosion and prior to the initiation of construction operations, an SWPPP, which includes erosion control measures, would be prepared and implemented for the project area. The SWPPP would be based on the 1992 EPA document entitled *Storm Water Management for Construction Activities-Developing Pollution Prevention Plans and Best Management Practices* (1992). Implementation of the SWPPP would minimize the impact to soils and erosion to low levels. All surface-disturbed or compacted areas not needed during the O&M phase of the project would be regraded, ripped, retopsoiled, and revegetated in accordance with the reclamation plan outlined under the Proposed Action. Application of design features to prevent soil erosion would be used throughout the implementation of the project. After erosion control and reclamation operations have been successfully completed, soil stability would likely be achieved, and the rate of erosion would return to predisturbance levels.

4.7.1.2 O&M Phase

No additional impacts beyond those discussed under construction impacts are expected to occur during the O&M phase of this project. Impacts to soils during the O&M phase of the project would largely be associated with limited soil erosion induced by vehicle traffic on existing roads; however, soil erosion from this source is expected to be minor. Teton will continue to implement the SWPPP for this project and will monitor and repair any areas of erosion or soil instability.

4.7.1.3 Decommissioning Phase

No additional impacts beyond those discussed under construction impacts are expected to occur during the decommissioning phase of this project. Soil erosion and some compaction are the primary impacts that would be expected from removal of roads, turbines, and other structures. Control of surface runoff and sedimentation during the decommissioning phase of the project would be accomplished by the continued implementation of SWPPP and other design features specified in Chapter 2.0 of this EA and would generally reduce the impact to soils to low levels. After final reclamation operations have been successfully completed, soil stability would likely be achieved, and the rate of erosion would return to predisturbance levels. Reclaimed areas would be considered stable if there are no large rills or gullies, no slumping or subsidence, no substantial soil movement, no headcutting in drainages, and no slope instability that can be attributed to construction, O&M, and after decommissioning of the project. Specifically, for BLM-administered lands, Wyoming Rangeland Standards would be met, and applicable standards would be met on private and state lands.

4.7.2 Alternative A - Development Only on Privately Owned Lands

4.7.2.1 Construction Phase

Potential direct and indirect impacts associated with soil resources under the construction phase of Alternative A would be similar to the type of impacts described in the Proposed Action.

Implementation of this alternative would involve the construction of 170 wind turbines on privately owned land; therefore, direct impacts to soil resources could include the disturbance of 619 acres of soils from the excavation of the turbine pads, the substation, and the collector lines. The potential impact to soils would be 30% less than those anticipated under the Proposed Action.

Control of surface runoff and sedimentation during the construction phase of the project would be accomplished by the implementation of the SWPPP and other design features specified in Chapter 2.0 of this EA, and would generally reduce the impact to soils to low levels. Teton would implement stability and erosion practices for all temporary and permanent reclamation in accordance with the SWPPP for the project. After temporary reclamation operations have been successfully completed following construction, soil stability would likely be achieved, and the rate of erosion would return to predisturbance levels.

4.7.2.2 O&M Phase

Under the O&M phase of Alternative A, no additional impacts beyond those discussed under construction impacts are expected to occur. Control of surface runoff and sedimentation during the O&M phase of the project would be accomplished by the implementation of the SWPPP and other design features specified in Chapter 2.0 of this EA.

4.7.2.3 Decommissioning Phase

Under the decommissioning phase of Alternative A, no additional impacts beyond those discussed under construction impacts are expected to occur. Soil erosion and some compaction are the primary impacts that would be expected from removal of roads, turbines, and other structures. Control of surface runoff and sedimentation during the decommissioning phase of the project would be accomplished by the implementation of the SWPPP and other design features specified in Chapter 2.0 of this EA and would reduce the impact to soils to low levels. After final reclamation operations have been successfully completed following decommissioning, soil stability would likely be achieved, and the rate of erosion would return to predisturbance levels. Reclaimed areas would be considered stable if there are no large rills or gullies, no slumping or subsidence, no substantial soil movement, no headcutting in drainages, and no slope instability that can be attributed to construction, O&M, and after decommissioning of the project. Specifically, for BLM-administered lands, Wyoming Rangeland Standards would be met, and applicable standards would be met on private and state lands.

4.7.3 No Action Alternatives

Under the No Action Alternative, the proposed wind energy facility would not be authorized nor approved. No ground would be disturbed, and no impacts to soils would take place beyond those that already exist.

4.7.4 Residual Impacts

Implementation of the Proposed Action or Alternative A would result in some temporarily increased and unavoidable soil loss and sedimentation to the receiving waters as a result of water and wind erosion. Productivity of some disturbed soils would be reduced due to vegetation removal, soil compaction and exposure, mixing of horizons, and increased susceptibility to wind and water erosion.

4.7.5 Cumulative Impacts

Impacts to soil resources would be minimized by implementation of the SWPPP and other design features specified in Chapter 2.0 of this EA. These mitigation measures will address temporary disturbance and life-of-project disturbance. Within 2-3 years after the BMPs have been installed, soil stability would likely be achieved. In addition, temporary and permanent reclamation operations would eventually (within 10-20 years) return vegetation cover to predisturbance levels, and the rate of erosion would also return to predisturbance levels.

Based on the disturbance calculations presented in Chapter 3.0, approximately 19,954 acres are

currently disturbed within the IAA. This represents 7.43% of the total area within the IAA. RFFA (including the Proposed Action) within the cumulative IAA would result in an additional 1,250 acres of disturbance--189 acres of disturbance due to the Proposed Action and 1,061 acres from other RFFAs. This represents 21,204 acres of the total within the IAA or 7.89% based on the total disturbance due to past, present, and RFFAs.

Provided that reclamation efforts are timely and successful, cumulative impacts to soils resources should be within acceptable limits and would not result in impacts beyond those that already exist or have already been identified and discussed in Chapter 4.0 of this EA.

4.8 THREATENED, ENDANGERED, CANDIDATE, PROPOSED, AND BLM SENSITIVE SPECIES

4.8.1 TEPC Species

No federally listed TEPC species were documented in the WMWE project area during wildlife surveys conducted in association with this project (TRC 2008a, 2008b, 2008c, 2008d, 2009b) or would be expected to be found in the WMWE project area. Therefore, the risk to such species during construction, O&M, and decommissioning phases of the WMWE Project would be minimal.

In addition, the BLM consulted with the USFWS concerning the 420-acre-ft life of project water depletion for the WMWE project and potential impacts on Colorado River endangered fish species. On October 2, 2009, the USFWS issued a biological opinion and in accordance with the RIP for Endangered Species in the Upper Colorado River Basin determined that annual water depletion would require payment to the USFWS in order to offset effects of the project. Therefore, Teton would make a one-time payment prior to the commencement of construction to mitigate water depletion and potential impacts to Colorado River endangered fish species.

4.8.2 BLM Sensitive Species

4.8.2.1 Construction Phase

Several BLM listed avian sensitive species (BLM 2002) were documented in the WMWE project area including: ferruginous hawk, Brewer's sparrow, sage sparrow, sage thrasher, loggerhead shrike, and greater sage-grouse (TRC 2009b). Ferruginous hawks could be impacted as a result of construction-related disturbance during the nesting season (BLM 2005; National Research Council 2007; Arnett et al. 2007). The BLM has established seasonal and no surface occupancy restriction areas that Teton will comply with according to BLM policy (BLM 1997). Additionally, Teton has committed to adopting a 50-m (164-ft) minimum setback from the ridgeline of White Mountain, as well as the edge of inter-gorge of large intermittent or ephemeral drainages to further reduce impacts to avian species. Table 2.9 lists the seasonal restriction areas, as well as the no surface occupancy buffers, and Teton would not place any wind turbines within these no surface occupancy buffer areas. In addition, to reduce the risk of electrocution to ferruginous hawks, all electrical systems and components will be designed, constructed, operated, and maintained in conformance with the National Electrical Safety Code and other applicable codes and standards, as well as *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (Avian Power Line Interaction Committee 2006). As a result, implementation of these design features would minimize risk to ferruginous hawks during construction operations. The risk to ferruginous hawks would be low and the impact would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

Construction impacts to sparrow, sage sparrow, sage thrasher, and loggerhead shrike could result from habitat disturbance (i.e., the removal of vegetation during site preparation) and direct injury or mortality (BLM 2005; National Research Council 2007; Arnett et al. 2007). However, the removal of natural vegetation (grassland and shrub communities) would be minimized to the extent possible during construction. In addition, ground disturbing activity and the movement of

construction personnel and equipment on-site would be limited to the extent possible to the construction areas to avoid inadvertent impacts to all wildlife species. The risk to PSB during the construction phase of this project would be low, and the impact would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

Construction impacts to greater sage-grouse could result from habitat disturbance (i.e., the removal of vegetation during site preparation), displacement, and direct injury or mortality (BLM 2005; National Research Council 2007; Arnett et al. 2007). To minimize potential impacts, construction personnel would be informed that greater sage-grouse occur in the project area and that they are not allowed to haze or harass greater sage-grouse, and they should minimize any direct disturbance to the greater sage-grouse whenever possible. In addition, ground-disturbing activity and the movement of construction personnel and equipment on-site would be limited to the extent possible to the construction areas to avoid inadvertent impacts to greater sage-grouse.

Mountain plover in the general project area are found in cushion plant communities and on windswept ridges (personal communication, June 10, 2002, with Lorraine Keith, BLM RSFO), and breeding/nesting habitat is often associated with active prairie dog towns (Dinsmore 2003). A small portion of proposed project area is composed of greasewood fans and flats and basin exposed rock with areas that are relatively void of vegetation, and it is possible that these areas could provide suitable nesting and foraging habitat for mountain plover. However, no mountain plovers were observed during 20+ weeks of diurnal and nocturnal avian migration studies conducted in 2008 (TRC 2009b). No mountain plover observations have been recorded in the vicinity the proposed WMWE project area (WNDD 2009). To minimize potential impacts to nesting mountain plover, Teton would conduct presence/absence surveys prior to vegetation removal and construction. If mountain plovers are found, Teton would work with the BLM to modify turbine placement to avoid the nesting birds, or they would wait to conduct construction activities until nesting activities have been completed. It is also possible that some mountain plovers could collide with a rotating wind turbine blades; however, while possible, these events are unlikely to occur because of the low density of mountain plovers in the WMWE project area. Therefore, the Proposed Action is expected to have minimal direct impacts on any nesting mountain plovers and minimal indirect impacts (through increased mortalities due to wind turbine and vehicle collisions) on any mountain plovers in the immediate project area. The risk to mountain plovers would be low, and the impact would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

Pygmy rabbit habitat occurs throughout the project area as inclusions of preferred vegetation densities and heights within Wyoming big sagebrush; therefore, impacts to pygmy rabbits could result from the removal of vegetation (clearing, grubbing, etc.) and compaction of soil during site preparation. It is also possible that increased human presence during the life of the project could lead to an increased number of predators such as coyotes and red foxes. The increased presence of predators could result in increased predation on pygmy rabbits and other small mammals. The removal of natural vegetation (grassland and shrub communities) would be minimized to the extent possible during construction. In addition, the movement of personnel and equipment on-site would be limited to the extent possible to construction areas to avoid inadvertent compaction of soil. Presence/absence surveys for pygmy rabbits and their associated habitat would be conducted prior to vegetation removal and construction. If pygmy rabbits are found, Teton would work with the BLM to modify turbine placement to avoid habitat to the extent possible. The risk to pygmy rabbits would be low, and the impact would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

Impacts to other BLM sensitive passerine birds (e.g., not recorded in the project area) and mammal species (e.g., Wyoming pocket gopher) during the construction phase of the Proposed Action would likely be the same as discussed for wildlife, including birds, presented in Section 4.12

of this EA. These potential impacts are within the range documented and acknowledged in the BLM Wind Energy Programmatic EIS (BLM 2005). Impacts to midget-faded rattlesnakes and other reptiles or amphibians would be eliminated or reduced after the results of the den survey and appropriate mitigation can be developed with the BLM, WGFD, and Teton if these species are found.

It is possible that cedar rim thistle could be found within suitable habitats within the WMWE project area. To mitigate potential impacts to cedar rim thistle, Teton would conduct surveys for cedar rim thistle and their associated habitat prior to vegetation removal and construction. If any cedar rim thistle is found, Teton would avoid physical disturbance to these plants and work with the BLM to modify turbine/road placement.

4.8.2.2 O&M Phase

During the O&M phase of the project, impacts to ferruginous hawk, Brewer's sparrow, sage sparrow, sage thrasher, loggerhead shrike, and greater sage-grouse would be different and primarily related to potential collisions with the operating wind turbines and service vehicles (BLM 2005; National Research Council 2007; Arnett et al. 2007).

Ferruginous Hawk. Based on the avian use study, 20 ferruginous hawk observations were recorded during the RLB continuous surveys, and the species is known to nest adjacent to the project area (TRC 2009b). Forty-five percent of the ferruginous hawks were observed flying, and five of the nine flying observations (56%) were within the rotor swept area. At 0.0270, the risk index for ferruginous hawk was seventh highest among RLBs but lowest among the raptor species observed in the study (TRC 2009b). Based on the preponderance of the abovementioned species in the project area and/or their flight characteristics, it is likely that operation of the proposed wind development could result in some ferruginous hawk fatalities. However, the risk to ferruginous hawks would be low, and the impact would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

Brewer's Sparrow and Sage Sparrow. Based on the avian use study, Brewer's sparrow and sage sparrow were the second and third most abundant PSB species with 325 (14.8% of total PSB observation) and 211 (11.2% of total PSB observation) individuals documented, respectively. Horned larks accounted for the majority of observations (933 [41.6%]). Twenty-six percent of the Brewer's sparrows and 21% of the sage sparrows were recorded flying, but none were observed within the rotor-swept area. Thus, based on the data, a valid risk index cannot be calculated, meaning that these two species may have a negligible or relatively low potential for turbine-related collisions compared to other species documented in the study area (TRC 2009b). Based on use studies conducted in the WMWE project area, Brewer's sparrows and sage sparrow appear to be locally abundant, and the project is unlikely to have an adverse impact on these species at the population level (TRC 2009b). The risk to Brewer's sparrow and sage sparrow would be low, and the impact would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

Sage Thrashers. Based on the results of the avian use study, sage thrashers were common in the WMWE project area, with 196 individuals documented (8.8% of the birds observed). Of those, 15 were flying, and one was observed in the rotor-swept area. Risk value for the sage thrasher was low at 0.0027 (TRC 2009b). Based on the use study conducted in the WMWE project area, sage thrashers appear to be locally abundant, and the project is unlikely to have an adverse impact on these species at the population level (TRC 2009b). The risk to sage thrashers would be low, and the impact would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

Loggerhead Shrike. One loggerhead shrike was recorded during the avian studies, but it was recorded as an incidental observation and was not flying and would therefore have a negligible or low risk index potential for turbine-related collisions compared to other species documented in the study area (TRC 2009b). The risk to loggerhead shrikes would be low, and the impact

would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

Greater Sage-grouse. Much of the following analysis for impacts to greater sage-grouse breeding, nesting, brood-rearing, and winter activities and habitat changes is from the summary article by Becker et al. (2009). Wind energy development is relatively new, and few field studies have been conducted concerning greater sage-grouse and potential impacts of wind energy projects (Becker et al. 2009). Lek use is widely studied to monitor greater sage-grouse population size and distribution locally and at the landscape scale. Factors affecting lek use and persistence are put forth with information on the effective distance of such factors as the time period required to detect lek abandonment following oil and gas field development (Becker et al. 2009). It is likely that similar types of effects would be observed in relation to wind energy development. However, it should also be recognized that oil and gas development and wind energy developments involve some important differences in the level of disturbance and human activity that are not directly comparable to each other (Strickland 2009).

