BLM

Prineville District

West Butte Wind Power Right of Way

Final Environmental Impact Statement

DOI-BLM-OR-P060-2009-0064-EIS

Bureau of Land Management
Prineville District Office
3050 NE 3rd Street
Prineville, OR 97754

October 2010

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
OREGON
PRINEVILLE DISTRICT OFFICE

EIS #:	**DOI-BLM-OR-P060-2009-0064-EIS**
Project Name:	West Butte Wind Project Right of Way Crook and Deschutes Counties, Oregon Final Environmental Impact Statement
Lead Agency:	U.S. Department of the Interior Bureau of Land Management Prineville Field Office, Oregon
Cooperating Agencies:	None
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Applicant:	West Butte Wind Power LLC c/o John V. Stahl P.O. Box 2028 Bend, OR 97709 541-382-1017

Abstract:

This Final Environmental Impact Statement (EIS) considers the Proposed Action of authorizing a right-of-way across BLM-administered lands for the construction and operation of access roads and a transmission line associated with the West Butte Wind Power Project. This Final EIS considers three alternatives: Alternative 1, including the Proposed Action of granting a ROW for construction and operation of an access road and transmission line across lands administered by the BLM, and considering the Connected Action of West Butte Wind constructing and operating a wind farm and associated facilities (e.g., access road, transmission line, substation, Operations and Maintenance (O&M) building) on privately held lands; Alternative 2, wherein a Northern Access Road is considered to access the project facilities making up the Connected Action, rather than an Access road through BLM-managed lands; and Alternative 3, the No Action Alternative. The following issues were identified for analysis in the Final EIS: potential project impacts on vegetation, the green-tinged paintbrush and its habitat, Oregon Sensitive Plant Species, and the spread of noxious weeds; potential project impacts on migratory birds and bats, sage grouse and their habitat, and raptors and their nests; potential project impacts on general wildlife habitat, big game habitat, and pygmy rabbits and habitat; potential noise impacts on wildlife; potential effects of a decrease in miles available for recreational routes within the Millican Valley OHV Recreation Area; potential visual/aesthetic impacts, including glare/light pollution from turbine lighting; potential project impacts on sensitive archaeological resources and properties listed on the National Register of Historic Places; potential project impacts on areas valuable to Native Americans; and potential economic effects of project to rural communities and landowners (jobs, tax revenues).

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Prineville District Office
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Prineville, Oregon 97754

IN REPLY REFER TO:

2800 (ORP060)
OR-065784

OCT 0 1 2010

Dear Reader:

The Bureau of Land Management (BLM) has prepared a Final Environmental Impact Statement (FEIS) to analyze the effects of allowing West Butte Wind Power LLC (the Applicant) to improve and operate a four mile long access road and transmission line across BLM managed public land. The Project Area is located 32 miles east of the city of Bend and 30 miles south of the city of Prineville.

The FEIS also analyzes an alternative where the transmission line would still cross four miles of public land, but the access road would be mostly on private land rather than crossing public land. The proposed right of way is part of the Applicant's proposal to construct, operate and maintain a wind generation facility on private lands in Deschutes and Crook counties, Oregon.

The FEIS is available for review for 30 days, after which the BLM will issue a Record of Decision approving the road and utility right of way, approving it with conditions, or denying it.

For further information on this project please contact one of the following employees at the Prineville District Office, phone (541) 416-6700: Steve Storo, Project Lead; Teal Purrington, Environmental Coordinator; Christina Lilienthal, Public Affairs Specialist; or Steve Robertson, Associate District Manager.

Sincerely,

Stephen R. Robertson

for Deborah J. Henderson-Norton
District Manager

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List of Acronyms

ACHP	Advisory Council on Historic Preservation
ADT	Average daily trip
ATV	All-terrain vehicle
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMP	Best management practice
BPA	Bonneville Power Authority
CEQ	Council on Environmental Quality
cfs	Cubic feet per second
CO_2	Carbon dioxide
dBA	A-weighted decibels
DEQ	Oregon Department of Environmental Quality
DRC	Deschutes River Conservancy
ECSI	Environmental Cleanup Site Information
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FLPMA	Federal Land Policy and Management Act
FTE	Full-time equivalent
GAP	Gap Analysis Program
GHG	Greenhouse gas
IM	Instruction Memorandum
JEDI	Jobs and Economic Development Impact
KOP	Key Observation Point
kV	Kilovolt
MBTA	Migratory Bird Treaty Act
MET	Meteorological tower
MW	Megawatts
NEPA	National Environmental Policy Act of 1969
NFPA	National Fire Protection Association
NHPA	National Historic Preservation Act of 1966, as amended (16 USC 470)
NRCS	Natural Resource Conservation Service
NREL	National Renewable Energy Lab
NWC	Northwest Wildlife Consultants, Inc.
NWI	National Wetland Inventory
O&M	Operations and Maintenance
ODFW	Oregon Department of Fish and Wildlife
OHV	Off-highway vehicle
ORNHIC	Oregon Natural Heritage Inventory Information Center
P&H	Patrick & Henderson Inc.

PFYC	Potential Fossil Yield Classification
ROD/RMP	Record of Decision and Resource Management Plan
ROW	Right-of-way
RPM	Revolutions per minute
SCADA	Supervisory control and data acquisition
SHPO	State Historic Preservation Office
SWPPP	Stormwater Pollution Prevention Plan
TAC	Technical Advisory Committee
UDRMP	Upper Deschutes Resource Management Plan
USDOE	U.S. Department of Energy
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Service
VRI	Visual Resource Inventory
VRM	Visual Resource Management
West Butte Wind	West Butte Wind Power LLC
WGFD	Wyoming Game and Fish Department
WTG	Wind turbine generator

EXECUTIVE SUMMARY

This Executive Summary provides a synopsis of the West Butte Wind Power Right-of-Way Final Environmental Impact Statement (EIS). The Final EIS describes the Proposed Action, Connected Actions, and alternatives thereto, and discloses their impacts on elements of the environment. The Final EIS has been distributed to interested persons in hard copy format, and is available for review on the internet at http://www.blm.gov/or/districts/prineville/plans/wbw_power_row/. A Draft EIS was issued in April 2010. Changes made to the Draft EIS are reflected in this Final EIS[1].

INTRODUCTION

In December 2008, the Bureau of Land Management, Prineville District Office, Prineville, Oregon (BLM) received an application from West Butte Wind Power LLC (West Butte Wind or the Applicant) for a right-of-way (ROW) authorization to improve or construct, and operate, an access roadway and transmission line across BLM-managed public land (the Proposed Action or Project). This ROW would be part of the Applicant's proposal to construct, operate, and maintain a wind generation facility and associated facilities on private lands in Deschutes and Crook counties, Oregon (the Connected Actions).

The agency decision to be made is to grant a ROW across the federally administered lands, to grant a ROW with modifications to the Applicant's proposal, or to deny a ROW.

The BLM has formally initiated consultation with the sovereign nations of the Confederated Warm Springs Tribes, Klamath Tribe, and Burns Paiute Tribe. Consultation with these Tribal Governments is ongoing throughout the analysis.

This Final EIS is based on the environmental review and public comments on the Draft EIS. The Final EIS is an informational document, for both lead agency decision-makers and the public, regarding the environmental effects of the proposed West Butte Wind Power Project. If the decision is to grant the ROW, then BLM would identify the most appropriate location on federal lands based on consideration for land status, affected resources, resource values, and environmental conditions; decide on issuance of the requested ROW grants; and determine appropriate stipulation/mitigation requirements.

PROPOSED AND CONNECTED ACTIONS

The Proposed Action under consideration in this analysis is the BLM's authorization of a 100-foot-wide, 3.9-mile-long ROW across federally administered lands for the construction and operation of an access road and transmission line. Although a 100-foot-wide ROW is being requested, the project facilities would be limited to a corridor approximately 30 feet wide. The ROW would permanently accommodate:

- a 3.9-mile-long, 24-foot-wide permanent access road;

[1] Side bar represents new text.

- a pole-mounted 115 kV electrical transmission line (the transmission line would be constructed using single wooden poles, 50 to 53 feet high, spaced at 300-foot intervals); the transmission line would be located six feet from the edge of the access road.
- a 14.4 kV electrical utility line under-hung on the transmission line pole structures described above; and,
- a fiber optic communication line that is also located on the transmission line poles.

The construction and operation of the West Butte Wind Power Project – even those Project facilities that are located on privately owned lands – are connected, non-federal actions since they can be prevented by BLM decision-making (i.e., denying the ROW) (BLM NEPA Handbook, Section 6.5.2.1). As part of this EIS, the effects of these non-federal connected actions are considered indirect effects of the BLM action to grant a ROW and are therefore also considered.

Facilities associated with the development of the Connected Actions on private land in Crook and Deschutes counties include 34 to 52 wind turbines, underground and overhead electric collector lines, substation, transmission line, switchyard, turbine access roads, operation and maintenance (O&M) facility, and up to three meteorological towers.

In addition to the Proposed and Connected Action (Alternative 1), this EIS considered two other alternatives. Alternative 2 is the Northern Access Road Alternative which would provide access to the Connected Action facilities in Crook County from the north from Reservoir Road rather than from the south from Highway 20. This would include a new location for the O&M facility to the north of West Butte. Alternative 2 would still include the proposed transmission line route and other Connected Action facilities. Alternative 3 is the No Action Alternative, where BLM would not grant a ROW to West Butte Wind.

SCOPING

Public and agency scoping was conducted to determine issues relative to the Proposed Action. A scoping notice and informational materials were mailed to potentially interested parties beginning in September 2009. BLM evaluated all scoping comments to identify key issues. The following issues were identified for analysis in the EIS: potential project impacts on vegetation, the green-tinged paintbrush and its habitat, Oregon Sensitive Plant Species, and the spread of noxious weeds; potential project impacts on migratory birds and bats, sage grouse and their habitat, and raptors and their nests; potential project impacts on general wildlife and wildlife habitat, big game habitat, and pygmy rabbits and habitat; potential noise impacts on wildlife; potential effects of a decrease in miles available for recreational routes within the Millican Valley OHV Recreation Area and potential noise impacts on recreational users; potential visual/aesthetic impacts, including glare/light pollution from turbine lighting; potential project impacts on sensitive archaeological resources and properties listed on the National Register of Historic Places; potential project impacts on areas valuable to Native Americans; and potential social and economic effects of the Project to communities

(community facilities and services, local development, jobs, and tax revenues) and landowners (noise and visual impacts, property value).

While a number of other issues were raised during the internal and external scoping process, not all of them warranted detailed analysis in the EIS to make a reasoned choice between alternatives or to determine the significance of impacts. The following is a list of the issues not analyzed or considered further in the EIS: geology and geohazards; paleontological resources; farmland (prime or unique); wastes (hazardous or solid); Wild and Scenic Rivers; wetlands; fish; air quality; livestock grazing; wilderness characteristics; and human health and safety.