In the Powder River Basin of northeastern Wyoming from 2001 to 2005, the number of males observed on leks inside coalbed natural gas (CBNG) fields that had been confirmed active in 1997 declined more rapidly than leks outside the CBNG fields. Lek count indices (counts of birds at leks that provide an indication of population size [Walsh et al. 2004]) inside gas fields declined by 82%, whereas indices outside such development declined by 12%. By 2005, leks in CBNG fields had 46% fewer males per active lek than leks outside the fields. Of leks active in 1997 or later, only 38% of 26 leks in CBNG fields remained active by 2004-2005, compared to 84% of 250 leks outside CBNG fields. Persistence of 110 leks was influenced positively by the proportion of sagebrush habitat. Lek persistence was influenced negatively by CBNG development and the proportion of power lines (considered as two separate factors) within about 4 mi of the lek, as well as the proportion of (heavily traveled all weather) roads within about 2 mi of the lek. Full development of the landscape within 2 mi of leks reduced the average probability of lek persistence from 87 to 5%. Leks disappeared on average within 3-4 years of CBNG development. It is nevertheless unclear whether declines in lek attendance within CBNG fields were caused by impacts to breeding birds at the lek, reduced survival or productivity of birds in the surrounding area, avoidance of developed areas, or some combination thereof (Walker et al. 2007).

Three studies were conducted in the Pinedale Anticline area of southwestern Wyoming--one during the initial stages of natural gas development (Lyon 2000) and two in more full stages of development (Holloran 2005; Kaiser 2006). These studies describe reductions in lek fidelity of male and female greater sage-grouse in response to natural gas development.

Holloran (2005) found that in areas subjected to full-field natural gas development, populations of breeding males on leks declined by an average of 51% compared to only a 3% decline at undisturbed leks. Males at three leks surrounded by natural gas development declined by 89%, and two of the three leks were abandoned within 3-4 years of initiation of gas drilling. Active drilling within 3.1 mi of a greater sage-grouse lek reduced the number of breeding males by displacing adult males and reducing recruitment of juvenile males. Increases in road traffic and well density also reduced the number of breeding males at leks.

Kaiser (2006) reported that yearling males tended to avoid leks (less recruitment) highly immersed in developing gas fields and, as distance from drilling rigs decreased, there was less recruitment. Hens continued to breed and initiated nests despite natural gas development; however, yearling hens tended to avoid visiting leks as proximity to a producing well increased. Both yearling males and females (9% and 11%, respectively) showed low fidelity to natal leks. Forty-three percent of yearling males and 14% of yearling females established a lek within 3.1 mi of the nest location from which they hatched, indicating some level of natal area fidelity but less philopatry than greater sage-grouse in other studies, in which 53-100% fidelity was observed.

Lyon (2000) found a small number of males returning to breed on the same lek during 2 years despite disturbance from natural gas development. However, at the time of the Lyon study, gas development in the area was in its initial stages (in contrast to being more developed during the later studies [Holloran 2005; Kaiser 2006]), and impacts on lek fidelity could take longer to detect (Holloran 2005; Walker et al. 2007). To maintain a stable number of males using a lek, yearling recruitment must equal adult mortality. Assuming 50% mortality (Connelly et al. 2004) and no yearling recruitment, the number of males attending a lek would decline by 50% per year, and the lek would become inactive within 4-6 years, the approximate amount of time lag documented by Walker et al. (2007) and Holloran (2005). Thus, the Lyon (2000) study may have begun too early during gas development and not lasted long enough to detect differences in lek attendance.

Impacts to sage-grouse have been documented up to 3.7 mi away from vertical structures such as overhead power transmission and communication distribution lines (Manville 2004). Collisions with power lines and vehicles and increased predation by raptors may increase mortality of birds at leks (Connelly et al. 2000). Further, direct greater sage-grouse mortality associated with roads and power lines have been documented year-round (Walker et al. 2007). Thus, power lines (i.e, vertical structure) may also alter the productivity or survival of greater sage-grouse outside the reproductive season, thereby indirectly reducing the number of birds that use leks, increasing lek abandonment (Naugle et al., in press).

Data on greater sage-grouse indicate that there are no greater sage-grouse leks within the WMWE project area, and the nearest lek to the WMWE project area is located approximately 3.1 mi west of the WMWE project area. The next closest lek known to occur near the WMWE project area is 4.4 mi away. Although these leks are located near the outer limit of where impacts have been documented based on the oil and gas information presented above, it is still unknown how taller rotating structures would affect persistence for these leks. Monitoring of these two leks would need to continue to try and evaluate these impacts.

Other attributes of species reproduction are studied to monitor greater sage-grouse populations locally and at the landscape scale. This subsection synthesizes the results of studies of declines in reproductive metrics, such as nest initiation, nest area fidelity, and adult and chick survival, which are attributed to oil and gas development. Factors affecting these declines are put forth with information on the effective distance of such factors. It is likely that similar types of effects could be observed in relation to wind energy development.

In the Pinedale Anticline area, Lyon and Anderson (2003) found that the nest initiation rate for females from leks disturbed by natural gas development was 24% lower than for females from undisturbed leks, and that hens from disturbed leks traveled twice as far to nest sites (Lyon 2000). In habitat fragmented by natural gas development, only 26% of hens captured on disturbed leks nested within 1.8 mi of the lek of capture, whereas 91% of hens from undisturbed areas nested within 1.8 mi of the lek of capture. Average distance between nests in consecutive years was 0.37 mi, indicating hens initially shifted nest locations due to disturbance but afterward showed fidelity to new-found nest locations (Lyon and Anderson 2003).

Holloran (2005) found that females strongly avoided nesting in areas of high well density, and there was a 21% decline in the population of nesting females compared to undisturbed females over the 5 years of the study. Females nesting in developed areas had a significantly lower survival rate than female grouse in undeveloped areas. Although nest success rates were higher in developed areas, this increase was not sufficient to overcome the reduced female survival rates, resulting in an overall 21% decline in greater sage-grouse population growth in developed gas fields compared to undeveloped areas. The distance between selected nesting sites and gas field infrastructure shifted between 2000-2003 and 2004, with females selecting nesting habitat farther from active drilling and producing wells in

2004. Population reductions likely resulted from a combination of dispersal away from gas fields and increased mortality rates for birds affected by development. A lag period occurs between the time when female greater sage-grouse are affected by development and when survival probabilities are influenced, suggesting negative fitness consequences for females subjected to natural gas development during the breeding and nesting periods.

In the Manyberries oil field in southeastern Alberta, sage-grouse selected heterogeneous patches of moderate sagebrush cover and avoided anthropogenic edge habitat for nesting (Aldridge and Boyce 2007). Nests were more successful in heterogeneous than anthropogenic edge habitats, but nest success was independent of anthropogenic features. Similarly, broods selected heterogeneous high-productivity habitats with sagebrush (at >0.6 mi^2) while avoiding human developments, cultivated cropland, and high densities of oil wells. Chick mortalities tended to occur in proximity to oil and gas developments and along riparian habitats. Limited source habitats appear to be the main reason for poor nest success (39%) and low chick survival (12%) (Aldridge and Boyce 2007). Risk of chick mortality was 1.5 times higher for each additional well site visible within 0.6 mi of brood-rearing habitat (Aldridge 2005; Aldridge and Boyce 2007).

Recent studies of greater sage-grouse conducted in southwest Wyoming indicated that 64 to 87% of hens nest within 3.0 mi of leks where the hens were bred (Holloran and Anderson 2005; Slater 2003). Therefore, it is possible that some nesting greater sage-grouse (36 to 13%) may experience displacement and/or reduced survival rates. This displacement and/or reduction in survival could be expected to occur for approximately 2-5 years after construction begins, until following generations of greater sage-grouse can occupy other areas. However, these areas are expected to be already occupied by greater sage-grouse, or of lower habitat quality, which may reduce sustainability.

The WMWE project area has been anecdotally shown to be a greater sage-grouse brood-rearing area based on WGFD observations and spring and fall avian surveys conducted in 2008 (TRC 2009b). It is anticipated that greater sage-grouse chicks may experience higher mortalities (1.5 times higher) in this area and extending out by 0.6 mi (Aldridge 2005; Aldridge and Boyce 2007) as turbines will be visible in most of these areas. Reduced survival and decreased recruitment may impact the local population and persistence of historic breeding grounds and seasonal use areas.

Avoidance of winter habitat is also known to occur in relation to oil and gas development and may affect the viability of greater sage-grouse populations. In the Powder River Basin, greater sage-grouse avoided CBNG development during winter at the 2.5 mi^2 scale (Doherty et al. 2008). Greater sage-grouse were 1.3 times less likely to use otherwise suitable winter habitats that had been developed for CBNG at a density of 12 wells/ 2.5 mi^2. Impacts were indiscernible at densities of 1-12 wells within 20 mi^2 of a lek (~1 well/640 acres) (Doherty et al. 2008). Impacts to winter habitat may have a disproportionate effect on regional greater sage-grouse population size and persistence if the species uses a small percentage of available sagebrush habitat in an area (Doherty et al. 2008).

While no winter concentration areas for greater sage-grouse have been identified in or near the WMWE project area, sagebrush habitat provides shelter and food during this time of the year, and habitat selection during the winter is influenced by factors such as snow depth and hardness, topography (elevation, slope, and aspect), and vegetation height and cover (Connelly et al. 2004). Although no greater sage-grouse were encountered during winter preconstruction surveys within the project area (TRC 2008a), it is possible that the WMWE project area is used by greater sage-grouse during the winter operations, and the WMWE Project could displace greater sage-grouse from using winter habitat within the project area.

Greater sage-grouse were recorded within the WMWE project area during spring and fall avian surveys conducted in 2008 (TRC 2009b) and documented in the WNDD (2009). A potential

concern for greater sage-grouse is the potential for collision with the rotating wind turbine blades. Preconstruction avian use surveys conducted at Foote Creek Rim wind energy project located in south-central Wyoming did not document any greater sage-grouse within the project area; however, the survey methodology did not include incidental observations, lek, or winter concentration surveys, which might explain the low use in this study. While the avian use surveys did not document any greater sage-grouse use, greater sage-grouse pellet density surveys did indicate the presence and use of the Foote Creek Rim project area (a range of a low of 0/hectare [ha] in the winter of 1997/1998 to a high of 69/ha in the winter of 1994/1995) (Johnson et al. 2000). Once the wind farm became operational, post-construction mortality surveys were conducted for 3.5 years. During these surveys, no greater sage-grouse were documented as being killed or injured as a result of the operation of the wind turbines (Young et al. 2003). Therefore, while greater sage-grouse use of Foote Creek Rim was assumed to be low, no species mortalities were documented during subsequent post-construction surveys. Information about greater sage-grouse within the WMWE project area was collected during avian surveys conducted in 2008, and for those greater sage-grouse documented as flying, 100% of the observations indicated that the grouse flew within the 0 to 35-m flight height category (i.e., below the rotor-swept area). These birds would not be at risk for collision with wind turbines (i.e., risk index of 0.0) (TRC 2009b). It is also possible that greater sage-grouse could collide with vehicles being operated in association with the Proposed Action. Posted speed limit signs would limit vehicle speeds and reduce the chances of accidental collisions.

It is also possible, but unlikely, that some high flying migrating individual greater sage-grouse might be at an increased risk during the fall if the birds migrate into or through the area at higher altitudes. Although greater sage-grouse are heavy-bodied and require time to gain altitude on short-distance flights (for instance, being flushed by a predator), during long-distance flights, these strong fliers may fly at greater heights and thus may be increasingly susceptible to collision with turbines and blades. Therefore, while possible, it is unlikely that operation of the WMWE Project would result in many greater sage-grouse fatalities.

Approximately 515 acres (3.9%) of privately owned lands in the project area in the northwestern corner occurs along the southern boundary of the South Pass greater sage-grouse core habitat (refer to Figures 3.5 and 4.4). The South Pass core habitat area encompasses approximately 2.5 million acres. It is likely that the portion of core habitat located within the WMWE project area would be of decreased value to greater sage-grouse since this area has three large 345-kV transmission lines that bisect this corner of the core habitat area. Research has indicated that greater sage-grouse prefer areas away from overhead transmission lines because the transmission line structures can serve as hunting perches and nesting locations for raptors (Connelly et al. 2000). In addition, Braun (1998) determined habitat use by greater sage-grouse was impacted by power lines up to a distance of at least 600m. Raptor nest surveys conducted in this area in 2008 (TRC 2008c) have documented two active raptor nests (a red-tailed hawk and common raven) on transmission power line structures located at the northern end of the WMWE project area that could affect the usefulness of this area for core greater sage-grouse habitat (refer to Figure 4.4) (TRC 2009b). In addition, it can also be documented that no greater sage-grouse were observed within the WMWE project area within the greater sage-grouse core area near the three large 345-kV transmission lines during the 2008 winter and spring aerial surveys and during the 2008 21-week long ground-based avian surveys (TRC 2008a, 2008b, 2009b). As a result, the existing 345-kV transmission lines have likely already adversely affected the corner of the core habitat area, thereby limiting its usefulness in protecting important greater sage-grouse habitat. Under the Proposed Action, 12 turbines and associated facilities are proposed in this area, and all 12 turbines and associated facilities would be located on private land. The 12 wind turbines and associated disturbance would result in approximately 24 acres of initial direct disturbance and 5.0 acres of life-of-project disturbance. Based on this analysis, the Proposed Action is expected to add to the existing adverse impacts to this specific portion of the

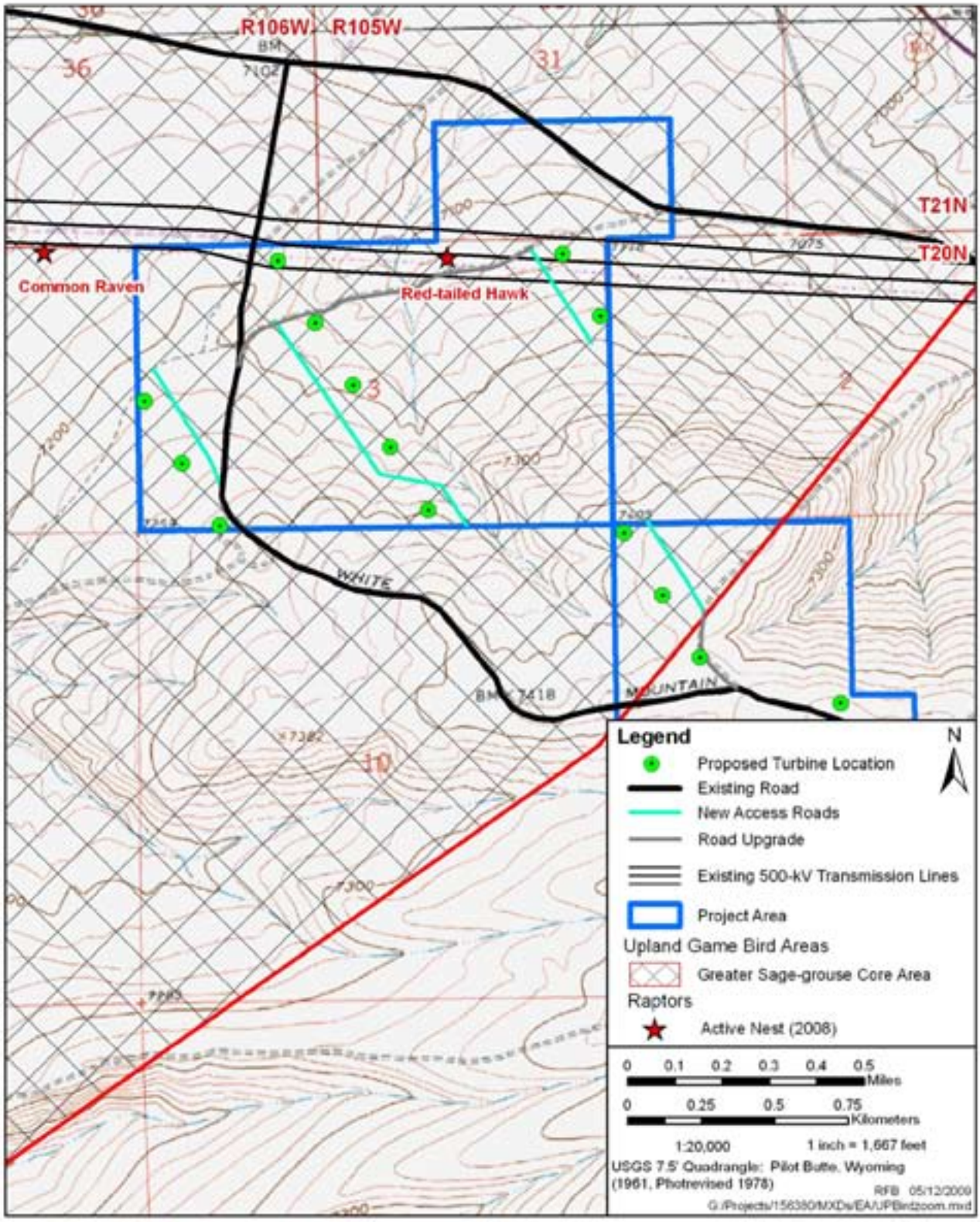

Figure 4.4 Greater Sage-grouse Core Habitat Area, Northeast of WMWE Project Area.

South Pass core habitat area by increasing habitat fragmentation and vertical structures.

Other BLM Sensitive Species. Impacts to other BLM sensitive passerine birds (e.g., not address above or not recorded in the project area), reptiles (e.g., midget faded rattlesnake), and mammal species (e.g., pygmy rabbits, Wyoming pocket gopher) during the O&M phases of the Proposed Action would be the same as discussed for wildlife, including birds, presented in Section 4.12 of this EA.

The O&M phase of the Proposed Action would not have any impacts to BLM sensitive plant species.

4.8.2.3 Decommissioning Phase

During the decommissioning phase, a limited amount of area would be redisturbed by crews removing the project components, and most of these areas would be associated with access roads and the tower and turbine lay down areas at the turbine pads. The removal of revegetated areas would be minimized to the extent possible during decommissioning operations. In addition, ground disturbing activity and the movement of decommissioning personnel and equipment on-site would be limited to the extent possible to the required areas to avoid inadvertent impacts to all wildlife species. No additional impacts to BLM sensitive species (including plant and animal species) during the decommissioning phase are expected beyond those already discussed above, and the risk to BLM sensitive species during the decommissioning phase of this project would be low, and the impact would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

4.8.3 Alternative A - Development Only on Privately Owned Lands

No federally listed TEPC species were documented in the project area during the WMWE avian surveys (TRC 2009b), so risk to such species during the construction of the WMWE Project likely would be limited.

Potential direct and indirect impacts to BLM sensitive species under Alternative A would be the same as discussed under the Proposed Action. Implementation of this alternative would involve the construction of 170 wind turbines on privately owned land; therefore, direct impacts to wildlife habitat would include the disturbance of 619 acres of habitat from the construction of the turbine pads, the access roads, the substation, and the collector lines. Most of the disturbed area would be reclaimed and revegetated, with 115 acres (less than 1.0% of the project area) remaining occupied by roads, turbines, and facilities for the life of the project. The potential impacts to BLM sensitive species habitat would likely be reduced by 30%, compared with those described under the Proposed Action. Teton would also implement the same mitigation measures to minimize impacts to these species.

The short- and long-term impacts to BLM sensitive species and their habitat under Alternative A would be minimal.

4.8.4 No Action Alternatives

Under the No Action Alternative, the proposed wind energy facility would not be authorized nor approved. No ground would be disturbed, and no impacts to the existing biological environment would take place beyond those that already exist.

4.8.5 Residual Impacts

There would be no impacts to federally listed species. However, under Proposed Action, it is possible that there could be some loss of BLM sensitive species or their habitat within the WMWE project area. Although some individual mortality is possible, operation of the WMWE Project under Alternative A is not expected to impact local population numbers for BLM sensitive species, and, in general, mortality rates are expected to be relatively low.

4.8.6 Cumulative Impacts

All developmental activities would comply with the *Endangered Species Act*, which requires avoidance or mitigation for impacts to TEPC

species, so no impacts would occur. Therefore, there would be no cumulative impacts to federally listed TEPC species.

In order to assess potential cumulative impacts to select BLM sensitive species, various IAAs have been established to evaluate the Proposed Action, and quantitative data for the various IAAs are summarized in Table 4.11.

Cumulative impacts to BLM sensitive species would be similar to those described under the Proposed Action. Standard mitigation measures presented in the Proposed Action would also reduce potential short- and long-term impacts to BLM sensitive species during the construction, O&M, and decommissioning phases of the project. In addition, the Proposed Action would not cause any BLM sensitive species to be petitioned for listing under the *Endangered Species Act*.

Implementation of the various mitigation measures to limit disturbance and encourage prompt reclamation of disturbance and other appropriate mitigation measures (including seasonal restrictions) presented in the Proposed Action would minimize impacts to TEPC species and BLM sensitive species. Cumulative impacts to populations of these species within the IAA are expected to be minimal. Therefore, Proposed Action and RFFAs are expected to have only minimal adverse impacts on population numbers and would be expected to have limited cumulative impacts.

Table 4.11 Cumulative Impacts Due to Direct Disturbance to BLM Sensitive Species.

Resource	Description	Total Area (acres)	Amount of Current Disturbance (acre and %)	Amount of Disturbance Related to RFFA (Including Proposed Action) (acre and %)	Total Amount of Current and RFFA Disturbance (acre and %)
Pygmy rabbits	WMWE Project area plus 2.17-mi buffer	66,189	5,201 (7.86%)	441 (0.66%)	5,642 (8.52%)
Pocket gopher	WMWE Project area plus 0.22-mi buffer	18,893	573 (3.03%)	281 (1.49%)	854 (4.52%)
Greater sage-grouse	Area north of Bitter Creek, east of the Green River, south of the Big Sandy River to Farson, then east to Killpecker Sand Dunes	545,351	10,508 (1.93%)	976 (0.18%)	11,484 (2.11%)
Midget faded rattlesnake	WMWE Project area plus 1.3-mi buffer	44,235	2,061 (4.66%)	356 (0.80%)	2,417 (5.46%)

4.9 VEGETATION (INCLUDING WETLANDS AND INVASIVE SPECIES)

4.9.1 Proposed Action

4.9.1.1 Construction Phase

Direct impacts to vegetation would include initial surface disturbance of 865 acres during construction. These impacts include disturbance and/or removal of native vegetation and grading and compaction of soil. Direct impacts to vegetation from clearing and grading for new roads, wind turbine pads and crane pads, the substation, and O&M facilities would be permanent because these areas would be occupied by the project facilities. Impacts to vegetation from installation of the electrical collector system between the turbines would be temporary.

Approximately 841 acres (97%) of the 866 acres of initial disturbance would occur in Wyoming big sagebrush vegetation. The width of the access roads and turbine pad footprints would be reduced and reclaimed following construction. In areas where potential construction impacts to vegetative resources are possible, BMPs from the SWPPP would be implemented. Most of the temporarily disturbed areas would be reclaimed and revegetated upon the completion of the construction phase of the project, with 162 acres (approximately 1.4% of the project area) of mostly preconstruction Wyoming big sagebrush habitat remaining occupied by roads, turbine foundations, and facilities for the life of the project. Since the project footprint would be relatively small compared with the overall size of the project area, these long-term direct impacts would be minimal.

A review of digital NWI information (USFWS 2003) indicates that the occurrence of a linear palustrine seasonally flooded wetland (PEMC) and two intermittent streams (R4SBA) located in the project area could potentially support seasonal riparian areas (refer to Figure 3.7). In addition, NWI data indicate the occurrence of several small playa areas (refer to Figure 3.7) scattered throughout the project area. The turbines, substation, and O&M project facilities would not be located in any NWI-identified wetland or riparian areas. Minimization of impacts to any wetland or riparian area would be accomplished by proper facility siting (i.e., avoidance of wetlands and riparian areas), implementation of SWPPP, and ensuring proper reclamation and revegetation. In addition, project facilities would be sited following procedures listed within the BLM Green River Management Plan (1997) regarding riparian areas and ephemeral channels (i.e., 100 ft from the edge of major drainages). To reduce avian impacts, this condition has been modified to limit placement of turbines within 50 m (164 ft) of major drainages. Therefore, the Proposed Action would have minimal impacts to wetlands and riparian areas.

Few noxious weeds or introduced species occur on the site; however, clearing, grading, and excavation activities associated with construction of the project creates potential new habitat for invasive nonnative species. Weed infestations could constitute an adverse effect, and the same is true where vegetation is crushed, and similar actions degrade existing native habitat. The effects of these impacts are usually permanent or require several years to heal in arid environments like that found in the project area. Adjacent undisturbed areas are indirectly impacted by the invasion of weed species due to proximity. Invasive nonnative species can also be introduced through the use of reclamation materials such as seed and mulch that are not certified weed free.

The control of invasive nonnative species is difficult, and some weeds can enter the project area on equipment and vehicles, while others may spread from distant areas by spores blowing onto the site in the wind. As discussed in Chapter 2.0 of this EA, Teton would design and build the project so that the least amount of ground disturbance occurs, thereby exposing the least amount of soil possible. Large construction equipment that travel off project roads will be cleaned prior to entering the site. Teton also would work with the BLM and the Sweetwater County Board of Weed and Pest Control to establish a weed control program (e.g., washing construction vehicles before going on-site, avoiding weedy areas once on-site, and controlling weeds in accordance with landowner wishes or

easement agreements) for the project. This may entail spot spraying with an approved herbicide along disturbed areas for invasive nonnative species. Teton would also use only certified weed free reclamation materials such as seeds and mulch. With implementation of a weed control program, impacts from invasive species are anticipated to be minimal.

4.9.1.2 O&M Phase

No additional impacts beyond those discussed under construction impacts to vegetation are expected to occur during the O&M phase of this project. O&M personnel would continue to implement appropriate weed control efforts in cooperation with the BLM and the Sweetwater County Board of Weed and Pest Control.

4.9.1.3 Decommissioning Phase

No additional impacts beyond those discussed under construction phase are expected to occur during the decommissioning phase of this project. With implementation of the project mitigation measures, including vehicle washing, the reclamation plan, and weed control plan, impacts to vegetation after the decommissioning phase of the project is complete is expected to be minimal.

4.9.2 Alternative A - Development Only on Privately Owned Lands

4.9.2.1 Construction Phase

Potential direct and indirect impacts to vegetation resources under the construction phase of Alternative A would be similar to the type of impacts described under the Proposed Action. Implementation of this alternative would involve the construction of 170 wind turbines on privately owned land; therefore, direct impacts to vegetation resources would include the initial disturbance of 619 acres of vegetation from the excavation of the turbine pads, the substation foundations, and collector lines. Most of the temporary disturbed areas would be reclaimed and revegetated, with 116 acres (less than 1.0% of the project area) remaining occupied by roads, turbine foundations, and facilities for the life of the project. The potential impact to vegetation would be reduced by 30%, compared with those described under the Proposed Action.

4.9.2.2 O&M Phase

Under Alternative A, no additional impacts beyond those discussed under the O&M phase of the Proposed Action are expected to occur.

4.9.2.3 Decommissioning Phase

Under Alternative A, no additional impacts beyond those discussed under the decommissioning phase of the Proposed Action are expected to occur.

4.9.3 No Action Alternatives

Under the No Action Alternative, the proposed wind energy facility would not be authorized nor approved. No ground would be disturbed, and no additional impacts to the existing biological environment would take place beyond those that already exist.

4.9.4 Residual Impacts

Implementation of the Proposed Action would result in the temporary but unavoidable removal of vegetation from 865 acres. Under the Proposed Action, approximately 163 acres would be disturbed for the life of the project, but all disturbed areas would be permanently reclaimed during the decommissioning phase of the project. There would also be the potential for an unavoidable increase in the population of invasive nonnative plant species within the project area.

4.9.5 Cumulative Impacts

Based on the disturbance calculations presented in Chapter 3.0, approximately 19,954 acres are currently disturbed within the IAA. This represents 7.43% of the total area within the cumulative IAA. RFFA (including the Proposed Action) within the IAA would result in an additional 1,224 acres of disturbance--163 acres of disturbance due to the Proposed Action and 1,061 acres from other RFFAs. This represents

21,178 acres of the total within the IAA or 7.84% based on the total disturbance due to past, present, and RFFAs.

Vegetation resources would be protected from long-term impacts by implementation of temporary and permanent reclamation operations, the invasive species control plan, and wetland/riparian mitigation measures included in the Proposed Action, and the vegetation would eventually (within 10-20 years) be capable of supporting predisturbance land uses once reclamation operations have been completed and vegetation becomes established. Nonnative invasive species would be controlled, and wetland and riparian areas would be protected. There are a few proposed linear facilities within the IAA; however, the facilities would be expected to contribute limited disturbance, and all of the disturbed lands would be revegetated. In addition, all RFFAs would also comply with the same requirements to control nonnative species and protect wetland and riparian areas.

4.10 VISUAL RESOURCES

4.10.1 Proposed Action

It is widely acknowledged that aesthetic impacts are among the most important impacts associated with wind energy development and operations. However, it is difficult to determine the relative significance of aesthetic impacts. Visual impacts are intangible, highly subjective, and dynamic, and because they cannot be completely avoided, they are one of the greatest sources of objection to wind energy development projects. Because of the subjective and experiential nature of visual resources, the human response to those changes and the importance of the impacts cannot be quantified, even though the visual impact of a proposed development can be described specifically (BLM 2005).