ALTERNATIVES

This EIS analyses the following three alternatives:

- Alternative 1 – Proposed Action and Connected Actions: Alternative 1 is the BLM's preferred alternative. This alternative includes the Proposed Action of granting a ROW for construction and operation of an access road and transmission line across lands administered by the BLM. Consideration of this alternative includes an analysis of the Connected Action of West Butte Wind constructing and operating a wind farm and associated facilities (e.g., access road, transmission line, substation, O&M building) on privately held lands.
- Alternative 2 – Northern Access Road Alternative and Connected Actions: Consideration of this alternative includes an analysis of a main access route through the Juniper Acres Development, the facilities related to the Connected Action as described in Alternative 1 related to construction of a wind generation facility and its accessory facilities, and a ROW through BLM-administered public land for a 3.9-mile transmission line.
- Alternative 3 – No Action Alternative: This alternative would deny a ROW for construction and operation.

The EIS has rigorously explored and objectively evaluated all reasonable alternatives as described above. Each alternative was evaluated for potential temporary and permanent impacts to soils, water quality and quantity, vegetation, wildlife, special status species, recreation, visual resources, cultural and tribal resources, socioeconomics, and climate change. Alternative 3 would not result in a change to the existing conditions of any of the resources present and is therefore not discussed in the following sections.

ENVIRONMENTAL IMPACTS

Soils

Construction of Alternative 1 would increase the potential for soil erosion from wind and water. Soil disturbance would result from site clearing, excavation activities, and access road construction/grading. Approximately 224 acres of soil would be temporarily disturbed by construction of Alternative 1. Of this, approximately 81 acres would be permanently impacted by installation of Project facilities.

Soil impacts due to Alternative 2 would be similar to those of Alternative 1. Approximately 223 acres of soil would be temporarily disturbed by construction of Alternative 2. Of this, approximately 80 acres would be permanently impacted by installation of Project facilities. The Applicant would implement design features to minimize soil erosion and disturbance during construction, and would revegetate temporarily disturbed areas.

Facilities would not be built under the No Action Alternative. Over the past 100 years, soil resources in the region have been used to support vegetation consumed by grazing activities. This would remain the primary use of soils for the reasonably foreseeable future and would account for impacts under the No Action Alternative.

Water Quality and Quantity

Surface Water

Both Alternatives 1 and 2 have the potential to impact existing drainages and downstream watercourses. Impacts may include increased runoff, sedimentation, and alterations to peak flow rates. The access road for Alternative 1 would cross 10 drainages (10 intermittent/ephemeral); the access road for Alternative 2 would cross 11 drainages (1 perennial, 3 ephemeral, and 7 intermittent).

Ground Water

The impacts of Alternatives 1 and 2 would be similar. Of the estimated 9.8 million gallons of water needed over an eight-month period, a majority would be associated with construction of the Connected Action. Up to 30,000 gallons of water would be needed per day for dust control of which a portion would be used for the Proposed Action.

The water withdrawals associated with the Project would represent a very small fraction of all withdrawals in the Upper Deschutes Basin; they would not have any discernible effect on surface waters in the basin.

Location of project facilities would not impede any recharge to the water basin located in the area. Therefore, operation of the Project would not impact groundwater quantities or groundwater quality in that area.

No facilities would be built under the No Action Alternative and no additional impacts on water resources would result. Use of water resources under this alternative would primarily support grazing activities on BLM-managed land and possible future residential development on private land.

Vegetation

Direct impacts on vegetation would include temporary and permanent vegetative loss associated with the construction, operation, and maintenance of Alternatives 1 and 2. Alternative 2 would result in about 9 acres less permanent impact on vegetation on BLM administered lands than Alternative 1. The total permanent vegetation impacts, when considering both private and public lands, would be similar between Alternative 1 and 2.

The impacts of removing vegetation would include a (temporary or permanent) reduction in evapotranspiration, water uptake, and soil stabilization which would lead to increased water runoff and erosion. Routine maintenance of the access road and turbine pads would include mowing grasses or removing shrubs and trees around the immediate periphery of these facilities

Any ground-disturbing or construction activity has the potential to further propagate invasive plant species populations in the location of Project and the surroundings, either through introduction from other areas, or natural propagation.

No facilities would be built under the No Action Alternative. Wildlife use, continued livestock grazing, recreation in accordance with approved management plans on BLM-managed lands and prescribed burns may impact vegetation under the No Action Alternative. On BLM-managed lands, grazing is expected to continue as the primary land use. Future residential developments on private lands may also impact vegetation.

Wildlife

Both direct and indirect effects could occur to wildlife species as a result of Alternatives 1 and 2. Generally, the effects described below would be similar for both alternatives, although Alternative 2 could lead to greater fragmentation impacts because of more miles of road construction and road and transmission facilities being located in separate corridors.

Displacement is a temporary effect during construction. Disturbance of habitat may cause the displacement of species. Disturbance would be limited to the duration of construction activities. Operation activity can also cause localized displacement, including operation noise. Habitat fragmentation could also lead to changes in bird behaviors that are dependent on specific vegetative types. The permanent removal of a specific habitat in a location of Alternative 1 or 2 would lead to birds being displaced to a similar habitat elsewhere.

Long-term habitat impacts would result from permanent changes to vegetation structure. Permanent structures and non-natural ground cover would convert many habitats to early seral vegetation stages. Generally, the effects of habitat shifts on bird species would be minimized because the alternatives have been carefully sited. Temporary impacts on sagebrush (low and big) habitat due to construction would be more short-term than the impacts on forest lands, but regeneration of these areas would still take approximately 10 to 30 years.

Land clearing to establish permanent facilities may result in habitat discontinuity or fragmentation of surrounding areas. The amount of habitat that would be physically disturbed by construction would be limited to the Project footprint. In some situations, habitat fragmentation can have negative effects on species, causing individuals to crowd into remaining patches of habitat or not use available habitat due to the fragmentation. This can lead to increased competition for nesting habitat, breeding habitat, and food resources. Sage grouse is one species occurring in the Project Area that could be sensitive to habitat fragmentation.

Noise during the construction phase can be generated by site clearing/excavation, construction of facilities, mechanical, and cleanup activities. Research has shown that noise may affect territory selection, territorial defense, dispersal, foraging success, fledging success, and song learning. Sporadic noise associated with heavy equipment, blasting, and construction may cause species to abandon areas directly adjacent to construction, alter use patterns to access habitat when construction would not be occurring, or cause increased energy expenditure.

Bird use of the direct construction area would be reduced because birds would be temporarily displaced due to construction activities, thereby reducing the potential for exposure.

The Alternative 1 Proposed Action and Northern Access Alternative, resulting in construction and operation of an access road and transmission line, would not likely result in adverse impacts to individual bats or bat populations. The Connected Actions, including construction and operation of WTGs on private lands could lead to the direct mortality or injury of birds and bats due to collisions, either during migration or during movement of resident species. Direct impacts from construction activity, such as mortality from collisions with construction vehicles, is expected to be low and of short duration.

The amount of habitat that would be directly physically disturbed by construction would be limited to the Project footprint. This area would include the loss of winter range habitats for pronghorn, mule deer, and elk, and habitat mapped in the Upper Deschutes RMP as having a primary wildlife emphasis.

Temporary disturbance to the normal behavior of big game is to be expected during construction of this project due of the influx of humans, heavy construction equipment, and associated construction disturbance.

Direct habitat modifications are not expected to fragment or impact movement of big game in the project area. There would be no long, linear fences installed as part of Alternative 1 or 2 that could interfere with pronghorn or mule deer movements (only fencing around individual structures such as the O&M building and project substation).

The Proposed, Connected, and Alternative Actions are not expected to adversely impact reptile or amphibian populations.

There would be no new facilities built or other activities under the No Action Alternative. As such, there would be no change – either positive or negative – to wildlife or wildlife habitats under this alternative.

Special Status Species

General direct and indirect effects on threatened and endangered species are similar to those listed above in the Wildlife section. The following impacts were identified to specific special status species present in the Project Area:

Greater Sage Grouse: The Project could potentially fragment sage grouse habitat in the Project Area through:

- permanent removal and/or alternations of sage brush habitats;
- construction and operation noise and related human disturbances; and
- installation of tall structures (i.e., transmission poles, wind turbines, and meteorological towers) in currently occupied habitats.

While quantification of specific impacts are difficult based on currently available information, it is anticipated that the Connected Action could lead to the gradual displacement of sage grouse from portions of the Project Area. Over time, this could include reductions in lek attendance and/or nesting on West Butte. To compensate for these potential impacts, West Butte Wind is proposing to monitor sage grouse use of the area and, if necessary, implement several compensatory mitigation measures to help offsite these potential impacts. These mitigation measures include establishment of conservation easements to protect habitat from further development in the Project Area, implementation of a Juniper Tree Management Program to enhance potential sage grouse habitats in the area, and financial support for off-site habitat enhancement and protection efforts.

Pygmy Rabbits: Impacts to pygmy rabbits could occur as a result of the Project due to the presence of this species in the area of construction. Due to the limited number of rabbits that appear to inhabit the area and the general habitat condition of the butte (slopes and shallow soils), it is expected Project impacts would be limited to no more than a few individuals – a level of impact that would not have a measurable impact on the locally breeding population.

Northern Sagebrush Lizard: Impacts to this species are expected to be minimal and localized in nature. Some individual lizards could be crushed by project equipment during the construction process. No long-term population level effects are expected as a result of this project.

Green-tinged paintbrush: Construction of roads and turbine platforms would result in the temporary disturbance of about one percent and the permanent removal of about one percent of the habitat occupied by this species on West Butte. It does not appear likely that approving the Project would lead to population level impacts of this species in the area and would not cause the listing of the green-tinged paintbrush as a federal threatened or endangered species.

No facilities would be built under No Action Alternative, and therefore there would be no effect on special status species.

Recreation

Construction of Alternative 1 would involve improvement of 3.65 miles of existing road and the construction of a quarter mile of new road to access the Connected Action area. Improvements to the 3.65 miles of existing road would decrease the amount of rugged trail miles available for OHV use. Users may also feel that this segment of road may lose some of its rural quality by nature of the road surface being improved. Rather than using the access road for a challenging riding experience, however, OHV users may travel the access road out of curiosity and create unauthorized trails off the road. Additionally, the quarter-mile of new road would reduce the overall amount of trail miles available for OHV use. Although under

Alternative 2 a transmission line would still be constructed, it would not involve improvement of the access road on BLM-managed lands.

For public safety reasons, access to the construction areas on BLM-managed public land would be restricted during the construction of the facilities associated with the proposed and Connected Actions. The quality of hunting or other recreational use of the BLM-managed public land would be minimally affected by the Project during construction and not affected as a result of operation of the wind energy project. However, under Alternative 1, improved access to public lands along the access road may result in more hunters in the area thereby decreasing big game hunting opportunities.

Under the No Action Alternative, the facility would not be constructed and there would be no change to existing recreational uses within the proposed Project Area or its vicinity.

Visual Resources

Construction of the project, including equipment movement, activities associated with road improvements, installation of new overhead power lines, and wind turbine installation, could temporarily impact the visual quality of the landscape. Both Alternatives 1 and 2 would have similar impact. However, construction of an access road and utility line to the proposed wind farm from the north (Alternative 2) would create a new linear feature on the landscape that might be more visible toward and from the north slopes of West Butte and in the previously undeveloped area. West Butte Wind would reduce visual impacts during construction of the project by minimizing areas of surface disturbance, controlling erosion, using dust suppression techniques, and restoring exposed soils as closely as possible to their original contour and vegetation.

The Alternative 1 Proposed Action would result in no or weak visual contrast in the landscape as determined through site reconnaissance and visual simulations. Under Alternative 2, the road and utility line could create a weak to moderate visual contrast in the landscape. Project facilities associated with the Alternative 1 Proposed Action and Alternative 2 would be consistent with the Visual Resource Management Class 3 and 4 objectives.

Under both Alternatives 1 and 2, the wind turbines would be the most visible feature of the Connected Action facilities given the structure height and rotation of moving blades. Construction and operation of the Connected Action, especially the wind turbines, would result in minimal to moderate disruption to the scenic quality of the existing landscape, depending on the location of the viewer and the wind turbine(s).

Under the No Action Alternative, no impacts to current visual conditions would occur without the influence of the Project.

Cultural Resources

No previously recorded archaeological resources were found during 2009 surveys in areas that would be affected by construction or operation of Alternative 1. Archeological surveys of the 6-mile existing access road crossing BLM managed property and the access road

alignments and WTG locations as presently defined for the Project, as well as the associated temporary storage yards, O&M building, and substation proposed on private land were completed by West Butte Wind Power. These surveys identified archeological isolates and sites, and historic features. No prehistoric features were identified. There is a historic Prineville to Lakeview Wagon Road within the vicinity of the Project. Remnant road beds exist in portions of BLM administered property. Segments of the historic wagon road may overlap with the project footprint.

A systematic pedestrian survey of selected locations was performed on May 20-21, 2010. This survey supplemented the Fall 2009 survey and addressed changes in turbine placement and access road alignment being considered to avoid archaeological resources identified in the 2009 field investigations (Ellis 2010). The previously proposed access road would have impacted two archaeological sites (field numbers 09-13/21 and 09/13/22). The May 2010 survey included an alternative access road alignment across Section 27, which would avoid potential effects to these two sites. The May 2010 survey did not identify any evidence of archaeological or historical resources along the proposed realignment. Thirty-four lithic scatter sites were found on private property. The majority of these sites will be avoided by minor relocation of turbines and roads. The Applicant is working with BLM and Oregon SHPO to develop a comprehensive cultural mitigation plan.

No field surveys or database searches have been conducted to identify the existence of archeological sites, historic structures, or other cultural resources in the Area of Potential Effect associated with Alternative 2.

Under the No Action Alternative, the Project would not be built. Future actions on BLM-managed lands that are approved or currently under review include grazing, recreational use in accordance with general management plans, right-of-way easements for utility and transportation corridors, and prescribed burns to reduce fuels and wildfire intensity. These actions would continue under the No Action Alternative, as well as Alternatives 1 and 2.

The amount of land in the Project vicinity currently used for grazing and the longevity of the grazing leases on BLM-managed land indicates that grazing is envisioned to continue as the primary land use. These actions may result in impacts to cultural resources under any alternative evaluated in this EIS. Future residential development on private land may also impact cultural resources.

Socioeconomic/Environmental Justice

Socioeconomic impacts of Alternative 1 and 2 would be identical. Construction and operation of the West Butte Wind Power Project is anticipated to bring employment opportunities to the State. During the construction period, the project would generate approximately 70 direct fulltime equivalent (FTE) positions, 345 indirect FTE positions through the purchase of materials and offsite services, and 143 induced FTE positions through direct and indirect employee purchases of goods and services. For operation and maintenance of the facility, the project would annually generate approximately 6 FTE permanent positions, 9 indirect FTE positions, and 8 induced FTE positions. The cities of

Bend, Redmond, and Prineville Positions could accommodate the minor increase in the need for short-term housing, goods, services, and community facilities from workers not living in the area.

Increased employment and subsequent consumer spending would result in a direct and indirect tax impact, including state and federal income taxes, property taxes paid by West Butte Wind, and both federal and state corporate income taxes paid on taxable revenues of the Project. Taxes paid by the landowner on royalty income from the property lease would also contribute to local, state, and federal tax revenues.

During construction, individuals who reside in or near the Project Area are likely to experience construction noise, visual impacts from construction equipment, and restricted access to some areas of private land typically used for recreation. Some individuals in the project area may also experience visual impacts from long-term project operation.

Given the results of the numerous studies cited in the document, the Project would not be expected to adversely affect property values. Although, under Alternative 2, a portion of 64 parcels would be converted from the existing use to Project-related use. These easements would not affect existing land use on the majority of the affected parcels and future land use development patterns in the area would remain unchanged. Affected landowners would be provided with financial compensation; however, the acquisitions and conversion to Project-related use would result in a reduction of the land available for the existing use.

There are no environmental justice concerns for the Project.

Under the No Action Alternative, the Project would not be built. Economic benefits associated with increased employment, multiplier effects from employment spending, and taxes for local, state, and federal governments would not be realized. There would be no change to existing residential uses within the Project Area or its vicinity. Future developments could occur with local zoning (private lands) and federal policy (BLM-administered lands).

Greenhouse Gas Emissions

A recent report by the National Research Council (2007) concluded that development of wind-powered electricity generation will probably contribute to offsets of about 4.5 percent in emissions of carbon dioxide from other electricity generation sources in the U.S. by the year 2020. Project construction would produce minor greenhouse gas emissions as a result of the operation of construction equipment, worker vehicles, and trucks transporting equipment, parts, and materials. These emissions would be temporary and short term.

Under the No Action Alternative there would be no Project-related construction or operation and therefore, no impacts or changes to greenhouse gas emissions as a result of the Project.

Cumulative Impacts

Based on the analysis of direct and indirect effects, the cumulative impacts analysis considers the cumulative effects of Alternatives 1 and 2 to be the same, unless noted otherwise, and

refers to them collectively as the proposed Project. The analysis of direct and indirect effects of Alternatives 1 and 2 reveals that these actions could affect vegetation and wildlife, recreation, visual resources, and socioeconomics. These effects, combined with the past and present actions (represented by the affected environment) and reasonably foreseeable future actions (grazing, recreational use, rights-of-way easements for utility and transportations corridors, and prescribed burns), could create a cumulative effect on these resources.

Under the No Action Alternative, the reasonably foreseeable future actions in the Project Area and vicinity (grazing, recreational use, rights-of-way easements for utility and transportations corridors, and prescribed burns) would continue to affect vegetation and wildlife, recreation, visual resources, cultural resources, and socioeconomics to the same extent these resources are being affected now. No additional adverse impact would occur for any of these resources to create a cumulative effect. Land management practices by BLM and the U.S. Forest Service continue to be reviewed by federal staff to determine best practices for sustainability of environmental resources on federal lands in the Project Area; however, no change to current practices is reasonably foreseeable.

Mitigation Measures

Mitigation measures are actions that could reduce, avoid, or compensate for effects of the proposed alternatives. Actions are only termed mitigation measures if they have not been incorporated into the Proposed Action or Alternatives. If mitigation measures are incorporated into the Proposed Action or Alternatives, they are called design features, not mitigation measures. A large number of "mitigations" have already been agreed to by the Applicant and incorporated into the design features of the Alternatives. For example, to limit effects on birds and bats, the company agreed to bury 90 percent of the electric collector lines between turbines, and to install raptor protection devices on all overhead electric transmission lines.

While BLM's decision could include any of the listed mitigation measures in Chapters 2 and 3 (by making their completion a condition of the right-of-way grant), the implementation and monitoring of most of them are beyond BLM's jurisdiction. Most of the onsite measures (e.g., turbine modifications) would fall under the authority of Crook County, where most of the Project would be constructed. Most of the offsite mitigation (e.g., conservation easements) would occur in and be overseen by Crook or Deschutes County. A few of the measures would involve federal, state or county land or a combination (e.g., noxious weed control and juniper cuts).

Crook County granted the Applicant a permit for the Project, but has said the Project will be subject to a mitigation package to be determined by a Technical Advisory Council (TAC). The TAC, chartered and overseen by the county, is comprised of representatives from Crook County, USFWS, ODFW, BLM, Oregon Natural Desert Association, the Applicant, and the owner of the Project land. The TAC has begun discussions but has not finalized a mitigation plan at this date. The Applicant has indicated it intends to fund several mitigation measures.

Probability of Implementation

Council on Environmental Quality regulations (1505.3) require BLM to "provide for monitoring to assure that their decisions are carried out," and discuss the probability of other jurisdictions implementing mitigations adopted in the decision.

A limiting factor in whether or not mitigation will occur is cost for planning, installation, maintenance and monitoring. Each of the mitigations would involve a cost, some rather minor (wildlife water sources and associated exclosure fencing and maintenance could be just a few thousand each) and others quite high (burying transmission lines would cost two million per mile more than overhead lines).

Since BLM does not receive any additional funding to cover mitigation for externally generated projects, most of the funding for mitigation for this Project would need to come from other sources. The County or the Applicant (perhaps through the TAC) may be able to apply for grants for some actions. Crook County may earmark some of the tax revenues from this Project towards mitigation. The Applicant has offered to cut juniper onsite (they have not specified a number of acres). The company has also offered to fund other mitigations for up to $50,000 annually for five years if (and only if) monitoring indicates the Project causes sage grouse to cease all breeding activity within the Project Area. While this EIS indicates the lek may be abandoned, it does not indicate all breeding activity is likely to be curtailed. The company has not offered to fund the sage grouse monitoring that this funding is contingent upon (assumed cost of $25,000 first year and $5,000 each subsequent year). The Applicant has offered to install wildlife watering stations on private land in the Project Area, but these are not listed in the table below as water is not limiting within the Project Area. The company has agreed to pay for decommissioning costs (hundreds of thousands of dollars). The Applicant has not agreed to limit turbine cut in speeds, modify turbine layout to avoid areas within 1 mile of leks, bury more electrical lines than already specified in Alternatives 1 and 2, fund conservation easements (unless sage grouse cease all breeding in the Project Area) (assumed cost $1,000 per acre for 30 year term), fund an avian or bat monitoring study (assumed cost $40,000 initially, unless developed by TAC, and $10,000 annually), or fund weed treatments offsite (assumed cost $250 per acre).

To summarize the probability of implementation of mitigation: BLM assumes that Project decommissioning (and monitoring of decommissioning) will be a condition of the right of way grant and covered by a bond paid for by the Applicant, and therefore this mitigation will occur. The BLM assumes that the Applicant will complete 100 acres of onsite juniper control on private land within the Project Area. The BLM assumes Crook County will earmark a portion of tax revenue from the Project toward mitigation (assuming this amounts to about $10,000 annually, this would cover 40 acres of weed treatment annually, or the purchase of one 300 acre conservation easement during the life of the Project). The remaining mitigations are unlikely to occur.