Based on information presented in Chapter 3.0 of this EA, approximately 85% of the WMWE project area is located in a BLM Class IV VRM area, and the remaining 15% is located in a BLM Class III VRM area; although, BLM visual classifications do not apply to private or state-owned lands. The Proposed Action would not impact any important or sensitive viewsheds (i.e., VRM Class I or II areas). The primary impact to visual resources due to the Proposed Action would be the installation and operation of up to 240 wind turbines. The construction of the access roads, substation, collection lines, and other support facilities would likely not be visible to most observers since White Mountain slopes off to the west and these areas would not be visible from the Rock Springs/Green River area.

Under the Proposed Action, and as a requirement of FFA, the wind turbines would be white with no daytime lighting and would change the aesthetics of the landscape with the addition of tall towers and rotating blades, and whether the effect is deemed a beneficial or adverse effect depends on the perspective and sensitivity of the viewer. The WMWE Project would be more visible than any other manmade structure in the immediate project area because the wind turbines would be located on White Mountain, a highly visible topographic feature. Other man-made features are visible along the face of White Mountain, including roads, microwave reflector and commercial communication towers, and the 230-kV power line.

In addition, night-time lighting on 84 of the 240 wind turbines would be required by the FAA, who approved the specific location and method of lighting to be used on this project. Because the FAA requires wind turbines located throughout the WMWE project area to be lit, an estimated 31 of the wind turbines visible along the 13-mi length of White Mountain could be lighted and visible at night.

The WMWE Project would be highly visible because of the introduction of turbines into a rural or natural landscape that has few other comparable structures. Photosimulations have been prepared and are presented in Appendix C. The photosimulations were developed based on the dimensions of a comparably sized wind turbine that would be used in the WMWE Project and the proposed wind turbine locations in UTM coordinates. These photosimulations allow the viewer to see the landscape with and without the

proposed wind turbines. These photosimulations illustrate the visual resource contrast elements from the wind energy project on the landscape. Visual evidence of wind turbines cannot be avoided, reduced, or concealed, owing to their color, size, and exposed location; therefore, effective mitigation would be limited (BLM 2005). However, Teton, in cooperation with BLM, has developed other design features to mitigate potential visual impacts. These design features are presented in Table 4.12 and comply with the visual resource mitigation measures included in the Wind Energy PEIS (BLM 2005).

In addition to the VRM class and the photosimulations, the BLM VRM system also uses a visual contrast rating analysis to evaluate visual impacts of the proposed project and to develop mitigation measures to reduce potential visual impacts. The locations where the visual contrast rating analyses are conducted are referred to as Key Observation Points (KOPs). The degree to which a proposed activity would affect visual quality depends on the contrast between the existing landscape and the proposed development. Contrast is measured by comparing the basic elements of form, line, color, and texture of the existing landscape with the elements introduced by the proposed project, and the degree of contrast are listed as either none, weak, moderate, or strong. Visual contrast ratings were computed for eight KOPs located between 1.0 and 17.0 mi from the WMWE project area, and the results of these analyses are presented in Table C.1 in Appendix C.

As expected, the degree of contrast is directly related to the distance the viewer is from the proposed project feature (i.e., the wind turbines). Those sites that are located closer to the WMWE project area tended to have a strong contrast while those sites located further from the project area have a weak degree of contrast.

The presence of the wind turbines under the Proposed Action would change the aesthetics of the landscape with the addition of tall towers and rotating blades. Whether the effect is deemed a beneficial or adverse effect depends on the perspective and sensitivity of the viewer (BLM 2005). The FAA has determined no hazard to air navigation based on the use of white wind turbines and towers. To reduce the contrast created by the color of the structures, it has been recommended that the color of the wind turbines be changed from white to light gray, if possible. However, according to FAA Advisory Circular AC 70/7460-1K (Chapter 13, 131F), use of gray turbines appears to be significantly less effective in providing daytime warning and would require daytime and nighttime lighting of all 240 wind turbines with medium intensity white strobes, which may be more visually intrusive than white towers with no daytime lighting (personal communication, August 12, 2009, with Michael Blaich, FAA, Fort Worth, Texas). Therefore, the use of white wind turbines with no daytime lighting would have reduced visual impacts compared to light gray wind turbines equipped with daytime lighting of all 240 wind turbines (personal communication, August 12, 2009, with Michael Blaich, FAA, Fort Worth, Texas). Visual impacts would not exceed those outlined in the Wind Energy PEIS (BLM 2005).

The WMWE Project would be constructed over a 3- to 4-year period, and the O&M phase would last approximately 20 years, after which time the wind turbines would be decommissioned and removed from the site. The decommissioning phase would eliminate most of the visual impacts of the WMWE Project.

4.10.2 Alternative A - Development Only on Privately Owned Lands

Potential direct and indirect impacts to visual resources under Alternative A would generally be the same as discussed under the Proposed Action, except this alternative would involve the construction of 170 wind turbines instead of the 240 planned under the Proposed Action. There would be a 30% reduction in the number of wind turbines, and some of the visual impacts would also likely be reduced depending on the location of the observer. However, many of the wind turbines would also likely still be visible from the KOPs discussed, since the most visible wind turbines would be located on private or state-owned lands nearest the edge of White Mountain, and there

Table 4.12 Design Features to Minimize Impacts to Visual Resources.

To minimize visual impacts, Teton would adopt the following visual mitigation measures:

- The design of the WMWE Project would provide visual order and unity among clusters of turbines (visual units) to avoid visual disruptions and perceived "disorder, disarray, or clutter" (BLM 2005)
- To the extent possible given the terrain of a site, Teton would create clusters or groupings of wind turbines when placed in large numbers; avoid a cluttering effect by separating otherwise overly long lines of turbines or large arrays; and insert breaks or open zones to create distinct visual units or groups of turbines.
- Teton would create visual uniformity in the shape, color, and size of rotor blades, nacelles, and towers.
- Teton would use tubular towers. Tubular towers present a simpler profile and less complex surface characteristics and reflective/shading properties.
- Components of the wind turbines would be in proper proportion to one another. Nacelles and towers would be planned to form an aesthetic unit and would be combined with particular sizes and shapes in mind to achieve an aesthetic balance between the rotor, nacelle, and tower.
- Color selection for turbines would be applied uniformly to tower, nacelle, and rotor in accordance with FAA requirements.
- The wind turbines would use nonreflective coatings to reduce reflection and glare.
- The O&M building would be painted before or immediately after installation with a green shale color.
- Uncoated galvanized metallic surfaces would be avoided whenever possible because they would create a stronger visual contrast, particularly as they oxidize and darken.
- Commercial messages on turbines and towers would be prohibited.
- The site design would be integrated with the existing landscape by using as many of the existing roads as possible.
- The operator would bury power collection cables or lines on the site in a manner that minimizes additional surface disturbance.
- Site design would minimize security lights, and any security lights located at the O&M building would be turned off except when activated by motion detectors.
- Teton would minimize ground disturbance and control erosion by avoiding steep slopes and by minimizing the amount of construction and ground clearing needed for roads, staging areas, and turbine pads.
- Dust suppression techniques would be employed where and when required to minimize impacts of vehicular and pedestrian traffic, construction, and wind on exposed surface soils.
- Disturbed areas would be regraded as soon as possible to their original contour and revegetated immediately after, or as contemporaneously as possible with construction. Teton would be prompt to limit erosion and to accelerate restoring the preconstruction color and texture of the landscape.
- Teton would maintained the WMWE Project during operation as inoperative or incomplete turbines cause the misperception to viewers that "wind power does not work" or that it is unreliable. Inoperative turbines would be completely repaired, replaced, or removed. Except during specific maintenance operations, nacelle covers and rotor nose cones would always be in place and undamaged.

Table 4.12 (Continued)

- The WMWE Project would evidence environmental care, which would also reinforce the expectation and impression of good management for benign or clean power. Nacelles and towers would also be kept clean to remove any spilled or leaking fluids and the dirt and dust that would accumulate.
- Facilities would be kept clean of debris, "fugitive" trash or waste, and graffiti.
- Scrap heaps and material dumps would be prohibited and prevented.
- The material stored at the O&M building would be screened and kept to an absolute minimum. Any surplus, broken, or disused materials and equipment would be maintained in an orderly manner.
- Teton would prepare a decommissioning plan, and it would include the removal of all turbines and ancillary structures and reclamation and revegetation of the site.

would be a proportional level of traffic over the life of the project compared to the Proposed Action. Similar mitigation measures presented in the Proposed Action would be implemented under Alternative A.

4.10.3 No Action Alternatives

Under the No Action Alternative, the proposed wind energy facility would not be authorized nor approved. No ground would be disturbed, and no impacts to visual resources would take place beyond those that already exist.

4.10.4 Residual Impacts

Residual impacts to visual resources under the Proposed Action would include the short-term disturbance of 866 acres. Additional residual impacts would include the construction and operation of 240 wind turbines on White Mountain and the perceived visual impacts. At the end of the life of the project, the wind turbines would be decommissioned and removed from the site.

4.10.5 Cumulative Impacts

The IAA for visual resources is the WMWE project area plus a 20-mi buffer. Based on the disturbance calculations presented in Chapter 3.0, approximately 38,289 acres are currently disturbed within the IAA. This represents 3.26% of the total area within the IAA. RFFA (including the Proposed Action) within the IAA would result in an additional 2,035 acres of disturbance--189 acres of life-of-project disturbance due to the Proposed Action and 1,846 acres from other RFFAs. This represents 40,324 acres of the total with the IAA or 3.43% based on the total disturbance due to past, present, and RFFAs.

In addition to the existing visual intrusions in this area and the Proposed Action, the RFFAs include two additional commercial wind energy projects (one north and one south of the Proposed Action). Both of these additional wind energy projects would be located in BLM VRM Class III and IV areas. Depending on the specific number, location, color, and size of the proposed wind turbines, these projects could result in cumulative visual intrusions on the landscape. As expected, the degree of contrast and visual perception would be directly related to the number, location, size, and color of the wind turbines and distance the viewer is from specific project features (i.e., the wind turbines). Those sites that are located closer to the viewer would tend to have a stronger contrast while those sites located farther from the various project areas would have a weaker degree of contrast and would be less noticeable.

Cumulative impacts to visual resources would result from the addition of two wind energy projects and other power line projects within the IAA (identified as RFFAs), when combined with the Proposed Action, would result in increased

localized visual impacts. However, these past, present, and RFFAs would not impact any important or sensitive BLM viewsheds (i.e., VRM Class I or II areas). Impacts would not exceed those outlined in the Wind Energy PEIS (BLM 2005).

4.11 WILD HORSES

4.11.1 Proposed Action

Impacts during the construction and O&M phase of the Proposed Action for wild horses would be similar to those impacts to big game species. These impacts would include loss of foraging habitat, displacement, direct mortality due to collisions with vehicles, displacement from portions of the project area due to the human presence, noise, and loss of habitat by alteration and/or fragmentation.

Initially, there would be 865 acres of disturbance (6.6% of the project area), and approximately 162 acres (1.2% of the project area) would be unavailable over the life of the project. Since the overall footprint of the project would be relatively small compared to the size of the project area, loss of forage for wild horses would be minimal. However, the existing habitat within the footprint of the project, including wind turbines, access roads, and support facilities, would be disturbed and some disruption of grazing by wild horses due to habitat fragmentation might occur. However, wild horses appear to habituate relatively quickly to the presence of humans, so habitat fragmentation would likely not result in widespread displacement of horses from the project area. Reclamation and revegetation of temporarily disturbed areas would reduce the extent of habitat losses, but these effects would likely persist for 2 to 5 years after construction until vegetation is re-established. Since the number of horses in the White Mountain WHHMA is at the appropriate herd objectives, the habitat alteration effects would likely cause temporary small-scale reduction or temporary displacement of the wild horses found in the White Mountain project area. Teton would also post speed limit signs and inform employees that wild horses occur in the project area. These mitigation measures would minimize direct impacts to wild horses. Therefore, the Proposed Action would not be expected to have any long-term impacts on the population level of wild horses in the White Mountain WHHMA.

In order to manage wild horses in the White Mountain WHHMA, they are occasionally rounded up by the BLM using a helicopter. The presence of cranes and wind turbines during the life of the project would affect the ability of the BLM to roundup wild horses from within the WMWE project area. Vehicle or horseback roundups could still continue within the project area, and the nBLM and Teton would coordinate access and shutting down wind turbines for 4-6 hours over 2 days when roundups and surveys would be conducted.

Impacts to wild horses during the decommissioning phase of the WMWE Project would be similar to impacts associated with construction, but of reduced magnitude. Noise and visual disturbance to wild horses may temporarily increase during decommissioning and site restoration relative to conditions during project operation. Additional habitat loss would be negligible, and wild horse mortality due to vehicle collisions would be much lower than during construction because of the reduced number of personnel. Disturbance to wild horse habitats and wild horses during decommissioning of the WMWE project facilities are expected to be localized, short-term, and minor. The number of wild horses and amount of habitat in the project area would eventually (10-20 years) return to preconstruction levels following site restoration, and wild horse habitat would be fully restored after decommissioning of the WMWE project facilities.

Impacts to wild horses would be minimized where practicable, and the implementation of design features during the life of the project, including the posting of speed limit signs to reduce the likelihood of wild horse/vehicle collisions. Teton personnel would be informed that wild horses occur in the project area, that they are not allowed to haze or harass wild horses, and that they should minimize any direct disturbance to the wild horses

whenever possible. Should an accident occur, the BLM Authorized Officer would be notified immediately.

4.11.2 Alternative A - Development Only on Privately Owned Lands

Under Alternative A, no additional impacts to wild horses beyond those discussed under the Proposed Action are expected to occur during the construction, O&M, and decommissioning phases of this project. Under Alternative A, the project would initially disturb 619 acres of rangeland in the White Mountain WHHMA. This disturbance would be reduced to 116 acres during the O&M phase of the project, and all disturbed lands would be revegetated during the decommissioning phase. Total disturbance and related impacts to wild horses would be expected to be reduced by 30% compared to the Proposed Action.

Impacts to wild horses would be minimized where practicable, and the implementation of design features during all phases of Alternative A, including the posting of speed limit signs, would reduce the likelihood of wild horse/ vehicle collisions. Teton personnel would be informed that wild horses occur in the project area. They are not allowed to haze or harass wild horses, and they should minimize any direct disturbance to the wild horses whenever possible. Should an accident occur, the BLM Authorized Officer would be notified immediately. The BLM and Teton would coordinate access and shutting down wind turbines for 4-6 hours over 2 days when roundup and surveys would be conducted.

4.11.3 Residual Impacts

Residual impacts to wild horses under the Proposed Action would include the short-term disturbance of 865 acres and life-of-project disturbance of 189 acres of wild horse habitat within the WMWE project area. There would also be a minor increased risk of collisions with wild horses and vehicles. Residual impacts would be mitigated by implementation of the appropriate design features discussed in the Proposed Action.

4.11.4 Cumulative Impacts

Based on the disturbance calculations presented in Chapter 3.0, approximately 18,013 acres are currently disturbed within the IAA. This represents 9.13% of the total area within the IAA. RFFAs (including the Proposed Action) within the IAA would result in an additional 824 acres of disturbance--189 acres of total life-of-project disturbance due to existing activities and 635 acres of disturbance due to RFFAs. This represents 18,837 of the total acres with the IAA or 9.53% based on the total disturbance due to existing activities, the Proposed Action, and RFFAs.