Chapter 1 PURPOSE AND NEED

1.1 INTRODUCTION

West Butte Wind Power LLC (West Butte Wind or the Applicant) is proposing to construct, operate, and maintain a wind energy generation facility in Deschutes and Crook counties, Oregon. The West Butte Wind Power Project would consist of 34 to 52 wind turbine generators (WTGs), their associated access roads, up to three meteorological towers, a substation, an operations and maintenance (O&M) facility, underground and overhead collector lines to transmit the generated energy to the substation, and a transmission line to transmit the energy from the Project substation to a switchyard, the point of interconnection at an existing Bonneville Power Authority (BPA) transmission line. The type of turbine proposed would be 2.0 to 3.0 megawatts (MW) in size, providing a maximum of 104 MW of generating capacity for the entire Project. The Project Area is located about 32 miles east of the city of Bend and 30 miles south of the city of Prineville, north of Oregon State Highway 20 (see Figure 1-1).

A majority of the Project would be located on private lands. However, a portion of a Project access road and transmission line would cross public lands administered by the Bureau of Land Management (BLM), Prineville District. The portion of the Project on public lands is the "Proposed Action." Because the private lands under consideration for the Project are surrounded by BLM-managed public land, a right-of-way (ROW) must be secured across BLM-managed public land to construct and operate the wind energy Project. As such, construction and operation of the portions of the Project on private lands are considered Connected Actions to BLM's decision regarding the proposed ROW.

The "Project Area" is composed of private and public property on which, and adjacent to which, the Proposed and Connected Actions (Alternative 1) or the Northern Access Road and Connected Actions (Alternative 2) would be located.

1.1.1 Proposed Action

The Proposed Action under consideration in this analysis is BLM's authorization of a 100-foot-wide, 3.9-mile-long ROW across federally administered lands for the construction and operation of an access road and transmission line. Although a 100-foot-wide ROW is being requested, the Project facilities will be limited to a corridor approximately 30 feet wide. The ROW would permanently accommodate:

- a 3.9-mile-long, 24-foot-wide permanent access road;
- a pole-mounted 115 kilovolt (kV) electrical transmission line, constructed using single wooden poles, 50 to 53 feet high, spaced at 300-foot intervals, located 6 feet from the edge of the access road;
- a 14.4 kV electrical utility line under-hung on the transmission line pole structures described above; and,
- a fiber optic communication line that would also be located on the transmission line poles.

Chapter 2 provides additional information on activities on federal lands that are part of the Proposed Action.

1.1.2 Connected Actions

Facilities associated with the development of the Connected Actions on private land in Crook and Deschutes counties include: 34 to 52 wind turbines, underground and overhead electric collector lines, substation, transmission line, switchyard, turbine access roads, O&M facility, and up to three meteorological towers. Chapter 2 provides additional information on the Connected Actions.

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of BLM's action is to respond to West Butte Wind's application for use of BLM-administered lands for a new utility and road ROW. Specifically, BLM will decide whether to grant, grant with conditions, or deny the application for a new ROW. Pursuant to 43 CFR § 2805.10, if BLM issues a grant, the BLM decision maker may include terms, conditions, and stipulations which she or he determines to be in the public interest. This includes modifying the proposed use or changing the route or location of the facilities on public land. The need for BLM's Proposed Action, to respond to the utility ROW application, arises from the Federal Land Policy and Management Act (FLPMA) of 1976, which establishes a multiple use mandate for management of federal lands, including energy generation and transmission facilities as outlined in 43 CFR 2800. Pursuant to 43 CFR § 2801.2, it is BLM's objective to grant ROWs and to control their use on public lands in a manner that: (a) protects the natural resources associated with public lands and adjacent lands, whether private or administered by a government entity; (b) prevents unnecessary or undue degradation to public lands; (c) promotes the use of ROWs in common, considering engineering and technological compatibility, national security, and land use plans; and (d) coordinates, to the fullest extent possible, all BLM actions under the regulations in this part with state and local governments, interested individuals, and appropriate quasi-public entities.

1.3 AGENCY DECISION TO BE MADE

The decision to be made by BLM is to grant a ROW across the federally administered lands, to grant a ROW with modifications to the Applicant's proposal, or to deny a ROW.

1.4 PUBLIC AND AGENCY INVOLVEMENT

1.4.1 Public Scoping and Issues Identification

The BLM must complete an environmental review of the effects of the Proposed Action and Alternatives, including the Connected Actions (see Section 1.1.2), to inform the public and assist in making a decision on the ROW application. The BLM has determined that preparation of an Environmental Impact Statement (EIS) is the appropriate level of review.

As described in Section 4.2.1, BLM completed a public scoping process to solicit input to identify issues, impacts, and potential alternatives to be addressed in the environmental

review. A Draft EIS was issued in April 2010. Changes made to the Draft EIS are reflected in this Final EIS[1].

The BLM used early public input to identify issues to be addressed in the EIS. Per Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (Title 40, CFR 1500-1508), issues point to environmental effects; as such, issues can help shape the proposal and alternatives. Issues may lead to the identification of design features or mitigation measures that can be incorporated into the Proposed Action. Included in Table 1.4-1 is a list of issues to be addressed in the EIS.

Table 1.4-1: Environmental Issues Identified During the Scoping Process

Environmental Issues	EIS Section where Issue is Addressed
Vegetation	
Potential project impacts on vegetation Potential project impacts to green-tinged paintbrush and the plant's habitat Potential project impacts to Oregon Sensitive Plant Species Potential spread of noxious weeds	3.4. 3.5. and 3.6
Wildlife/Habitat	
Potential project impacts on migratory birds and bats Potential project impacts on sage grouse and habitat Potential project impacts on big game habitat Potential project impacts on raptors and raptor nests Potential project impacts on pygmy rabbits and habitat Potential project impacts on general wildlife habitat Potential noise impacts on wildlife	3.5 and 3.6
Recreation	
Potential impacts on recreational users resulting from a decrease in miles available for recreational routes within the Millican Valley OHV Recreation Area Potential noise impacts on recreational users	3.7
Visual Resources	
Potential visual/aesthetic impacts, including glare/light pollution from turbine lighting	3.8
Cultural and Tribal Resources	
Potential project impacts on sensitive archaeological resources and properties listed on the National Register of Historic Places Potential project impacts on areas valuable to Native Americans	3.9
Socioeconomics	

[1] Side bar represents new text.

Environmental Issues	EIS Section where Issue is Addressed
Potential social and economic effects of project to communities (community facilities and services, local development, jobs, and tax revenues) and landowners (noise and visual impacts, property value)	3.10

1.4.2 Issues Not Analyzed

While a number of other issues were raised during the internal and external scoping process, not all of them warranted detailed analysis in the EIS to make a reasoned choice between alternatives or to determine the significance of impacts. Included below is a list of the issues not analyzed or considered further in the EIS. The Applicant has made a commitment to implement design features that would minimize or eliminate impacts on many of the resources discussed below. As described in the introduction to Chapter 2, these design features would be implemented by West Butte Wind in both Alternative 1 and 2.

Geology and Geohazards

Prior to construction, geotechnical testing would be completed at each of the proposed turbine foundation sites. If faults are detected, foundation design changes or relocation of the turbines would prevent any potential adverse impacts. The Project would be located in areas that are primarily composed of volcanic substrate and not subject to karst features such as sinkholes, depressions, large ground cracks with rotating blocks of rock, enlarged joints and fractures, and/or internally drained basins. Prior to construction, site specific geotechnical surveys would be conducted at the sites of WTGs to determine the best suited foundation types for the subsurface ground conditions present. The Upper Deschutes Resource Management Plan (RMP) Map 8: Minerals (BLM, 2005a) shows that there are BLM-administered lands in the vicinity of the Project that are open to mineral material mining and mineral leasing. However, the geological formations of West Butte and surrounding area are not known to contain ores. A mineral potential map by the U.S. Geological Service (USGS) (2002) shows no known potential for locatable minerals such as gold, silver, or copper in the Project Area. Additionally, review of BLM records shows no active federal mining claims within the Project Area.

As described in Chapter 2, West Butte Wind is proposing to conduct site-specific geotechnical surveys prior to construction of facilities, design roads and foundations according to established engineering practices for site safety and erosion prevention, vegetate temporarily disturbed land, and implement erosion controls through implementation of a Stormwater Pollution Prevention Plan (SWPPP) as required by the construction stormwater permit.

Paleontological Resources

The BLM Paleontological Resource Management (1998a and b) and BLM Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands (2007) were used to assess the probability of occurrence and the level of importance of fossils in the

Project Area. As described in more detail in Section 3.2, exposed geologic units in the Project Area are Neogene volcanic rock. This igneous rock structure is unlikely to contain significant vertebrate fossils. Based on this information, land within the Project Area is classified as Condition 3 – having no known occurrences of significant fossil deposits. The probability for impacting any fossils is therefore negligible.

Farmland (Prime or Unique)

Review of the Natural Resource Conservation Service Soil Survey indicated that there are no designated prime or unique farmlands in the Project Area.

Wastes (Hazardous or Solid)

In August 2009, HDR Engineering, Inc. reviewed the DEQ Environmental Cleanup Site Information (ECSI) database and aerial imagery to identify potential hazardous or solid waste sites at the wind farm site and a 0.5-mile buffer surrounding the access road and transmission line. Hazardous materials that may occur in the area are those associated with ranching or agricultural operations including individual supplies of fuel, lubricants, pesticides, herbicides, and agricultural chemicals. Construction, operation, and decommissioning activities associated with the Project Area would require the use of some hazardous materials, although the variety and amounts of hazardous materials present during operation would be minimal. Types of hazardous materials that would be used include fuels (e.g., gasoline, diesel fuel), coolants, lubricants, cleaning solvents, adhesives, paint and paint thinners, concrete form-release agents, and explosives. With the implementation of the design features related to storage of hazardous materials and appropriate disposal of waste (described in Appendix B), the impacts associated with hazardous materials and wastes are expected to be negligible to nonexistent.

Wild and Scenic Rivers

Review of the Upper Deschutes RMP indicated that there are no federally designated Wild and Scenic Rivers in the vicinity of the Project Area.

Wetlands

A review of National Wetland Inventory (NWI) maps identified approximately 15 acres of NWI wetlands within the Project Area (NWI, 2009). Construction and operation of the proposed facilities is not going to occur in or near these wetland features. Impacts to wetlands would therefore not occur as a result of the implementation of the actions described in this EIS. Design features would be implemented to protect water quality and sensitive habitats as described in Chapter 2 and Appendix B.

Fish

There is very little aquatic habitat in the Project Area. There is a seasonal pond and several intermittent streams. Of those, only Williamson Creek, which drains to the north from West Butte, has aquatic/emergent vegetation and may provide fish habitat. The WTGs, Project substation, O&M facility, and collector lines would avoid direct impacts on the pond and streams. None of the Project Alternatives would cross Williamson Creek. Access road

crossings of intermittent streams would be designed to utilize existing crossings whenever feasible, and would be engineered so runoff from the upper portions of the watershed can flow unrestricted to the lower portion of the watershed, therefore avoiding downstream impacts on fishery habitat. Indirect impacts would be avoided by using standard water and soil conservation practices during construction and operation of the Project to protect topsoil and minimize soil erosion. Therefore, impacts to fishery resources would not occur as a result of the implementation of the actions described in this EIS.