Cumulative impacts to wild horses would be similar to those discussed under the Proposed Action (e.g., habitat disturbance and increased risk of wild horse/vehicle collisions), and there are no RFFAs that, when combined with the Proposed Action, would result in anything but minor impacts to wild horses.

4.12 WILDLIFE

The BLM *Wind Energy Programmatic Environmental Impact Statement* describes potential wildlife impacts associated with wind energy development in detail (BLM 2005). *Impacts of Wind Energy Facilities on Wildlife and Wildlife Habitat* (Arnett et al. 2007) and *Environmental Impacts of Wind-Energy Projects* (National Research Council 2007) also provide an overview of potential direct and indirect impacts to wildlife from wind energy facilities. General wildlife data for Wyoming and specifically for the WMWE project area also illustrate potential areas of wildlife conflict (refer to Figure 1.2). The principal impacts to wildlife associated with construction and operation of the facilities would occur from: 1) habitat loss, 2) disturbance and disruption effects on wildlife behavior, and 3) potential injury and mortality of wildlife associated with collisions with turbines and other facilities.

4.12.1 Proposed Action

4.12.1.1 Construction Phase

Wildlife (Including Big Game)

Impacts to wildlife species (including big game) during the construction phase of the Proposed Action could include direct mortality due to collisions with vehicles; loss of foraging, nesting, brood-rearing, and winter habitats; displacement from portions of the project area due to human presence, fugitive dust, or noise; and loss of habitat by alteration and/or fragmentation (BLM 2005; Arnett et al. 2007; and National Research Council 2007). Construction location and timing may also affect migratory and other behavioral activities of some species of wildlife and big game. It is also possible that big game could be struck by construction vehicles; however, posted speed limit signs would be installed on project roads in cooperation with Sweetwater County officials, and mortalities due to vehicular collisions should be minimal. Initial direct removal of wildlife habitat would include 866 acres (6.6% of the project area), and approximately 189 acres of wildlife habitat (1.4% of the project area) would be unavailable over the life of the project.

Since the overall direct footprint of the project would be small compared to the size of the project area (6.6%), loss of forage would be minimal. However, the existing habitat within the footprint of the project, including wind turbines, access roads, and support facilities, would be disturbed, and habitat fragmentation would increase. To minimize habitat fragmentation, Teton would upgrade as many of the existing access and two-track roads as possible. Reclamation and initial revegetation efforts of the temporarily disturbed areas would reduce the extent of habitat loss, but these effects would likely persist for 2 to 5 years after construction until revegetation of grasses and forbs is established. Sagebrush would take longer to become re-established (20 years). The Wyoming big sagebrush vegetation habitat found within the WMWE project area is common in the area, and large continuous tracts of similar habitats occur adjacent to the project area. However, the sagebrush ecosystem is one of the fastest declining habitat types (Knick et al. 2003). The effects of habitat alteration on big game due to construction of wind energy developments are mostly unknown. However, a recent study regarding interactions of transplanted elk populations during the construction and operations phase of a wind facility found no evidence that construction or operating activities had any significant impacts on elk use of the surrounding area (Walter et al. 2004). However, based on responses of mule deer to natural gas development in Wyoming, it is likely that some reduction in use and/or displacement of local big game species could occur (Sawyer et al. 2009). At this time, long-term effects cannot be predicted. Studies are being initiated to assess the impact of wind development on big game found in Wyoming.

For pronghorn antelope, approximately 12,144 acres (92%) of the project area occurs in habitat the WGFD has designated as yearlong habitat, and 1,021 acres (8%) of the proposed project area occurs in habitat the WGFD has designated as crucial winter/yearlong antelope range and is located near the eastern ridge of the project boundary and the rim of White Mountain (refer to Figure 3.10). In order to minimize potential impacts to pronghorn antelope in crucial winter ranges, Teton would comply with seasonal restrictions and would not conduct any project-related activities within antelope crucial/ yearlong range from November 15 to April 30. However, Teton may request an exception from the seasonal restriction stipulation from the BLM or the landowner, who would evaluate the request on a case-by-case basis. This seasonal mitigation measure would minimize impacts to antelope on the crucial winter/yearlong range located within the WMWE project area during the construction period.

For mule deer, approximately 12,028 acres (91%) of the proposed project area occurs in habitat the WGFD has designated as yearlong mule deer range, and 8% is designated as winter yearlong. The remaining 108 acres (1%) located in the northwest corner of the project area is designated as “out” under the WGFD habitat designations, meaning that this area is not part of any herd unit;

this area does not contain enough animals to be important habitat or the habitats are of limited importance to this species (WGFD 2006) (refer to Figure 3.11). No mule deer crucial winter range or parturition areas occur within the proposed project area. Therefore, during construction operations, the Proposed Project is not expected to have any adverse impacts to important mule deer ranges.

For elk, approximately 11,559 acres (88%) of the project area occurs in habitat the WGFD has designated as spring/summer/fall habitat, and 1,097 acres (8%) of the proposed project area occurs in habitat the WGFD has designated as winter/yearlong elk range. Approximately 509 acres (4%) of the western project area intersects the boundary of habitat designated as crucial winter/yearlong range (WGFD 2006) (refer to Figure 3.12). An elk parturition area is located 0.5 to 2.0 mi west of the project boundary. In order to minimize potential impacts to elk in crucial winter ranges, Teton would comply with seasonal restrictions and would not conduct any project-related activities within elk crucial/ yearlong range from November 15 to April 30. However, Teton may request an exception from the seasonal restriction stipulation from the BLM or the landowner, who would evaluate the request on a case-by-case basis. This seasonal mitigation measure would minimize impacts to elk on the crucial/yearlong ranges located within the WMWE project area during the construction period. The WMWE project area is approximately 0.5 mi away from the nearest elk parturition area, and the Proposed Action is not expected to impact elk parturition areas.

Construction noise would also be a potential impact to wildlife in the WMWE project area. Potential noise sources during construction could include heavy trucks and equipment operation, and human presence during construction activities are likely to temporarily displace wildlife species that may be present within or near construction areas. The duration and distance an animal is displaced are dependent on the individual species, and an individual's response to disturbance may change over time (BLM 2005; Arnett et al. 2005; National Research Council 2007). The construction of the WMWE Project could affect local wildlife by disturbing normal behavioral activities such as foraging and mating. Wildlife may avoid foraging and mating near the active construction areas or may vacate the active construction areas. Wildlife may temporarily or permanently abandon construction area habitats and adjacent habitats (BLM 2005; National Research Council 2007).

Direct impacts from mortality or injury to smaller less-mobile species (e.g., reptiles, small mammals) could occur during construction if those species are present. These impacts are expected to be low and of short duration (BLM 2005; National Research Council 2007).

Assuming appropriate design features are implemented, erosion and sedimentation, contaminant exposure, and fugitive dust from construction of the WMWE facility would have minimal impacts on wildlife. Surface disturbance could increase the introduction and establishment of invasive and exotic vegetation. Establishment of such vegetation could reduce habitat quality and alter the biotic community (BLM 2005; National Research Council 2007). Because there are no perennial waters in the project area and water erosion and sedimentation would be avoided through the implementation of appropriate protective measures (i.e., the SWPPP), impacts to wildlife from a decrease in water quality would be minor. Fugitive dust would also be minimized through the implementation of appropriate dust abatement measures, and impacts to wildlife would be minor. Contaminants within the project area would be contained, and any potential impacts to wildlife from contaminants would be short-term, localized, and minimized by implementation of appropriate measures (i.e., SPCCP). Introduction of invasive vegetation has the potential to reduce habitat quality and locally affect wildlife occurrence and abundance. These potential impacts would be minimized through the implementation of appropriate design features to manage nonnative invasive species as outlined in Chapter 2.0.

Short-term ground disturbance impacts to small wildlife species (e.g., pocket gopher or burrowing rodents) would result from direct disruption of

soils and vegetation, as well as from the presence of humans and vehicles in the construction areas. Most of these wildlife species would likely move away from the construction activities to undeveloped areas located outside of the disturbed area. However, some species such as burrowing rodents would be vulnerable to mortality from the physical disruption of soils and vegetation or displacement. These short-term ground disturbance impacts would include temporary loss of 866 acres of primarily Wyoming big sagebrush habitat. Habitat disturbance would include a series of string corridors consisting of tower assembly areas and pads (160 x 200 ft), the construction or upgrading of access roads and the construction of the substation area, staging area, O&M building area, and concrete batch plant area.

Impacts include the life-of-project loss of 163 acres of Wyoming big sagebrush habitat and habitat fragmentation due to the presence of the access roads, turbine strings, and new facilities, as well as regular disturbance from humans during periodic maintenance. There would be a permanent loss of 9 acres of burrowing rodent habitat from below grade concrete pads used to support the turbines.

Bats

The construction phase of the Proposed Action is expected to have minimal impacts on resident or migrant bat species that may occur in the WMWE project area. The primary impact to bats during the construction phase is from collision-related mortality with the turbines prior to operation or into towers and/or guide wires (BLM 2005; National Research Council 2007). Since bats are not known to roost in the area, impacts to bats during the construction phase are expected to be low (TRC 2008d). In addition, the WMWE project area does not contain topographic features likely to funnel or provide roosting areas for migrating bats, and the project area lacks large tracts of forest cover, open water, or other suitable foraging areas. Based on the topography of the WMWE project area, it is expected that a majority of bat mortalities during the construction phase of the project would occur as individuals migrate through the area. While it is possible that bats could fly into construction equipment and the turbines prior to operation, it is anticipated that bat mortality would be minimal during the construction phase of the project. While not documented as a proven mitigation measure, Teton would avoid siting wind turbines within 50 m (164 ft) of large drainages within the project area.

Raptors and Other Migratory Birds

Impacts to birds during the construction phase would be similar to those discussed for wildlife habitat loss and fragmentation due to vegetation disturbance, human presence, and noise. Additional impacts during the construction phase to raptors and other birds may be collisions with construction vehicles, turbines, met towers, and substation structures (BLM 2005; National Research Council 2007; Arnett et al. 2007).

The *Migratory Bird Treaty Act* provides protection to most PSBs found in or migrating through the project area. Impacts to migratory species could result from the removal of vegetation (clearing, etc.) during site preparation or from inadvertent compaction of vegetation. The removal of natural vegetation (grassland and shrub communities) would be minimized to the extent possible during construction. In addition, the movement of construction personnel and equipment on-site would be limited to the extent possible to the construction areas to avoid inadvertent impacts to all wildlife species.

Raptors could be impacted as a result of construction-related disturbance during the nesting season. The BLM has established seasonal and no surface occupancy restriction areas that Teton would comply with according to BLM policy (BLM 1997). Additionally, Teton has committed to adopting a 50-m (164-ft) minimum setback from the ridgeline of White Mountain, as well as the edge of large drainages to further reduce impacts to avian species. Table 2.9 lists the seasonal restriction areas, as well as the no surface occupancy buffers, and Teton would not place any wind turbines within these no surface occupancy buffer areas. In addition, to reduce the risk of electrocution, all electrical systems and

components would be designed, constructed, operated, and maintained in conformance with the National Electrical Safety Code and other applicable codes and standards, as well as *Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 2006* (Avian Power Line Interaction Committee 2006).

4.12.1.2 O&M Phase

Wildlife (Including Big Game)

Impacts to wildlife (including big game) during the O&M phase of the WMWE Project would result from the loss of foraging habitat, avoidance of the project area due to vehicle traffic and project related noise, and increased wildfire potential. During the O&M phase, turbine assembly areas would be reduced and revegetated to an 80 x 80-ft pad area, and road widths would be reduced and revegetated from 54 ft to approximately 26 ft. Trenches for collection and communications lines would be backfilled and revegetated. These temporarily disturbed areas would be primarily located adjacent to roads that would be utilized by O&M personnel. Temporary disturbance areas would be reclaimed and revegetated and allowed to return to its previous use as wildlife habitat. The timing of seeding operations would typically occur during the fall, but some reseeding efforts may occur during the spring. However, approximately 189 acres of wildlife habitat would be occupied by the WMWE facility during project operation. The predominant habitat type affected by operation on the WMWE facility is the Wyoming big sagebrush vegetation community. This habitat is common in the area, and large continuous tracts of similar habitats occur adjacent to the project area.

The primary noise-generating activities associated with routine O&M operations include pickup trucks and maintenance equipment noise and wind turbine noise. Truck and maintenance equipment noise is expected to be minor and periodic and associated with vehicle traffic on established project roads (as described in Chapter 2.0). O&M activity (i.e., maintenance operations) may disturb and/or displace some wildlife species from the area of activity. Some species may move permanently, and some species may be drawn to the project due to human activities (e.g., coyotes and common ravens could be attracted to human activity and these species could adversely impact ground-nesting species). New or improved access roads in the project area may increase access by recreational users, especially during winter, which may also disturb wildlife. It is also possible that with improved access within the project area there could be an increased potential for poaching or harassment of wildlife. However, if O&M personnel observe such illegal activity, they would immediately report it to WGFD.

As discussed in Section 4.5 of this EA, the wind turbines identified for this project (the GE 1.5 SLE unit) are expected to have a maximum sound power level less than 104 dBA (General Electric 2004). According to the Wind Energy PEIS (BLM 2005), considering geometric spreading, a wind turbine with a sound power level of 104 dBA would have a resulting sound power level of 58 to 62 dBA at a distance of 164 ft from the turbine, which is about the same level as conversational speech at a distance of about 3 ft. This level of noise could disturb foraging and reproductive behaviors of various wildlife species that could lead to habitat avoidance (BLM 2005). However, it is unclear what impact this level of noise from wind turbines might have on wildlife species, including big game, because to date, few wildlife studies related to noise impacts of wind energy projects have been conducted (BLM 2005). It should also be noted that as wind speeds increase, background noise levels (from the wind) would also increase and would be louder than the operating wind turbine (BLM 2005; Rogers et al. 2006).

For big game species (pronghorn antelope, mule deer, and elk), the O&M phase of the project could result in some level of disruption and/or displacement of big game in the project area. Wind energy development is relatively new and few field studies have been conducted concerning big game species and potential impacts from wind energy projects. A recently completed multi-year study of mule deer in west-central Wyoming indicates that mule deer populations were adversely affected by disturbance from natural gas

development and associated human activity (Sawyer et al. 2009). As a result, it is possible that similar types of effects could be observed in relation to wind energy development. However, it should also be recognized that oil and gas development and wind energy developments involve some important differences in the level of human activity and disturbance that are not directly comparable to each other (Strickland 2009; Erickson 2009). Typical oil and gas well disturbance entails between 0.8 to 2.7 acres during operations depending on the type of well whereas a typical wind turbine surface disturbance entails 0.1 to 0.15 acres. However, there are other aspects of these developents that are not directly comparable (i.e., height of facilities and moving parts).

Disruption and/or displacement during the O&M phase of the project would likely be a continuation of construction-related impacts discussed above (Strickland 2009). However, the level of human activity during the O&M phase would be much less than during the construction phase of the Proposed Action. Two studies related to big game species and wind energy facilities documented the following results. A study of pronghorn antelope at the Foote Creek Rim wind project in south-central Wyoming conducted in association with raptor use studies indicate that no substantial change in pronghorn abundance in the immediate project area (Johnson et al. 2000). In addition, a recent study regarding interactions of transplanted elk populations during the construction and O&M phases of a wind facility found no evidence that the construction or operation of the wind turbines had significant impacts on elk use of the surrounding area (Walter et al. 2004).