Air Quality

Under typical conditions and with appropriate design features, construction, operation, or decommissioning of a wind energy facility is not likely to result in adverse air quality impacts (BLM, 2005b). The background air quality in the vicinity of the Project Area was rated as "good" or "moderate" on 44 of the 49 days reported (90 percent) by the Oregon Department of Environmental Quality (DEQ, 2009). None of the alternatives contain actions that would constitute a source of regulated pollutants. Temporary and localized increases in pollutant concentrations would occur during the construction phase of Alternative 1 or 2. These would consist of tailpipe emissions from construction equipment exhaust, fugitive dust emissions from vehicular traffic, and fugitive dust emissions from soil and rock disturbances.

These emissions would vary with time of day and construction activity. During Project operation or decommissioning, vehicle travel and maintenance activities might generate minor tailpipe emissions and fugitive dust, but these activities would be limited in extent and should have no appreciable air quality impacts (i.e., measurable, but not triggering significance criteria). As described in Chapter 2, West Butte Wind would implement design features to minimize construction and operational emissions, including dust emissions from activities on the Project site. With these design features, impacts to air quality would be negligible.

Livestock Grazing

One of the primary uses in the Project Area is livestock grazing. The Project Area is located within the West Butte BLM-grazing allotment (#5231), which extends to the north, south, and east. The West Butte allotment permit is valid until February 2016 (BLM, 2009). There are 25,160 acres in the allotment area; 17,879 acres are BLM and 7,281 acres are private. A corral and cattle troughs have been constructed on the private land to support grazing operations. The allotment uses a five-pasture rotation with an additional north pasture, which is located on primarily private land, used late each year. Properties to the north and south consist of private grazing lands. Land to the east includes the Williamson Creek and Millican grazing allotments.

The private landowner will continue to coordinate grazing activities with BLM every year as currently required under the grazing lease. Grazing practices would remain the same over the long term in the Project Area, but cattle would likely be removed from pastures adjacent to construction activities during the Project construction period. Adverse impacts to grazing are not expected to occur.

Wilderness Characteristics

The existence of wilderness character outside Wilderness Areas and Wilderness Study Areas is often an issue raised in project analyses. Wilderness characteristics include: naturalness, outstanding opportunities for solitude, and outstanding opportunities for primitive and unconfined recreation. These characteristics must be present in a roadless area of at least 5,000 acres, or a smaller roadless area that is of sufficient size to make practical its preservation in an unimpaired condition (Wilderness Act of 1964 (16 U.S. C. 1131-1136), Section 2c). The size of the roadless area is a critical factor in the determination of the presence or absence of individual wilderness characteristics. If the size requirement is not met, then the area cannot be considered to possess wilderness characteristics, since such characteristics are dependent on the sufficient size of the roadless area.

The Project Area is located in the North Millican Valley Off-Highway Vehicle (OHV) Recreation Area, where OHV use is allowed on existing roads and trails year-round. Because of the presence of roads, the area does not meet the requirements of naturalness and outstanding opportunities for solitude and for primitive and unconfined recreation. BLM has made a determination that no wilderness values exist in the area affected by the proposal. Impacts to wilderness character will, therefore, not be further evaluated (BLM, 2010a).

Human Health and Safety

The Project Area is located in a very sparsely populated rural area in east-central Oregon. A ranch worker residence and the Juniper Acres subdivision are located within the Project Area. There are no public gathering areas located on the public or private lands where the Project facilities are proposed to be located. Because much of the Project Area is located in a semi-arid region, wildfire is the primary existing non-occupational health and safety risk.

Predominant land use activities in the area include livestock grazing, recreation, and vehicle use of public roadways. An established transportation and utility network provides access and necessary services to light industry, small cities, and residences in the region. The closest communities are Alfalfa, Bend, and Prineville, located more than 30 miles from the Project boundaries. Highway 20 will be used to access the Project site.

Evaluation of health and safety issues was limited to the Project Area and specifically focused on the construction and operation activities associated with the Project. Safety hazards during construction, operation, and maintenance of wind energy development projects and related facilities may include risks associated with occupational hazards, public safety hazards, electric and magnetic fields, aviation operations, increased vehicle traffic, and construction and operation noise (BLM, 2005b). These hazards are discussed below.

Occupational and public safety hazards

Public safety hazards may include rare tower failures, turbine or blade malfunction causing blades to be thrown off, ice throw, the unauthorized or illegal use of the Project facilities, and aviation safety interference. Many occupational hazards are minimized through safety standards and the use of protective equipment. Chapter 2 and Appendix B describe design features that will minimize Project health and safety impacts.

Electric and magnetic fields

Electric and magnetic fields would be present in the vicinity of the overhead transmission lines and substation. However, research studies have not found conclusive evidence that there are adverse human health effects from electric and magnetic fields (BLM, 2005b).

Aviation operations

FAA requires that WTGs be lit at night to provide for aviation safety; however, the Project WTGs would be lit at the minimum level required by the FAA. Chapter 2 and Appendix B describe design features that will ensure the Project does not affect aviation safety.

Traffic

Traffic volumes in the area on Highway 20 are relatively low for a two-lane state highway. The current use on the highway in the area of the Project access is approximately 1,500 average daily trips (ADTs). Traffic engineers consider 9,500 ADTs to be an excellent traffic flow for this type of highway, with congestion only starting to occur at 12,800 ADTs (West Butte Wind, 2008b). Traffic on the existing gravel and dirt roads throughout the Project Area is extremely light and primarily limited to traffic associated with grazing or livestock operations in the area. Users of Highway 20 may encounter slower traffic due to the presence of large construction vehicle traffic. As described in Chapter 2, a traffic safety assessment would be conducted to describe potential safety issues and the means that would be taken to mitigate them, including issues such as heavy equipment transportation and traffic management. West Butte Wind would apply for, and comply with, transportation permits through the Oregon Department of Transportation prior to construction, including a utility access permit, a highway access permit and an oversize and overweight permit.

Noise

Construction of Alternative 1 or 2 on private and BLM-managed public lands would cause temporary elevations in noise levels in the immediate vicinity of the construction activities. Possible noise sources during construction include: grading, excavation and trenching, blasting, turbine installation, batch plant operation, and other vehicle and equipment operation. Peak construction is scheduled over a six-month period. Due to the temporary nature of construction activities and the distances between occupied residences and facility components, (the closest Noise Sensitive Area is a residence in the Juniper Acre Development that is more than 1.8 miles from the nearest turbine), construction noise impacts to existing residential uses would be negligible.

Maintenance noise emissions would be limited to the noise of vehicles travelling on access roads and staff using hand tools.

During operation, the facilities making up Alternative 1 or 2 would emit perceptible sounds.

When in motion, wind turbines emit a perceptible sound. The level of this noise varies with the speed of the turbine and the distance of the listener from the turbine. On relatively windy days, the turbines create more noise; however, the ambient or natural wind noise level tends

to override the turbine noise as distance from the turbines increases. Modern wind turbine technology (such as would be used for the Project) has minimized the level of noise such that at a distance of 750 to 1,000 feet (0.1 to 0.2 miles) from a turbine, it is no louder than a kitchen refrigerator (about 50 decibels using the A-weighted scale (dBA)) (U.S. Department of Energy (USDOE), 2006). At a distance of approximately 2,000 feet (0.4 mile), turbines generate a noise level of 36 to 40 dBA, which is typical of rural environment background levels (BLM, 2005b). The closest residence within Juniper Acres would be approximately 1.8 miles from the nearest proposed WTG. At this distance, the increase in ambient noise due to wind generation turbine operation would not be perceptible.

The turbines would be operated so that noise emissions meet applicable provisions of DEQ noise regulations (OAR 340-035-0035 Noise Control Regulations for Industry and Commerce).

Noise from high voltage overhead transmission lines (i.e., corona noise) is generated by electrical discharge activity and has a characteristic crackling sound. This corona noise is sometimes accompanied by a low frequency (120 Hertz) hum. Noise from the overhead transmission lines would not be perceptible at a distance of 1 mile or more from the line, and would therefore not be perceptible at the closest residence 1.8 miles away in Juniper Acres.

There are two sources of audible noise associated with substations: transformer noise and switchgear noise. Transformer noise consists of a constant low-frequency hum, with the strongest component occurring at 100 Hertz. Noise is a factor that is considered in transformer design, and current design trends have shown decreases in generated noise levels. Such noise cannot be detected beyond the fenced substation area. Switchgear noise is generated by the operation of circuit breakers used to break high voltage connections. Such operations are infrequent and the noise is insignificant. In general, substation noise is not expected to be audible above background levels at distances greater than 0.5 mile. Due to the distance from the Project transmission line and substation to residences (approximately 2 miles and more), noise impacts to residences in the area are not expected to occur from the operation of these facilities.

Finally, motorized vehicles and hand and motorized equipment used to maintain the Proposed and Connected Actions would also be sources of temporary noise.

Because of the distance to any residences or other sensitive receptors from Project facilities being constructed as part of Alternative 1 or 2, and with incorporation of the design features described in Chapter 2, adverse noise impacts on residences would be negligible. Potential noise impacts on wildlife, including big game, are discussed in Section 3.5. Potential noise impacts on recreational users are discussed in Section 3.7.

1.5 CONFORMANCE WITH LAWS, REGULATIONS, PLANS, AND POLICIES

1.5.1 BLM Plans and Policies

The Upper Deschutes ROD/RMP provides area-specific land use allocations and allowable uses as well as management objectives and guidelines for the conditions under which future

uses might be authorized. BLM is responsible for processing applications for grants of ROW for use of federal lands administered by BLM. This requires completing environmental reviews pursuant to NEPA [42 USC 4332] and reviewing requests for ROW authorizations in relation to the *Upper Deschutes Record of Decision and Resource Management Plan* (ROD/RMP) (BLM, 2005a). The Upper Deschutes ROD/RMP provides area-specific land use allocations and allowable uses as well as management objectives and guidelines for the conditions under which future uses might be authorized. It identifies resource conservation areas, special management areas, land uses, recreation areas, transportation and utility corridors within its boundary as well as goals and objectives for a variety of resources. BLM is required to consider these when completing NEPA analysis for projects within the Upper Deschutes RMP planning area. The proposed action and the alternatives considered in the West Butte Wind Energy EIS are not precluded or excluded by the RMP/ROD. Key to this determination is the need to consider resources, minimize effects where feasible, and mitigate undesirable effects as appropriate.

For example, the Transportation and Utility Rights-of-Way goal states the BLM will:

> Provide transportation and utilities facilities that protect public safety, protect the environment, conserve and protect resources, and enhance the productivity and use of public lands…. Collaborate with local communities to plan reasonable, safe access to or across public land in a manner that serves to protect and conserve sensitive resources and the environment.

Objective TU-1 (page 135) directs the BLM to "provide new or modified rights of way for transportation/utility corridors and communication/energy sites to meet expected demands and minimize environmental effects." Objective TU-3 (page 138) directs the BLM to "incorporate mitigating measures…during the design and application process for new or expanded rights of way."