No linear fences that could interfere with movement of big game species would be installed as part of the Proposed Action, and fences would only be installed around individual structures such as the electrical substation and O&M facility to protect public health and safety and to protect the company's assets.

There are no known migratory corridors for mule deer or elk within or immediately adjacent to the WMWE project area. As discussed in Chapter 3.0, no known pronghorn antelope migration corridors occur near the project area; however, there are several migration routes documented north of the WMWE project area (refer to Figure 3.10). Based on WGFD migration corridor data and range maps (refer to Figure 3.10), crucial winter range is located in the southeastern and northeastern edge of the WMWE project area. During the winter, it appears likely that most pronghorn antelope migrate east to crucial winter range below White Mountain and would likely avoid the top and rim of White Mountain due to typically heavy snow accumulations. It is possible that some pronghorn antelope may cross through the project area in the winter/spring and could travel on project roads or other roads (such as County Road 53) where snow removal operations occur, and they could become stranded on top of White Mountain during periods of heavy deep snows if the roads become impassable. Since Teton would be conducting yearlong operations, project roads would be plowed and would typically remain open all winter long. Any impediment to pronghorn antelope movement in the project area would be negated since Teton has committed to plowing openings (at least one opening every 0.25 mi or as directed by the BLM) in the snow berms to allow big game species to move off and away from road activities. Therefore, the Proposed Action is expected to have limited impacts on migrating pronghorn antelope.

In addition, the project would result in the unavoidable life-of-project direct loss of 189 acres of big game habitat within the project area. It is also possible that big game could be struck by O&M vehicles; however, posted speed limit signs would be installed on project roads in cooperation with Sweetwater County officials. Operation of the facility is not expected to have any long-term effects on big game once they have habituated to the increased level of traffic and the presence of the wind turbines. O&M personnel will be informed that wildlife (including big game species) occur in the project area, that they are not allowed to haze or harass the animals, and that they should minimize any disturbance to the animal whenever possible. Any incidents of

poaching will be immediately reported to the WGFD.

Increased O&M activity in the project area could increase the potential for wildfires. While possible, wildfires associated with the O&M phase of the Proposed Action are unlikely to occur. In the event of a wildfire, impacts to wildlife (including big game) would include direct mortality, reduction of habitat, and/or reduction in habitat quality. Implementation of the wildfire prevention plan outlined in the Proposed Action would minimize the chance of a wildfire occurring.

While unlikely, wildlife could also be affected by exposure to contaminants during operation of the WMWE Project. Although petroleum products (e.g., fuel, mineral oil, hydraulic oil, lubricating oil, etc.) would be stored and used at the facility, exposures are not expected under normal facility operations. In addition, a SPCCP would be implemented to minimize potential impacts from any spills that might occur. In general, wildlife (including big game) would not be affected by contaminant exposure during operation of the project.

The implementation of design features during the O&M phase, including using noise reducing turbines, employees carrying fire extinguishers to prevent the spread of wildfire, disposing of trash properly, restricting site maintenance activities to the minimum area necessary, designating travel corridors with reasonable speed limits, and control efforts for nonnative invasive species, would minimize potential disturbance or impacts to wildlife habitats and species (including big game).

<u>Bats</u>

The causes of bat mortality due to wind turbines are relatively unknown, and studies are ongoing (Kunz et al. 2007). To date, only a limited number of post-construction monitoring studies have been conducted at wind energy projects in the western U.S., and the results of these studies suggest: 1) migratory species with low frequency calls (e.g., hoary and silver-haired bats) comprise almost 75% of reported bats killed; 2) the majority of bat fatalities occur during the postbreeding or fall migration season (roughly August and September); and 3) the highest reported fatalities occur at wind facilities located along forested ridgetops (Arnett et al. 2008; Gruver 2002; Johnson et al. 2003; Kunz et al. 2007), although recent studies in agricultural regions of Iowa and Alberta, Canada, report relatively high fatalities as well (Jain 2005; Baerwald 2006).

Currently, mortality surveys are the only source of information on the number of bat fatalities at wind energy facilities. The following analysis is based on previous bat mortality studies, but differences between the proposed project and previous study projects, including the number of turbines, geographic region, habitat, topography, bat populations, weather, and other unknown factors, may result in different levels of bat mortality at the project.

It is estimated that the large majority of bat fatalities at wind energy facilities involve solitary, migratory, and 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 et al. 2003; Johnson 2005). Although variable and periodic, bat fatalities consistently peak in late summer and fall, coinciding with migration (Arnett et al. 2007). Approximately 90% of fatalities occur from mid-July through late September, with over 50% occurring in August (Erickson et al. 2002; Johnson 2004; Johnson 2005). Mortality during the breeding season is low. One study showed that, although there were relatively large breeding populations of bats near an operating wind facility, bat collision mortality was low to nonexistent (Johnson 2004). Mortality during spring migration is also very low (Johnson 2005). Only a small fraction of bats that traverse wind energy facilities are actually impacted by wind turbines (Erickson et al. 2002; Johnson 2005). These data suggest that wind energy facilities do not currently affect resident breeding or foraging bat populations (Erickson et al. 2002; Johnson et al. 2003; Johnson 2004; 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).

Based on bat surveys conducted at the WMWE Project in 2008, bat activity was highest in August compared to any other month of survey. Hoary bats were approximately 18.7% of total passes detected within the study area, and silver-haired and big brown bats were approximately 14.6% of the total passes detected within the study area. Studies indicate that the most likely species to travel within turbine rotor heights include hoary bats, western red bats, and silver-haired bats. These species would be most susceptible to impacts during fall migration. The remaining 66.7% of the bat passes were from bats with high frequency calls such as the little brown bat, long-legged bat, western small-footed bat, and western long-eared bat (TRC 2008d).

Comparisons between bat activity and mortality rates at operational wind energy facilities and recorded bat activity at the project suggest that mortality at the project could be similar to that experienced at the Foote Creek Rim wind farm in Wyoming. The Foote Creek Rim site contains habitat comparable to the project area (i.e., primarily mixed-grass prairie and sagebrush shrubland). Bat fatalities at Foote Creek Rim consisted of hoary bats (80%), little brown bats (9%), silver-haired bats (7%), and big brown bat (1%) and 3% could not be identified. Based on post-construction mortality surveys at the Foote Creek Rim wind farm, estimated bat mortality at this site is approximately 1.3 bats per turbine per year (Young et al. 2003).

Some bat studies at wind energy facilities have included both preconstruction surveys (i.e., Anabat detection studies) and post-construction surveys (i.e., bat mortality surveys), and the results are presented in Table 4.13. Based on the presumed relationship between preconstruction bat activity and post-construction fatalities, the overall bat mortality rates at the WMWE Project is estimated to be low, in the range of 1.3 bat fatalities per turbine per year (documented in the Foote Creek Rim wind farm site) to slightly higher than the 2.2 bat fatalities per turbine per year documented at the Buffalo Ridge wind farm site (TRC 2008d). Under the Proposed Action, approximately 312 to 528 bat deaths per year could occur as a result of the operation of the WMWE Project. While projects occurring in the eastern U.S. may have higher bat activity and mortalities per year, population sizes are believed to be much higher in these areas when compared to the sagebrush ecosystems. Therefore, while total bat mortalities may be low in the WMWE Project compared to eastern states, impacts to population levels could have a larger impact due to greater potential for loss of genetic diversity. The expected range of bat mortalities at the WMWE Project are within the range of bat mortalities documented and acknowledged in the Wind Energy PEIS (BLM 2005).

To minimize potential impacts to bats during the O&M phase of the project, Teton would work with the BLM to develop and implement an operational protocol to modify the cut-in speeds of wind turbines within the WMWE project area. These protocols would be implemented during a portion of evening and night time hours of operation during the peak bat migration season. This protocol would be developed based on the preliminary results of the Arnett et al. (2009) study that documented reduced bat fatalities by changing the cut-in speed of wind turbines. In this study, the experimental cut-in speeds ranged between 11.1 mph (5.0 m/s) and 14.5 mph (6.5 m/s) with a corresponding nightly reduction in bat fatalities from 53 to 87% (165 to 438 fewer animal fatalities). Results of on-site post-construction avian and bat mortalities would be used by Teton and the BLM to fine tune the cut-in speed protocol.

In addition, the proposed WMWE Project is not located near any known bat colonies or other features that are likely to attract large numbers of bats. The WMWE project area does not contain topographic features likely to funnel migrating bats, and the project area lacks large tracts of forest cover, unlike high- mortality sites in the eastern U.S. However, the relatively large numbers of bat fatalities recently reported in northern Iowa (Jain 2005) and southwestern Alberta (Baerwald 2006) indicate that an open landscape is no guarantee of low mortality. Based

Table 4.13 Wind Energy Facilities in the U.S. with both Preconstruction Anabat Sampling Data and Post-construction Mortality Data for Bat Species.[1]

Wind Energy Facility	Activity[2] (No./Detector-night)	Mortality (Bats/Turbine/Year)	Reference
WMWE, Wyoming	2.6	N/A	(2008d)
Foote Creek Rim, Wyoming[3]	2.2	1.3	Gruver (2002)
Buffalo Ridge, Minnesota[3]	2.1	2.2	Johnson et al. (2004)
Buffalo Mountain, Tennessee[3]	23.7	20.8	Fiedler (2004)
Top of Iowa, Iowa[3]	34.9	10.2	Koford et al. (2005)
Mountaineer, West Virginia[3]	38.3	38.0	Arnett et al. (2005)

1 Adapted from TRC (2008d).
2 Average detections during study duration.
3 Detection data based only on ground-mounted units.

on the topography of the WMWE project area, it is expected that a majority of bat mortalities associated with the operation of the wind energy facility would occur as individuals migrate through the area.

Mortality rates of solitary tree-dwelling species are expected to be highest during fall migration. Resident and foraging bat populations are at the lowest risk (Young et al. 2003). With proper design and siting of wind projects, bat mortality can be greatly reduced and population impacts avoided (BLM 2005). The expected range of bat mortalities at the WMWE project area are within the range of bat mortalities documented and acknowledged in the Wind Energy PEIS (BLM 2005).

Raptors and Other Migratory Birds

The majority of impacts to birds from operation of the WMWE Project would result from collision with the wind turbines. Studies have also shown that densities of bird populations in the vicinity of wind energy projects may be reduced near turbines if continuous noise levels are in the range of 40 dBA or higher (BLM 2005). Birds hear best between about 1 and 5 kHz (Dooling 2002), and studies have also shown that blade noise from a normally operating wind turbine would simply add to the background noise and would be inaudible to birds at a distance of approximately 80 ft from the turbine when the blade and wind noise levels are within 1.5 dBA of one other (BLM 2005). 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 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).

One study suggests that nesting grassland passerines may be displaced by wind energy facilities (Leddy et al. 1999) and occupy other areas. However, another displacement study in Montana has not detected any displacement of nesting grassland birds within a wind energy facility (TRC 2009c).

It is estimated that bird fatalities at wind energy facilities probably represent from 0.01 to 0.02% (i.e., 1 out of every 5,000 to 10,000 avian fatalities) of the annual avian fatalities in the U.S. (Arnett et al. 2007). Bird deaths caused by wind turbines are a small fraction of the total anthropogenic bird mortality (Committee on Environmental Impacts of Wind Energy Projects 2007). In 2003, it was estimated that turbine collisions killed 20,000 to 37,000 birds, with all but 9,200 of those deaths occurring in California.

In comparison, collisions with buildings kill 97 to 976 million birds annually, and collisions with cars may kill 80 million birds per year (Erickson 2004). 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 U.S. 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 (General Accounting Office [GAO] 2005). Excluding California, an average of 1.83 avian fatalities per turbine per year and 0.006 raptor fatalities per turbine per year have been documented (Erickson et al. 2001). Studies conducted to date indicate that, in the U.S., passerines and raptors appear to be the most susceptible to turbine collisions (American Wind Energy Association [AWEA] 1995).

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. However, this level of mortality is not expected to 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 (e.g., 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 2005). Although population effects may be possible for some species, no studies have thus far documented such effects (BLM 2005).

Risk index is the risk exposure to turbine collision for each bird species. A risk index value of zero for a species does not indicate that there would be no risk associated with operation of the wind energy facility; any bird flying in the area would be at risk of turbine collision. The risk index simply identifies species that may be at more risk than other species based on observed flight height relative to proposed turbine rotor height. Species with high relative exposure indices may actually not be at high risk of turbine collisions; they are just at more risk than species with lower indices based on the risk formula.

Estimating risk exposure is difficult because abundance and behavior influence the risk of exposure. An extensive preconstruction avian survey was conducted at the WMWE project area, and among the PSBs, the risk value for horned larks (0.0790) was the highest--over seven times higher than unidentified sparrows (0.0109), the second highest risk value. American robins (0.0054) had the third highest risk value, followed by sage thrashers (0.0027) (TRC 2009b). Based on avian surveys at the WMWE Project in 2008, horned lark was the most abundant of the species documented in the WMWE project area during both spring and fall surveys (TRC 2009b). Given its abundance in the project area and the high mortality rates documented for this species compared to other species in several wind farm avian mortality studies (Young et al. 2003; Erickson et al. 2002; Erickson et al. 2004), it is likely that wind farm-related mortality would be highest for horned lark relative to other bird species occurring in the WMWE project area. This species may be especially vulnerable to collision with turbines during the breeding season because of their distinct aerial courtship displays. Male horned larks may deliver flight songs lasting 0.5 to 8 minutes during the breeding season (Beason 1995). After ascending to heights of approximately 541 ft (range 262-820 ft), the birds glide toward the ground with wings and tail spread (Beason 1995). The birds repeatedly regain altitude and repeat their song. At the end of the song flights, the males dive to the ground. However, despite their potential vulnerability to collide with turbines, it is unlikely that turbine-related mortality in the WMWE project area would have a significant negative impact on horned lark populations. Many of the other passerine birds were not observed flying within the rotor-swept area, so risk value is assumed to be low.

Raptor use in the WMWE project area is dominated by northern harriers and golden eagles, whereas nonraptor large bird species most common in the area are common raven and black-

billed magpie. Similarly, the risk index among raptors and other large birds reflects the dominance of these species: common raven, golden eagle, and northern harrier, which rank in the top three in risk for turbine-related collision. Risk for black-billed magpies is assumed to be low, as no individuals were observed flying within the rotor-swept area.

Although the number of PSBs observed during the WMWE avian studies far exceeded the number of RLBs observed, RLBs had a notably higher risk level associated with turbine-related injury or mortality (0.8919 vs. 0.1499) because they were over six times as likely to fly within the rotor-swept area of a typical 1.5-MW turbine. Despite the apparent higher risk level, raptor mortality has been absent to very low at all newer-generation wind energy facilities in the U.S. (Erickson et al. 2002; Young et al. 2003). Other studies report that passerines appeared to be at greatest risk given their higher fatality rates compared to raptors (McCrary et al. 1986; Young et al. 2003). In the WMWE project area, some raptors appeared to use the area along the eastern edge of White Mountain preferentially. Raptors also used areas near drainages and hills. Based on these findings and the increased tendency for raptors to fly within the rotor-swept area along rim edges (Johnson et al. 2000), turbines located along the eastern edge of the mountain would pose the greatest risk to RLBs. Turbines along the edges of incised drainages also might pose higher than average risk to RLBs.