In addition to NEPA and the Upper Deschutes ROD/RMP, all Alternatives for this Project would be consistent with BLM's national wind energy policy issued in Instruction Memorandum (IM) 2009-043. This IM clarified the policies and best management practices (BMPs) provided in the BLM Wind Energy Development Programmatic EIS (BLM, 2005b). The Record of Decision for the BLM Wind Energy Development Programmatic EIS amended the Upper Deschutes RMP.

BLM is also responsible for complying with relevant Executive and Secretarial Orders. Presidential Executive Order 13212, *Actions to Expedite Energy-Related Projects*, established a policy that federal agencies should take appropriate actions, to the extent consistent with applicable law, to expedite projects to increase the production, transmission, or conservation of energy. Secretarial Order 3285, *Renewable Energy Development by the Department of Interior*, was issued by Secretary of Interior Salazar on March 11, 2009, establishing the development of renewable energy as a priority for the Department of Interior. This Secretarial Order specifies that "Agencies and bureaus within the Department will work collaboratively with each other, and with other Federal agencies, departments,

states, local communities, and private landowners to encourage the timely and responsible development of renewable energy and associated transmission while protecting and enhancing the Nation's water, wildlife, and other natural resources." This Secretarial Order further specifies that an Energy and Climate Change Task Force be established to develop a strategy that, among other things, prioritizes "the permitting and appropriate environmental review of transmission rights-of-way applications that are necessary to deliver renewable energy generation to consumers."

1.5.2 Other Permits and Approvals

During construction, operation, maintenance, and decommissioning of the West Butte Wind Power Project, West Butte Wind would comply with all existing and subsequently enacted, issued, or amended federal, state, or local laws and regulations applicable to the Project. Table 1.5-1 summarizes the status of the other primary permits and approvals that are anticipated for the West Butte Wind Power Project. West Butte Wind would also work with landowners to develop agreements for any Project facilities located on private lands.

Table 1.5-1: Status of Primary Authorizations, Permits, Reviews, and Approvals

Agency	Permit/Approval	Status
Federal		
Bonneville Power Administration	Interconnection Agreement to interconnect to existing BPA Brasada (Redmond)-Harney 115-kV transmission line.	Request for Interconnection submitted December 2008
Federal Aviation Administration	Notice of Proposed Construction or Alteration within 6 miles of Public Aviation Facility and structures over 200 ft (61 meters) to complete a 7460 Proposed Construction or Alteration Form	Application to be submitted after BLM ROW approval
U.S. Fish and Wildlife Service	Avian Protection Plan	West Butte Wind will consult with USFWS regarding the preparation of an Avian Protection Plan. If an APP is deemed appropriate, BLM may issue a ROD approving the project; however a Notice to Proceed will not be issued until a letter of concurrence for the APP is received from FWS.
U.S. Army Corps of Engineers	Section 404 Permit	Application to be submitted after BLM ROW approval, if applicable
State of Oregon		
Oregon Department of Environmental Quality	Oregon S-1200C Pollutant Discharge Elimination System Permit for Construction Stormwater	Application to be submitted after BLM ROW approval

Agency	Permit/Approval	Status
	Section 401 Water Quality Certification	Application to be submitted after BLM ROW approval, if applicable
Oregon Department of Transportation	Utility Access Permit	Application to be submitted after BLM ROW approval
	Highway Access Permit	Application to be submitted after BLM ROW approval
	Oversize and Overweight Permit	Application to be submitted after BLM ROW approval
Oregon Water Resources Department	Limited License	Application to be submitted after BLM ROW approval, and prior to construction
Local Permits		
Crook County	Conditional Use Permit[1]	Obtained 4/8/2009 [2]
Deschutes County	Conditional Use Permit	Obtained 6/29/2009

1. Conditional Use Permits issued by Crook and Deschutes Counties apply to project facilities located on private lands only. The Counties do not have jurisdiction on BLM-managed public lands. A "conditional" use permit in local land use regulation differentiates a use that is "out right" permitted from one that requires approval at a specific location by local government. The local government may include requirements associated with the approval of the use; such requirements are then enforceable under local ordinances.

2. West Butte Wind is coordinating with a Technical Advisory Committee (TAC).to prepare a Wildlife Mitigation and Monitoring Plan, which would consider appropriate plans and procedures designed to protect wildlife. The TAC consists of representatives from Oregon Department of Fish and Wildlife (ODFW), United States Fish and Wildlife Service (USFWS), Oregon Natural Desert Association, Crook County, Oregon, State Extension Office, and the wind farm location private property owners.

Chapter 2 PROPOSED ACTION AND ALTERNATIVES

This EIS considers the Proposed Action of authorizing a ROW across BLM-administered lands for the construction and operation of access roads and a transmission line associated with the West Butte Wind Power Project. CEQ and BLM NEPA implementing policy also requires that the analysis consider actions that are connected to the BLM's issuance of a ROW authorization. Connected actions are those actions that are "closely related" and "should be discussed" in the same NEPA document, per 40 CFR 1508.25 (a)(1). CEQ and BLM consider actions to be connected if they cannot or would not proceed unless other actions are taken previously or simultaneously, or if the actions are interdependent parts of a larger action and depend upon the larger action for their justification (40 CFR 1508.25 (a)(i, ii, iii)). The construction and operation of the West Butte Wind Power Project – even those project facilities that are located on privately owned lands – are connected non-federal actions since they can be prevented by BLM decision-making (i.e., denying the ROW) (BLM NEPA Handbook, Section 6.5.2.1). As part of this EIS, the effects of these non-federal connected actions are considered indirect effects of the BLM action to grant a ROW and must therefore be considered.

NEPA directs the BLM to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal that involves unresolved conflicts concerning alternative uses of available resources." (NEPA Section 102(2) (E)). The CEQ regulations direct that an EIS "rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives that were eliminated from detailed study, briefly discuss the reasons for their having been eliminated," (40 CFR 1502.14(a) see also NEPA Sec. 102(2)(C)(iii)).

Included below is a description of the Proposed Action, Connected Actions, and Alternatives considered as part of this EIS:

- Alternative 1 – Proposed and Connected Actions (Sections 2.1 through 2.3). Alternative 1 is BLM's preferred alternative. This alternative includes the Proposed Action of granting a ROW for construction and operation of an access road and transmission line across lands administered by the BLM. Consideration of this alternative includes an analysis of the Connected Action of West Butte Wind constructing and operating a wind farm and associated facilities (e.g., access road, transmission line, substation, Operations and Maintenance (O&M) building) on privately held lands. A detailed description of this alternative, including best management practices and/or design features that would be incorporated into the Proposed and Connected Actions, is provided in Sections 2.1 through 2.3 below. Section 2.1 provides a description of Alternative 1, Section 2.2 describes construction of Alternative 1, and Section 2.3 describes operations and maintenance of Alternative 1. Each of these sections discusses the Proposed Action on public land, and the Connected Actions on private land.

- Alternative 2 –Northern Access Road Alternative and Connected Actions (Section 2.4). Consideration of this alternative includes an analysis of a main access route through the Juniper Acres Development, the facilities related to the Connected Action as described in Alternative 1, and a ROW through BLM-administered public land for a 3.9-mile transmission line.
- Potential Mitigation Measures for Alternatives 1 and 2 (Section 2.5). These measures would be implemented under either alternative.
- Compensatory Mitigation and Conservation Offsets (Section 2.6). These project elements would be implemented under Alternative 1 or 2.
- Alternative 3 – No Action Alternative (Section 2.7). This alternative includes denying a ROW for construction and operation.

The "Project Area" is composed of private and public property on which, and adjacent to which, the Proposed and Connected Actions (Alternative 1) and the Northern Access Road and Connected Actions (Alternative 2) would be located. The Project Area is illustrated in Figure 2-1.

West Butte Wind has made a commitment to implement design features that would avoid or minimize impacts on the resources discussed in Chapter 1 and Chapter 3 of this document. These design features have been identified in Sections 2.1 through 2.3, and Appendix B, Additional Design Features, as actions that West Butte Wind "would" conduct. If BLM approves the ROW grant, West Butte Wind would implement the features on public and private lands as applicable as described herein. If BLM chooses to approve the ROW, the design features proposed for public land would be included in the ROW grant as a required action.

2.1 ALTERNATIVE 1 - DESCRIPTION

2.1.1 Proposed Action

The Proposed Action under consideration in this analysis is the BLM's authorization of a 100-foot-wide, 3.9-mile-long ROW across federally administered lands for the construction and operation of an access road and transmission line (see Figure 2-1A). Although a 100-foot-wide ROW is being requested, the project facilities would be limited to a corridor approximately 30 feet wide. The ROW would permanently accommodate:

- a 3.9-mile-long, 24-foot-wide permanent access road;
- a pole-mounted 115 kV electrical transmission line, constructed using single wooden poles, 50 to 53 feet high, spaced at 300-foot intervals, located six feet from the edge of the access road.
- a 14.4 kV electrical utility line under-hung on the transmission line pole structures described above; and,
- a fiber optic communication line that would also be located on the transmission line poles.

Access Road

The 3.9-mile access road proposed on BLM-managed public lands would be accessible from the south via a private gravel road located in Deschutes County. The access road on BLM-managed public lands would provide access to the north to a private road located in Crook County. Both of these private roads are described below in Section 2.1.2, Connected Actions.

Of the 3.9 miles of access road proposed on BLM-managed public lands, 3.65 miles would follow an existing gravel road. The existing road would be widened and upgraded. At its northernmost location, a new quarter-mile section of road would be constructed to connect the access road on BLM-managed public lands with an existing private road in Crook County.

During construction, both the new and upgraded sections of the access road on BLM-managed public lands would be graded to a permanent, finished width of 24 feet to allow transportation of turbine components, turbine assembly cranes, and other construction materials and equipment. The minimum road width (24 feet) is required to accommodate the width and length of the specialized cranes needed to transport, install, and maintain the various turbine components. In areas of steep slopes (at the north connection with private property in Crook County, for approximately a quarter mile) the construction width may be up to 100 feet. The remainder of the road (3.65 miles) would be constructed at 24 feet wide. After construction is completed, the entire length of access road would be maintained at a width of 24 feet.

The roadway would be constructed of compacted gravel/base material and surfaced with aggregate materials. The revegetated road shoulder on each side of the permanent roadway would vary in width between 2 and 76 feet in hilly sections, where wider shoulders may be needed to accommodate any cut and fill that would be necessary to create the appropriate uphill and downhill slopes (generally to be built to a 2:1 grade and engineered to ensure road and slope stability).

The access road would incorporate the following design features:

- An existing road location will be used to the maximum extent feasible. Any new road constructed or reconstructed would be designed constructed, and maintained consistent with BLM 9113 Manual (BLM, 1985) and the Surface Operating Standards for Oil and Gas Exploration and Development (Rocky Mountain Regional Coordinating Committee, 1989) (i.e., the Gold Book).
- The access road would be located to follow natural contours and minimize side-hill cuts.
- The road would be designed so that changes to surface water runoff are avoided and erosion is not initiated.
- The road would be located away from drainage bottoms and would avoid wetlands and stream crossings.
- Existing drainage systems would not be altered, especially in sensitive areas such as erodible soils or steep slopes. Potential soil erosion would be controlled at culvert

outlets with appropriate structures. Catch basins, roadway ditches, and culverts would be cleaned and maintained regularly.