Although it has been widely used in wind energy studies (e.g., Johnson et al. 2000; Erickson et al. 2002; Young et al. 2003) to date, the exposure risk model has been validated by few post-construction fatality studies (for an exception see Johnson et al. 2000). The exposure risk does not take into account factors such as bird behavior, flight styles, and varying abilities of birds to detect turbines, all of which may be important factors in determining risk of collision with turbines. Therefore, the index is useful primarily as an indicator of those species in the project area that had the highest exposure to the wind turbine rotor-swept area. It also facilitates comparisons of risk among selected species in the project area. Because of the similarities of the WMWE project area to that of the Foote Creek Rim wind farm, it is estimated that the WMWE Project would result in approximately 1.5 avian fatalities per turbine per year, and most (possibly 90%) of the fatalities would be passerines and the remaining 10% would be RLBs. Under the Proposed Action, approximately 360 total avian mortalities per year could occur. Of these mortalities, approximately 324 mortalities could be PSBs and 36 could be RLBs. Based on other post-construction avian mortality studies, the mortalities are expected to include migratory and resident birds (Young et al. 2003). The potential avian mortalities expected at the WMWE Project are within the range of avian mortalities documented and acknowledged in the Wind Energy PEIS (BLM 2005), which acknowledges that an average of 1.83 avian fatalities per turbine per year has been documented and a range of 0.0 to 4.45 bird fatalities per turbine per year (excluding wind energy projects in California, which historically had higher fatality rates). With proper design and siting of wind projects, avian mortalities can be reduced (BLM 2005).

All mitigation measures listed in Chapter 2.0 to avoid avian collisions with wind turbines would be incorporated into the design of the wind turbine and the tower. These measures include solid tubular towers to eliminate perch locations, slow-rotating blades for increased visibility, and setback of wind turbines at least 50 m (164 ft) from the east edge of White Mountain and at least 50 m (164 ft) from the edge of large drainages within the project area. Lighting of the wind turbines would also be in accordance with USFWS and FAA recommendations to aid in the reduction of avian and bat mortalities (Gehring et al. 2009). Teton would conduct a 3-year post-construction avian and bat mortality study for the project unless sufficient evidence determines that continued monitoring is unneccesary.

In addition, all electrical equipment (including the substation) would be designed and constructed in accordance with *Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 2006* (Avian Power Line Interaction Committee 2006). In addition, all permanent met towers

would be self supported (i.e., nonguyed) to minimize avian collisions and mortalities and potential big game entanglement.

4.12.1.3 Decommissioning Phase

Wildlife (Including Big Game)

Impacts to wildlife from decommissioning of the WMWE Project would be similar to impacts associated with their construction, but of reduced magnitude. Noise and visual disturbance to wildlife may temporarily increase during decommissioning and site restoration relative to conditions during project operation. New habitat loss would be negligible, and wildlife injury and mortality would be much lower than during construction. Removal of facilities components would eliminate the impacts associated with wildlife collisions with WMWE structures. Wildlife habitat in the area is expected to return to preproject conditions following decommissioning and site restoration (BLM 2005).

Disturbance to wildlife habitats and wildlife during decommissioning of the WMWE project facilities is expected to be localized, short-term, and minor. Impacts to wildlife would be minimized, where practicable, and the implementation of environmental protection measures during decommissioning, including seasonal wildlife stipulations, dust suppression, contaminant control, control of nonnative invasive species, and revegetation of impact areas with native seed mixtures, would minimize potential disturbance or impacts to wildlife habitats and species. Protection measures for the project can be found in Chapter 2.0 of this EA.

Bats

No additional impacts to bats beyond those discussed under construction impacts are expected to occur during the decommissioning phase of this project, and these impacts are expected to be minimal.

Raptors and Other Birds

No additional impacts to raptors and other birds beyond those discussed under construction impacts are expected to occur during the decommissioning phase of this project. The removal of a limited amount of natural vegetation (grassland and shrub communities) would be minimized to the extent possible during decommissioning of the project. In addition, the movement of personnel and equipment on-site would be limited to the extent possible to construction areas to avoid inadvertent compaction of vegetation.

Raptors could be impacted as a result of decommissioning-related disturbance during the nesting season. To avoid impacts on the nesting raptors during the decommissioning phase of the project, Teton will implement the same seasonal restriction areas in accordance with BLM policy (BLM 1997) as provided in Table 2.9 of this EA.

4.12.2 Alternative A - Development Only on Privately Owned Lands

4.12.2.1 Construction Phase

Potential direct and indirect impacts to wildlife, including big game, bats, and birds, under Alternative A would be the same as discussed under the Proposed Action. Implementation of this alternative would involve the construction of 170 wind turbines on privately owned land; therefore, direct impacts to wildlife habitat would include the disturbance of 619 acres of habitat from road construction, the excavation of the turbine pads, the substation and batch plant, and the collector lines. Most of the disturbed area would be reclaimed and revegetated, with 115 acres (less than 1.0% of the project area) remaining occupied by roads, turbine foundations, and facilities for the life of the project. The potential impact to wildlife habitat would be reduced by 30% compared to those described under the Proposed Action; however, if the construction of the 170 turbines occurs wholly on one vegetation type, impacts to that single vegetation community would be similar to that described under the Proposed Action. Noise and

human disturbance during construction activities under Alternative A are anticipated to be the same as under the Proposed Action.

The reduction in both short-term and life-of-project loss of wildlife habitat under Alternative A when compared to the Proposed Action would be negligible.

4.12.2.2 O&M Phase

Under Alternative A, no additional impacts beyond those discussed under the Proposed Action are expected to occur during the O&M phase of this project. Implementation of Alternative A may slightly decrease the total number of bird and bat turbine-related fatalities by 30% as a result of the construction of 30% fewer turbines. Under Alternative A, approximately 255 total avian mortalities per year and approximately 218 to 370 total bat mortalities could occur. Assuming all design features are implemented, potential avian and bat mortalities would be within the range of mortalities documented and acknowledged in the Wind Energy PEIS (BLM 2005).

4.12.2.3 Decommissioning Phase

Under Alternative A, no additional impacts beyond those discussed under the Proposed Action are expected to occur during the decommissioning phase of this project.

4.12.3 No Action Alternatives

Under the No Action Alternative, the proposed wind energy facility would not be authorized nor approved. No ground would be disturbed, and no impacts to the existing biological environment would take place beyond those that already exist.

4.12.4 Residual Impacts

The Proposed Action would result in the direct life-of-project loss of approximately 189 acres of wildlife habitat due to vegetation removal. Some wildlife species could be temporarily displaced from project-related construction activities and some species, especially small mammals, birds, amphibians, and reptiles, may be killed by construction, O&M, and decommissioning operations. Habitat effectiveness, especially for big game species, would likely be reduced, due to the change in the compaction of vegetation communities as revegetated areas become re-established and evolve toward a sagebrush dominated plant community. There would also be an unavoidable loss of wildlife due to wildlife/vehicle collisions.

4.12.5 Cumulative Impacts

In order to assess potential cumulative impacts to wildlife species, various IAAs have been established to evaluate the Proposed Action, and quantitative data for the various IAAs are summarized in Table 4.14.

4.12.5.1 Wildlife (Including Big Game)

For general wildlife (i.e., nongame and small mammals), habitat disturbance associated with the existing Proposed Action and RFFAs is expected to result in 8.15% disturbance of the IAA, and cumulative impact would be similar to those discussed under the Proposed Action.

Implementation of the various mitigation measures to limit disturbance and encourage prompt reclamation of disturbance and other appropriate mitigation measures presented in the Proposed Action would minimize impacts to wildlife species, and cumulative impacts to nongame and small mammal populations within the cumulative IAA are expected to be limited.

For pronghorn antelope, current disturbance accounts for a total of 17,409 acres (2.84%) of the IAA, and physical disturbance associated with the Proposed Action and RFFAs would represent an additional 973 acres (0.16%) of the IAA for a total current and projected physical disturbance of 18,382 acres (3.00%) of the IAA for pronghorn antelope (refer to Table 4.13). Impacts to pronghorn antelope during the life of these projects would be similar to those discussed under the Proposed Action and could include disturbance and/or displacement due to human presence, fugitive dust or noise, direct mortality due to

Table 4.14 IAAs for Wildlife Resources.

Resource	Description	Total Area (acres)	Amount of Current Disturbance (acre and %)	Amount of Disturbance Related to RFFA (Including Proposed Action) (acre and %)	Total Amount of Current and RFFA Disturbance (acre and %)
Wildlife, bats, and migratory birds	Level 12 HUC boundary	268,613	19,954 (7.43%)	1,080 (0.40%)	21,034 (7.83%)
Pronghorn antelope	WGFD - Sublette Herd Unit	612,496	17,409 (2.84%)	973 (0.16%)	18,382 (3.00%)
	Crucial Pronghorn antelope winter/yearlong range	279,452	9,944 (3.56%)	71 (0.02%)	10,015 (3.58%)
Mule deer	WGFD - Mule Deer Steamboat Herd Unit	2,554,688	27,191 (1.06%)	1,268 (0.05%)	28,459 (1.11%)
Elk	WGFD - Elk Steamboat Herd Unit	2,529,715	23,452 (0.93%)	1,207 (0.05%)	24,659 (0.98%)
	Crucial elk winter/yearlong range	280,448	1,896 (0.68%)	29 (<0.01)	1,925 (0.69%)
Raptors and other birds	Project area plus 14.45-mi buffer	693,604	29,676 (4.28%)	1,455 (0.21%)	31,131 (4.49%)

collisions with vehicles, and loss of habitat by alteration and/or fragmentation. Appropriate design features as discussed in Chapter 2.0 (including prompt revegetation efforts) would be implemented for each federally authorized project and would mitigate potential impacts. The Proposed Action and RFFAs would add 973 acres of disturbance (0.16% of the total IAA), and this represents a small percentage of direct disturbances. However, indirect disturbance (due to human presence, noise, dust, etc.) and habitat fragmentation would likely increase and would result in some reduction in use and/or displacement.

In addition, the largest amount of current disturbance is in pronghorn crucial winter/ yearlong range and these disturbances account for a total of 9,944 acres or 3.56% of the crucial winter/yearlong range within the IAA. Physical disturbance associated with the Proposed Action and RFFAs would represent an additional 71 acres or 0.02% of the crucial winter/yearlong range within the IAA for a total physical disturbance for current and projected disturbance of 10,015 acres or 3.58% of the crucial winter/yearlong range within the IAA (refer to Table 4.14). Impacts to pronghorn antelope crucial winter/yearlong ranges during the life of these projects would be similar to those discussed above and could include disturbance and/or displacement due to human presence, fugitive dust or noise, direct mortality due to collisions with vehicles, and loss of habitat by alteration and/or fragmentation. Implementation of all appropriate seasonal restriction for all federally authorized projects would minimize potential impacts to pronghorn antelope in crucial winter ranges, Teton and other companies would comply with seasonal restrictions and would not conduct any project-related activities within antelope crucial winter/yearlong range from November 15 to April 30. However, Teton and the other companies may request an exception from the seasonal restriction stipulation from the BLM or the landowner, who would evaluate the request on a case-by-case basis. This seasonal mitigation measure would minimize impacts to antelope on the crucial/yearlong ranges located within the various projects during the construction periods. The Proposed Action and RFFAs would add 71 acres of disturbance (0.02% of the crucial winter/yearlong range in the IAA), and this represents a small percentage of direct disturbances. However, indirect disturbance (due to human presence, noise, dust, etc.) and habitat fragmentation would likely increase and could result in some reduction in use and/or displacement.

For mule deer, current disturbance accounts for a total of 27,191 acres (1.06%) of the IAA, and physical disturbance associated with the Proposed Action and RFFAs represents approximately 1,268 acres (0.05%) of the IAA for a total current and projected physical disturbance of 28,459 acres (1.11%) of the IAA for mule deer (refer to Table 4.14). Impacts to mule deer during the life of these projects would be similar to those discussed under the Proposed Action and could include disturbance and/or displacement due to human presence, fugitive dust or noise, direct mortality due to collisions with vehicles, and loss of habitat by alteration and/or fragmentation. Appropriate design features as discussed in Chapter 2.0 (including prompt revegetation efforts) would be implemented for each federally authorized project and would mitigate potential impacts. The Proposed Action and RFFAs would add 1,268 acres of disturbance (0.05% of the total IAA), and this represents a small percentage of direct disturbances. However, indirect disturbance (due to human presence, noise, dust, etc.) and habitat fragmentation would likely increase and would result in some reduction in use and/or displacement.

There are no crucial winter, severe winter relief, or mule deer parturition areas within or immediately adjacent to the WMWE project area. Therefore, the Proposed Action would not result in any cumulative impacts to these important mule deer habitats.

For elk, current disturbance accounts for a total of 23,452 acres (0.93%) of the IAA, and physical disturbance associated with the Proposed Action and RFFAs would represent an additional 1,207 acres (0.05%) of the IAA for a total current and projected physical disturbance of 24,659 acres

(0.98%) of the IAA for elk (refer to Table 4.14). Impacts to elk during the life of these projects would be similar to those discussed under the Proposed Action and could include disturbance and/or displacement due to human presence, fugitive dust or noise, direct mortality due to collisions with vehicles, and loss of habitat by alteration and/or fragmentation. Appropriate design features as discussed in Chapter 2.0 (including prompt revegetation efforts) would be implemented for each federally authorized project and would mitigate potential impacts. The Proposed Action and RFFAs would add 1,207 acres of disturbance (0.05% of the total IAA), and this represents a small percentage of direct disturbances. However, indirect disturbance (due to human presence, noise, dust, etc.) and habitat fragmentation would likely increase and would result in some reduction in use and/or displacement.

In addition, current disturbance in elk crucial winter/yearlong range accounts for a total of 1,896 acres or 0.68% of the crucial winter/ yearlong range within the IAA. Physical disturbance associated with the Proposed Action and RFFAs would represent an additional 29 acres or less than 0.01% of the crucial winter/yearlong range within the IAA for a total physical disturbance for current and projected disturbance of 1,925 acres or less than 0.69% of the crucial winter/yearlong range within the IAA (refer to Table 4.14). Impacts to elk crucial winter/yearlong ranges during the life of these projects would be similar to those discussed above and could include disturbance and/or displacement due to human presence, fugitive dust or noise, direct mortality due to collisions with vehicles, and loss of habitat by alteration and/or fragmentation. Implementation of all appropriate seasonal restriction for all federally authorized projects would minimize potential impacts to elk in crucial winter ranges. Teton and other companies would comply with seasonal restrictions and would not conduct any project-related activities within elk crucial winter/yearlong range from November 15 to April 30. However, Teton and the other companies may request an exception from the seasonal restriction stipulation from the BLM or the landowner, who would evaluate the request on a case-by-case basis. This seasonal mitigation measure would minimize impacts to elk on the crucial/yearlong ranges located within the various projects during the construction periods. The Proposed Action and RFFAs would add 29 acres of disturbance (less than 0.01% of the crucial winter/yearlong range in the IAA), and this represents a small percentage of direct disturbances. However, indirect disturbance (due to human presence, noise, dust, etc.) and habitat fragmentation would likely increase and could result in some reduction in use and/or displacement. The Proposed Action would not result in any disturbance to elk parturition areas. Therefore, the Proposed Action would not result in any cumulative impacts to elk parturition areas.