- The full 100-foot ROW width would only be used in areas of steep cross slopes where a wider road is needed to ensure safe road conditions. Removal of vegetation would be limited to only the area of the ROW that is needed for construction of the road and transmission line facilities.
- Project personnel and contractors would be instructed and required to adhere to speed limits commensurate with road types, traffic volumes, vehicle types, and site-specific conditions, to ensure safe and efficient traffic flow, to minimize wildlife collisions or disturbance, and reduce airborne dust. West Butte Wind would instruct project personnel and contractors to adhere to a 25 mile per hour (mph) speed limit established for all project related traffic on the access road. The speed limits would apply to construction, operation, maintenance, and decommissioning project phases.
- During construction and operation, traffic would be restricted to the roads developed for the project. Use of other unimproved roads would be allowed only in emergency situations. Construction personnel would be required to avoid driving over or otherwise disturbing areas outside the designated construction areas.
- West Butte Wind would be required to seek review and approval of any road signs that may be deemed appropriate to control traffic on the access road on BLM-administered lands.
- Access to and from private lands from the access road on BLM-managed public lands would not be restricted, except for the existing cattle guards associated with existing fences. If other BLM trails or roads would intersect the proposed main access road on BLM–managed lands, these intersections would not be gated or fenced in any way.

Transmission Line

West Butte Wind proposes to construct an approximately 3.9-mile 115 kV transmission line across BLM-managed public lands to allow interconnection of the Connected Action with the regional transmission system. The transmission line on BLM-managed public lands would connect a transmission line constructed on private lands in Crook County from the north, to a transmission line constructed on private lands in Deschutes County to the south. The alignment of this transmission line is shown in Figure 2-1.

The transmission line would be located adjacent to the main access road, in a corridor 6 feet wide. During construction, some vegetation may be removed from this corridor to allow equipment and vehicles to install the poles and string the conductor. After construction is finished, this corridor would be revegetated.

The transmission line would be constructed on a series of single wooden poles, 50 to 53 feet in installed height. Sixty-foot wooden poles would be buried 7 to 10 feet in the ground. The typical span between poles would be about 300 feet. Span distances may vary by about 50 feet to accommodate pole placement to avoid drainages or rocky areas. Single steel poles could be used at acute angle points (alternatively, wooden poles at acute angle points may have guy wires).

Three types of wires would be hung from the poles:

- a new overhead 115 kV transmission line that would carry the power generated by the Connected Action facilities located on private land in Crook county to the Connected Action facilities located on private lands in Deschutes County;
- a 14.4 kV Oregon Central Electric Cooperative electrical utility line to provide operational power to the Connected Action facilities located in Crook County; and,
- a fiber optic line for the communications and control systems between the Connected Action facilities located in Crook and Deschutes counties. This fiber optic line would be under-hung on the transmission poles.

Per the Upper Deschutes ROD/RMP's Visual Resource objective VR-1, all transmission line towers and conductors associated with the Proposed Action would use non-reflective surfaces or be painted to minimize visual impacts and blend in with the adjacent landscape.

2.1.2 Connected Actions

As noted above, Connected Actions analyzed as part of this EIS include the construction and operation of the West Butte Wind Power Project facilities that would be located on private lands. West Butte Wind is proposing to construct, operate, and maintain a wind energy generation facility in Deschutes and Crook counties, Oregon.

The Connected Action includes those project elements that would be constructed and operated on private land in Crook and Deschutes counties (zoned Exclusive Farm Use-1 (EFU1) in Crook County and EFU Alfalfa (EFUAL) in Deschutes County; see Figure 2-2). The proposed WTGs and substation would be located on-private land in Crook County. An O&M building and overhead 115 kV power line to facilitate transmission of power to a new BPA switchyard would be located on private land in Deschutes County (see Figures 2-1A and 2-1B). The corresponding temporary and permanent footprint associated with the connected action is shown in Table 2.2-1 below.

The principal and ancillary facilities associated with the project include:

- 34 to 52 2.0 to 3.0 MW WTGs (total project generating capacity would not exceed 104 MW), located in Crook County;
- about 12.5 miles of underground and overhead 34.5 kV collector lines from the WTG transformers to the project substation;
- a project substation located in Crook County which would boost the 34.5 kV turbine production power to 115 kV transmission power;
- 1.1 miles of the 5-mile new overhead 115 kV transmission line to interconnect the project with the existing BPA Redmond-Harney 115 kV line would be constructed on private lands (0.6 miles in Crook County, and 0.5 miles in Deschutes County, 3.9 miles on BLM-managed lands);
- a switchyard located in Deschutes County (to be built, owned, and operated by BPA) at the project interconnect at the existing BPA Redmond-Harney 115 kV line that

generally consists of a single line termination, disconnect switches, power circuit breaker, and a 115 kV takeoff structure;
- approximately 18 miles of new turbine access roads (all located in Crook County);
- approximately 4.5 miles of main access roads across private lands from Highway 20 to the project substation in Crook County (widening or improving existing roads);
- a project O&M facility to be located in Deschutes County;
- an overhead 14.4 kV power line (owned and operated by Central Electric Cooperative) under-hung with the 115 kV transmission line to supply the switchyard and substation;
- an overhead 14.4kV power line to supply the O&M building; and,
- up to three meteorological towers, about 262 feet high, to collect wind condition data at the site, all located in Crook County.

The preliminary layout of project components and facilities included as Connected Actions is shown in Figure 2-1.

Wind Turbine Generators

Each WTG consists of several components, which are individually transported to the site and erected. The components include the tower, nacelle, hub, blades and rotor, controller, and transformer. Each tower would be located on a concrete foundation. On top of each tower would be a nacelle containing the mechanical drive train of the WTG, including the generator unit used to create electricity from the wind. Three blades, collectively called the rotor, are mounted to the hub on the front of the generator unit. The blades spin as lift is created from the wind passing over them. A transformer is used to step-up the electric voltage produced by the generator to a level suitable for distribution into the electrical collection system.

Depending on the model selected, 34 to 52 WTGs are proposed for this project. The WTGs would be approximately 400 to 500 feet high, from foundation to blade tip, with the blade in an upright position (see Figure 2-3). The WTGs do not operate at high wind speeds due to the high loads exerted on the equipment; the maximum operating wind speed would be in the range of 45 to 55 miles per hour, depending on the specific model chosen. In higher wind speeds, for equipment protection reasons, the blades would feather and a brake would be applied to lock the blades and keep them from rotating. Turbines with low revolutions per minute (RPM) have been selected to minimize risk of bird collision. The WTGs and their towers would be equipped with grounding and lighting protection devices in compliance with applicable safety standards, for example the most current National Fire Protection Association (NFPA) Standard for the Installation of Lightning Protection Systems (NFPA standard 780, current issue 2008).

Because of the structural nature of the WTGs and WTG arrays, the design of the proposed facilities associated with the Connected Actions would be integrated with the surrounding landscape. Visual uniformity has been taken into consideration as a design element, and the structures would be constructed as tubular towers, painted with non-reflective white paint. Manufacturer logos or other commercial messages would not be displayed on the turbines.

For aeronautical safety, the Federal Aviation Administration (FAA) requires approved safety lighting of structures taller than 200 feet (FAA, 2007). These requirements apply to the WTGs that make up a wind generation facility. The FAA does not require daytime lighting (with white lights) if the turbines are painted a light color. The FAA does require periodically spaced nighttime red aviation synchronized warning lights. Not all of the turbines are required to be lit. The lighting scheme depends on whether the WTGs are arranged in strings or clustered. Typically, lighting is required at the periphery of a cluster or at the ends of a string to identify the boundaries of the structures, with additional lights located at half-mile intervals. The FAA reviews and approves the lighting arrangement prior to construction once the final project layout has been developed.

The West Butte Wind Power Project would be designed to comply with FAA regulations, including lighting regulations, to avoid potential air traffic safety issues. West Butte Wind would choose FAA-compliant lights. The FAA currently recommends red strobe lights with a pulse rate of 24 per minute on wind turbines. Preliminary indications are that strobe lights are less impactful to birds than steady lights (American Bird Conservancy, 2010). WTG and other project lighting (see Operations and Maintenance Facility, below) is not expected to impact the Pine Mountain Observatory, as the observatory is located on the south side of Pine Mountain and the view to the north is already obstructed (Bothun, 2010).

Towers

The towers supporting the WTGs would be heavy-duty tapered monopoles of welded steel or concrete design, mounted on concrete foundations. One recently developed design uses a pre-tension concrete tower, constructed in segments. Depending upon the wind flow across the site, the type of tower chosen, and the surface conditions, the towers would be approximately 262 to 328 feet high, from foundation to hub. Wind shear, the percent of increase in wind speed from the ground level as height above ground increases, is one of the most important considerations determining tower height.

The towers would be approximately 15 feet in diameter at the base where they are bolted to the reinforced concrete foundation, and approximately 7 feet in diameter at the nacelle. Each tower would weigh approximately 80 to 285 tons and would be transported in three to four sections, depending on hub height and design. All surfaces are sandblasted and multi-layer painted inside and out with a tough epoxy-based paint to resist corrosion. Access to the turbine is through a lockable steel door at the base of the tower. Four platforms are connected with a ladder and a fall-arresting safety system for access to the nacelle. There would be no guy wires required to hold the towers upright – tubular towers would be used to minimize risk of bird collision with the WTGs.

Meteorological Towers

Up to three permanent meteorological towers would be installed in the project area, located at the same spots as the existing temporary meteorological towers. Each meteorological tower would be supported by guy wires and would be approximately 262 feet high. The meteorological towers would be lit with red nighttime lights in accordance with FAA

requirements as described above. The approximate location of these towers is shown in Figure 2-1.

Throughout the operational life of the project, these meteorological towers record weather data that includes wind speed and direction, temperature, humidity, and barometric pressure. This data is used to determine the generation efficiency of the project over time and to adjust the operation of the WTGs to extract the maximum potential energy out of the wind resource.

West Butte Wind would implement the following design measures associated with permanent meteorological tower installation:

- The area disturbed by installation of meteorological towers (i.e., footprint) would be kept to a minimum.
- Meteorological towers installed for site monitoring and testing would be inspected periodically for structural integrity.
- Bird flight diverters would be used to minimize potential for avian collisions with guy wires.

Electrical Collector System and Transmission Line

Electricity produced by the WTGs would be fed down the tower via three-phase 600 Volt cables to pad-mounted electrical transformers that raise the voltage to transmission levels (34.5 kV). The transformers would be located near the base of each tower and encompass an area of approximately 64 square feet. Each array of WTGs would be interconnected through underground cables, which would run to the project substation.