4.12.5.2 Bats

For bats, habitat disturbance associated with the existing Proposed Action and RFFAs is expected to result in 7.83% disturbance of the IAA. The Proposed Action would be expected to primarily affect migratory bats during the fall; however, studies indicate that the population of migratory bats is generally limited. In addition, the WMWE project area does not contain topographic features likely to funnel migrating bats, and the project area lacks large tracts of forest cover, unlike high-mortality sites in the eastern U.S. Assuming all design features are implemented for the Proposed Action and all BLM-authorized RFFAs, potential cumulative impacts to bats would likely be within the range of mortalities and impacts documented and acknowledged in the Wind Energy PEIS (BLM 2005).

4.12.5.3 Raptors and Other Birds

For raptors and other birds, current disturbance accounts for a total of 29,676 acres (4.28%) of the IAA, and disturbance associated with the Proposed Action and RFFAs would represent an additional 1,455 acres (0.21%) of the IAA for a total current and projected disturbance of 31,131 acres (4.49%) of the IAA for raptors and other birds (refer to Table 4.14). Impacts to raptors and other birds during the life of these projects would be similar to those discussed under the Proposed Action and could include habitat loss and fragmentation due

to vegetation disturbance, human presence, and noise. Additional impacts during the construction and decommissioning phases to raptors and other birds may be collisions with construction vehicles, turbines, meteorological towers, substations, and other structures. The primary impact during the O&M phase of the Proposed Action and other wind energy projects would be avian collisions with the operating wind turbines. In addition to the Proposed Action, one other wind energy project is located within the IAA and it would be located north of the WMWE project area. It is estimated that there would be approximately 1.5 avian fatalities per turbine per year for the Proposed Action and for the proposed Lonesome Bronco wind energy project. Most (possibly 90%) of the fatalities would likely be PSBs, and the remaining 10% would likely be RLBs.

Raptors could be impacted as a result of construction-related disturbance during the nesting season. The BLM has established seasonal and no surface occupancy restriction areas that Teton would comply with according to BLM policy (BLM 1997). Additionally, Teton has committed to adopting a 50-m (164-ft) minimum setback from the ridgeline of White Mountain and the edge of large drainages to further reduce impacts to avian species. Table 2.9 lists the seasonal restriction areas, as well as the no surface occupancy buffers, and Teton and all other BLM-authorized RFFAs would not place any wind turbines or other disturbances within these no surface occupancy buffer areas. In addition, to reduce the risk of electrocution, all electrical systems and components would be designed, constructed, operated, and maintained in conformance with the National Electrical Safety Code and other applicable codes and standards, as well as *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (Avian Power Line Interaction Committee 2006). In addition, the removal of natural vegetation (grassland and shrub communities) would be minimized to the extent possible during construction. The movement of construction personnel and equipment on-site would be limited to the extent possible to the construction areas to avoid inadvertent impacts to all wildlife species.

Therefore, potential cumulative impacts to avian species would be within the range of mortalities and impacts acknowledged and documented in the Wind Energy PEIS (BLM 2005).

4.13 ENVIRONMENTAL PROTECTION MEASURES

The environmental protection measures for the Proposed Action are presented in Section 2.5 of this EA as design features.

5.0 CONSULTATION AND COORDINATION

5.1 INTRODUCTION

A Notice of Scoping for the EA for the WMWE Project, Sweetwater County, Wyoming, was issued on November 20, 2008, to more than 200 government offices and government officials, public land users and user groups, newspapers, radio stations, and television stations for a 30-day public comment period (Appendix A). Forty comment letters were received, including letters from the WDEQ, WGFD, USFWS, National Wildlife Federation, Biodiversity Conservation Alliance, Wyoming Outdoor Council, Department of Agriculture, PacifiCorp, Wyoming Department of Transportation, the RSGA, the Sierra Club, Sweetwater County Board of County Commissioners, Sweetwater County Land Use Department, Historic Trail Corps, the Rock Springs Airport, and local broadcasting station and communication companies.

5.2 LIST OF AGENCIES, ORGANIZATIONS, AND INDIVIDUALS CONTACTED

Table 5.1 lists the agencies, organizations, and individuals contacted during preparation of this EA.

5.3 LIST OF PREPARERS

Table 5.2 lists the names of people who prepared this EA.

Table 5.1 Record of Persons, Groups, and Governmental Agencies Contacted or Provided Comments.[1]

Company/Agency	Individual	Discipline/Position
	Richard Beckwith	Citizen
	John Bookless	Citizen
	H. Caller	Citizen
	Daniel Calvey	Citizen
	Dennis Carlson	Citizen
	Mike Cheney	Citizen
	Lynn Clark	Citizen
	Carl Demshar	Citizen
	Joe Drnas	Citizen
	Albert Ellis	Citizen
	Michael Fletcher	Citizen
	Ray Gordon	Citizen
	James Graham	Citizen
	Ted Hainworth	Citizen
	Dorothy Harton	Citizen
	Michael J. Herzing	Citizen
	Richard H. Honaker	Citizen
	Debra Izatt	Citizen
	Nelle Johnson	Citizen

Table 5.1 (Continued)

Company/Agency	Individual	Discipline/Position
	Lynn Kinter	Citizen
	Fred & Fern Linton	Citizen
	Joe Lustik	Citizen
	Drew Mather	Citizen
	Craig Nelson	Citizen
	Ken Nosich	Citizen
	Doug Obrocto	Citizen
	Chris Plant	Citizen
	Natalie & Dylan Powell	Citizen
	Angelina Pryich	Citizen
	Leslie M. Ranta	Citizen
	Susan Ruff	Citizen
	Bill Taliaferro	Citizen
	Russel L. Tanner	Citizen
	Craig Thompson	Citizen
	Glennise Wendorf	Citizen
	Haman Wise	Citizen
	Hollis Wold	Citizen
Alliance for Historic Wyoming	Barbara Dobos	
American Lands Alliance	Mark Salvo	
American Wind Energy Association	Jaime Steve	
Anadarko E&P LP	Patrick Navratil	
Anadarko E&P LP	Steve Ruhl	
Anadarko Petroleum Corporation	Tom Clayson	
Anadarko Petroleum Corporation	Cathy Flansburg	
Anadarko Petroleum Corporation	Richard T. Robitaille	
Animal Protection Institute of America		
Arapaho Wind River Traditional Elders	Mr. Bobby Joe Goggles	
Barlow & Haun, Inc.		
Biodiversity Conservation Alliance	Jeff Kessler	
Bjork Lindley Little P.C.	Laura Lindley	
Buys & Associates Inc.	Lindsey S. Hockert	
BWAB		
Casper Star-Tribune	Jeff Gearino	
City of Rock Springs	Tim Kaumo	Mayor
	Richard Beckwith	City Attorney
Defenders of Wildlife		

Table 5.1 (Continued)

Company/Agency	Individual	Discipline/Position
District 1 Schools	Superintendent	
District 2 Schools	Superintendent	
Earth Justice Legal Defense Fund	Research Associate	
Eastern Shoshone Tribe	Richard Ferris	Tribal Cultural Consultant
Edge Environmental		
Environmental Defense Fund		
Exxon Company U.S.A.	Fernando Blackgoat	
Fed Energy Regulatory Commission		
Fed Energy Regulatory Commission	Mike Boyle	
Fed Energy Regulatory Commission	L. J. Sauter, Jr.	
Friends of the Red Desert		
General Chemical Co		
Grassroots Advocate		
Greater Yellowstone Coalition	Melissa Frost	
Greater Yellowstone Coalition	Scott Groene	
Heitzmann Drill Site Services	Bob Anderson	
Indep Petroleum Assn of Mtn States	Marc Smith	
Infinity Oil and Gas Of Wyoming	John Long	
J.A. Rohn Consulting	Jennifer Head	
Jackson Hole Conservation Alliance	Pam Lichtman	
JFC	Joe Manatos	
Julian Land & Livestock	Truman Julian	
Land and Water Fund for the Rockies	Melinda Harm Benson	
Land Management Services	Earl Layser	
Library-Colorado State University	Judy Smith	
Library-Rock Springs	E. Gamble	
Library-Sweetwater County		
Library-University of Wyoming	Tamsen Hert	
Library-White Mountain		
Library-Western Wyoming Community College	Hay Library	
Mayor of Green River		
Mayor of Rock Springs		
Medicine Butte Wildlife Assn.		
Mormon Trails Association	President	
MPEC Inc.	Jon Kennedy	
MPEC Inc.	Justin Strub	
National Pony Express Association		

Table 5.1 (Continued)

Company/Agency	Individual	Discipline/Position
National Wildlife Federation		
Natural Resources Defense Council	Johanna H. Wald	
Natural Resources Defense Council	Andrew Willis	
Northern Arapaho Tribe	James Chase	Tribal Archaeologist
Northern Ute Tribes	Betsy Chapoose	Tribal Cultural Specialist
Northwestern University	H Paul Friesema	
OCI Wyoming L.P.		
OCTA - Oregon-California Trails Association	Preservation Officer	
OCTA - Oregon-California Trails Association Wyoming Chapter	Frank “Pinky” Ellis	
OCTA - Oregon-California Trails Association Wyoming Chapter	Don Hartley	
People for the USA	c/o Randy Shipman	
People for Wyoming	Executive Director	
Petroleum Association of Wyoming	Bruce Hinchey, President	
Petroleum Information Corporation	Bob Knowles	
Powder River Basin Resource	Council	
Predator Project		
Public Lands Advocacy	Claire M. Moseley	
Public Lands Advocacy	George Lea	
Questar Gas Management Corporation		
Questar Gas Management Corporation		
Rock Springs Grazing Association		
Rocky Mountain Elk Foundation	Dennis Hughes	
Rocky Mountain Power	Rights-of-way Services	
Roscoe Culvert	Andy Seiller	
Safari Club International	Executive Director	
SAIC		
Sierra Club	Patricia Dowd	
Sierra Club Northern Plains		
Sierra Club Wyoming Chapter	Page McNeill	
Sinclair Oil Corporation		
Shoshone-Bannock Tribe		
Southwest Wyoming Mule Deer Foundation	Les Greene	
Southwest Wyoming	Industrial Association (SWIA)	
State of Wyoming	Oil and Gas Conservation Commission	

Table 5.1 (Continued)

Company/Agency	Individual	Discipline/Position
State of Wyoming	WGFD, Environmental Coordinator	
State of Wyoming DEQ		
State of Wyoming DEQ – Air Quality Division	Darla Potter	
State of Wyoming DEQ – Industrial Siting Division	Tom Schroeder	
State of Wyoming DEQ – Land Quality Division		
State of Wyoming DEQ – Water Quality Division		
State Representative (District 17)	Bernadine Craft	
State Representative (District 18)	Allen Jaggi	
State Representative (District 20)	Kathy Davison	
State Representative (District 23)	Keith Gingery	
State Representative (District 33)	Patrick Goggles	
State Representative (District 34)	Frank Philip	
State Representative (District 39)	Stan Blake	
State Representative (District 48)	Joe Barbuto	
State Representative (District 60)	Bill Thompson	
State Senator (District 12)	Marty Martin	
State Senator (District 13)	John Hastert	
State Senator (District 14)	Stan Cooper	
SWEDA		
Sweetwater County	Historical Society	
Sweetwater County	Land Use Department	
Sweetwater County	Museum Ruth Lauritsen	
Sweetwater Conservation District	Mary Thoman	
Sweetwater County Commission	Debby Dellai-Boise	
Sweetwater Commissioner	Paula Wonacott	
Sweetwater County Planning and Zoning	Mark Kot	Planner
	John Radosevich	Engineering and Planning
	Steve Horton	Planner
Sweetwater County Weed and Pest Control	Gale Lamb	Supervisor
U.S. Fish and Wildlife Service, Wyoming Office	Brian Kelly Kathleen Erwin Pat Deibert	Field Officer Supervisor Staff Biologist Staff Biologist
Wyoming Department of Agriculture	Chris Wichman	

Table 5.1 (Continued)

Company/Agency	Individual	Discipline/Position
Wyoming Department of Parks and Cultural Resources	Mary Hopkins	State Historic Preservation Office
Wyoming Department of Environmental Quality	Mark Conrad Todd Parfitt	Water Quality Division Industrial Siting Council
Wyoming Game and Fish Department State Office, Cheyenne	Mary Flanderka	Habitat Protection Supervisor
Wyoming Governor's Office	Steve Furtney	
Wind Energy	Temple Stevenson	
Wyoming Natural Diversity Database	Staff	

[1] Additional individuals, groups, and agencies were contacted during scoping.

Table 5.2 List of EA Preparers.

Agency/Company	Discipline/Position
BLM Interdisciplinary Team, RSFO	
Teri Deakins	Project Lead
Lance Porter	Field Manager
John MacDonald	Assistant Field Manager, Lands and Minerals
Bernie Weynand	Assistant Field Manager, Resources
Jim Glennon	Vegetation
Nicholas Kaczor	Wildlife Resources, TEPC species, and BLM-sensitive species
Jo Foster	Visual Resources, Recreation
Dennis Doncaster	Water Resources
Patricia Hamilton	Realty Specialist
Penny Daniels	Cultural Resources
Colleen Sievers	Cultural Resources
Cherette Mastny	Range
Jay D'Ewart	Wild Horses
Dale Hanson	Geology and Paleontology
Angelina Pryich	Editor
John Henderson	Fisheries - water depletions
BLM Wyoming State Reviewers	
Teresa Ingles	Project Manager - Renewable Energy Coordination Office
Melissa Hovey	Air Quality Specialist
Ken Peacock	Planning Environmental Coordinator
Janet Kurman	Environmental Protection Specialist

Table 5.2 (Continued)

Agency/Company	Discipline/Position
Other Contributors	
Teton Wind, LLC	Gary Tassainer
	Jesse Tassainer
	Rick Frandsen
Lloyd Levy Consulting, LLC	Lloyd Levy
Uinta Paleontological Associates, Inc.	Kellie Trujillo
	Peter Robinson
TRC Environmental Corporation	
Scott Kamber	Project Manager, EA Preparation
Jan Hart	EA Preparation--Vegetation, Soils, Species, and BLM-sensitive Species, Rangeland, and Wild Horses
Diane Thomas	EA Preparation--Wildlife, Socioeconomic, Avian Surveys, and Raptor Surveys
James Lowe	EA Preparation--Cultural and Historic Resources
Nathan Fleming	EA Preparation--Cultural Resources
Chase Hahn	EA Preparation--Air Quality
Ryan Johnson	Diurnal and Nocturnal Avian Surveys
Waylon Hiler	Diurnal and Nocturnal Avian Surveys
Judy Bartos	GIS, Photosimulation
Randall Blake	GIS, Photosimulation, Greater Sage-grouse Surveys
Mindy Uitterdyk	GIS
Betty Wills	AutoCad and GIS
Genial DeCastro	Document Production
Rena Merritt	Document Production
Jessica Robinson	Technical Editor and Document Production
Tamara Linse	Technical Editor

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