All electrical collector lines would be buried in a manner that minimizes additional surface disturbance (e.g., along roads or other existing paths of surface disturbance). These 34.5 kV conductor cables would be buried underground in 3- to 5-foot-wide and 3- to 5-foot-deep trenches, parallel to access roads and existing or new utility corridors. Overhead pole lines would be used as part of the collector system to avoid trenching in areas of extensive rock or across steep drainages. The poles would be similar in height and installation as described in Section 2.2.

At the project substation, the voltage of the electrical current produced at the turbines would be increased to 115 kV. From the project substation, a new overhead 115 kV transmission line would be constructed south to the existing BPA 115 kV transmission line. The new 115 kV transmission line would continuously connect from the north and the south to the transmission line constructed on BLM-managed public lands as part of the Proposed Action (described above). On private land, 1.1 miles of 115 kV electrical transmission line would be constructed and would be identical in design and construction methods to the line on BLM-managed public lands described above. The line on private lands would also carry a 14.4 kV utility line and an optic fiber communications line.

The transmission line on private lands would interconnect to the BPA switchyard and existing Redmond-Harney 115-kV line south of the wind farm site. This power line would

also run on single wooden poles, along existing roads, across private and BLM-managed public lands along the alignment shown in Figure 2-1.

Electric Substation

The proposed project substation would be located in Crook County in the center of the wind farm site on top of West Butte (see Figure 2-1). The substation would consist of a main step-up transformer and other facilities to increase the 34.5 kV power from the project collector lines to a higher voltage for delivery to BPA's 115 kV system. The substation would be similar to those typically used on transmission systems in the region and would be approximately 0.75 acre in size, within a fenced enclosure. The substation would be painted a neutral color to reduce contrast with the surrounding landscape. Additional lighting at the substation would be limited to reduce nighttime light pollution through the use of directed lighting, timers, and motion sensors.

Operations and Maintenance Facility

An O&M facility, including a control room for project operations, is planned to be located just north of Highway 20 in Deschutes County (see Figure 2-1). Access to the Project Area from this single location would ensure that all visitors would have to check into the O&M facility before traveling to the project site. Additionally, the proposed location would allow trucks to deliver supplies during the winter when access to the project area could be more difficult because of snow on the higher elevations of the site. The O&M facility would include a single building accommodating offices, spare parts storage, restroom, and a shop area. The building would be a single-story metal "Butler" type, 50 feet wide by 100 feet long (WBWP, 2009). The O&M building metal siding and roof would be painted a tan color to reduce contrast with the surrounding landscape. Outdoor parking facilities, a loading area, a turn-around area for larger vehicles, outdoor lighting, and a gated access with partial or full perimeter fencing encompassing approximately 0.75 acre would make up the remainder of the facility uses. The 8-foot-high chain-link fencing would also incorporate tan slats to screen the fenced area. Native Juniper would be planted outside the fence around the periphery of the O&M facility. Power to the O&M building would be available through a connection with the Central Electric Cooperative line on Highway 20. Additional lighting at the O&M building would be limited to reduce nighttime light pollution through the use of directed lighting, timers, and motion sensors. The O&M facility would be accessed from the main access road. A single locked access gate would be located at the entrance to the project site from Highway 20.

Communications System

A supervisory control and data acquisition (SCADA) system would be used for the project to collect operating and performance data from each wind turbine and the project as a whole, and provide remote operation of the wind turbines. The wind turbines would be linked to a central computer in the control room via a fiber optic network. Communication cables would be buried in the same trenches used for power collection lines and follow the same above ground power distribution lines described earlier. Communications between the substation and O&M building would be by phone or radio.

Access Roads

The facilities associated with the Connected Actions in Deschutes County would be accessible via a private gravel access road off of Highway 20 at milepost 32.25. From the highway, 3.75 miles of this main access road traverses private land until it reaches the 3.9-mile strip of BLM-managed lands in Deschutes County. The main access road resumes in Crook County for a distance of 0.75 mile to the project substation. A majority of the main access road on private lands follows an existing gravel road that would need to be upgraded prior to construction of the WTGs. The main access road would be 24 feet wide during construction and operation. Sections of main access road located on private lands would be constructed and their shoulders revegetated to the same specifications as access road on public land (see above).

From the project substation, individual WTGs would be accessed via a network of existing and proposed gravel roads throughout the project area (see Figure 2-1). The "turbine access roads" leading from the main access road to the WTGs would be graded and maintained to a width of 24 to 40 feet for construction. Widths greater than 24 feet would be needed in certain locations to accommodate the turning radius of the crane at curves or movement over steeper slopes. Less than a half-mile of the turbine access roads would be located in existing road corridors. After construction is completed, all turbine access road widths would be reduced to 24 feet.

Speed and travel restrictions on roads constructed on private lands would be equivalent to those implemented on the access road constructed on BLM-managed public lands, as described above. Access to and from BLM-managed lands and private lands is also described above. Longer range access routes to the project area would include Highway 97 into Bend, Highway 26 into Prineville, Highway 20 from Bend to the Project site, and Highways 27 and 20 from Prineville to the project site. Larger turbine components would likely be shipped to the Ports of Vancouver or Longview, Washington – the major ports of entry for wind turbine components arriving in the region.

2.2 ALTERNATIVE 1 - CONSTRUCTION

The construction phase would last approximately 6 to 10 months. Construction would be primarily conducted during the dry-weather seasons when site access is safe, unrestricted due to weather conditions, and soil erosion by water is minimized.

Construction activities would normally occur during daylight hours; however, some construction activities may require extended working hours due to scheduling constraints, or engineering requirements such as maintaining structural integrity of concrete pours. It is estimated that the peak construction crew would include 50 to 100 people.

2.2.1 Proposed Action

Pre-Construction Activities

Before construction of the Proposed Action can begin, a site survey would be performed to stake out the location of the roads and transmission line alignment. A geotechnical

investigation would be performed to identify subsurface conditions which would dictate the design of the roads and transmission line.

Site Preparation and Road Construction

Heavy equipment would be used to clear the site, build the road, haul and lift materials, and pull the transmission line. Typical equipment used for road construction includes excavators, bulldozers, load graders, compactors, water trucks, dump trucks, forklifts, scrapers, trenchers, line-up trucks, and pickup trucks.

Road construction would be performed in multiple passes, starting with site preparation and followed by the rough grading and leveling of the roadway areas. Once rough grade is achieved, base rock would be trucked in, spread, and compacted to create a road base. A capping rock would then be spread over a 24-foot-wide portion of the road base and roll-compacted to finished grade.

Water bars, similar to speed bumps, would be cut into the road where needed to allow for natural drainage of water over the road surface and to prevent road washout. This would be done in accordance with a formal Stormwater Pollution Prevention Plan (SWPPP) for the project. Stormwater controls, such as hay bales (certified weed-free) and diversion ditches in some areas, would be used to control stormwater runoff during construction.

The project is located on open rangeland. Excess excavated rock that arises through grading would be disposed of on private land in the project site at approved (and if appropriate, permitted) disposal areas. Excess excavated soils would be segregated and used for habitat restoration activities at the site. Larger excavated rocks would be disposed of at approved sites or crushed and re-used on-site as backfill or roadway material. Placement of excess rocks in jurisdictional waterways would only occur if permitted by appropriate state and federal agencies.

Transmission Line Installation

Overhead poles constructed as part of the Proposed Action would be sited along the access road. The single, wooden pole overhead system would be constructed in conformance with good utility practice, and the guidelines or requirements of the National Electric Safety Code, the American National Standards Institute, and the Avian Power Line Interaction Committee.

The wooden overhead poles are first assembled and fitted with all of their cross-arms, cable supports, and insulator hardware on the ground at each pole location. Holes for each pole would then be excavated or drilled and the poles would be set in place using a small crane or boom truck. Once the pole is set, clean fill would be compacted around the pole base according to the engineer's specifications. At locations with a significant change in direction of the power line, a steel pole may be installed rather than a wooden pole to carry the extra line load.

Commissioning

Electrical tests on the power lines are performed by qualified engineers, electricians, and test personnel to ensure that all electrical equipment is operating within industry and

manufacturer's tolerances and that all such equipment has been installed in accordance with design specifications.

Site Clean-up and Habitat Restoration

After construction is complete, West Butte Wind would remove construction equipment and debris and restore disturbed areas to preconstruction conditions. Since project site restoration generally consists of reseeding disturbed areas and earthwork, it is very weather and season sensitive. Site restoration would follow a revegetation plan developed in consultation with the BLM and other appropriate agencies. All temporarily disturbed areas would be re-seeded with a mix of native plant species at the time of year that would best assure success (e.g., prior to the rainy season). The revegetation plan would specify the seed mix and vegetation species suited to restoration activities based on the habitats being restored, and the methods for seed application or planting (see Appendix B).

Construction clean-up may require the use of a motor grader, dump trucks, front-end loaders, and light trucks for transportation of any waste materials.

Construction Compliance and Monitoring

West Butte Wind would implement a construction compliance and monitoring program. If the BLM approves the requested ROW, compliance and monitoring would be requirements of the authorization. An environmental compliance and monitoring program would ensure that construction activities satisfy the environmental standards and design features described in this EIS as well as the conditions required through any of the project's federal, state, or local permits. Copies of all applicable construction permits would be kept on-site. The lead project construction personnel and managers would be required to read, follow, and be responsible for all required compliance activities.

Prior to construction, an environmental monitor would be retained to train construction personnel on avoidance of sensitive areas and to monitor construction activities to ensure compliance with design features and permit conditions. The environmental monitor would be responsible for ensuring that all construction permit requirements are adhered to, and that any deficiencies are promptly corrected. The environmental monitor would ultimately report to the project manager and would provide weekly reports on environmental problems reported or discovered as well as corrective actions taken to resolve these problems.

The environmental compliance program would cover avoidance of sensitive areas during construction, waste handling and storage, stormwater management, spill prevention and control, and other components required by federal, state, and county regulations. Upon identification of a non-compliance issue, the environmental monitor would work with the responsible contractors or workers to correct the problem.

As noted in Appendix B, West Butte Wind would implement a suite of design features and project plans. The environmental monitor would be responsible for ensuring that project construction activities comply with these commitments.

2.2.2 Connected Actions

Preconstruction Activities

Before construction of facilities associated with the Connected Actions can begin, a site survey would be performed to stake out the exact location of the WTGs, site roads, electrical cables, access entryways from public roads and BLM lands, substation area, etc. Surveys would be conducted using professional surveyor standards to ensure that project facilities and construction activities are correctly located with respect to public and private property lines. Once the survey is complete, a detailed geotechnical investigation would be performed to identify subsurface conditions which would dictate much of the design of the roads, foundations, underground trenching, and electrical grounding systems. Typically, the geotechnical investigation involves a drill rig, which bores to the engineer's required depths (typically 8-inch diameter drill to 30-40 feet deep) and a backhoe to identify the subsurface soil and rock types and strength properties by sampling and lab testing. Testing is also done to measure the soil's electrical properties to ensure proper grounding system design. A geotechnical investigation is generally performed at each WTG location, at the substation location, and at the O&M building location.

Design and Construction Specifications

Using all of the data gathered for the project, including geotechnical information, environmental and climatic conditions, site topography, etc., West Butte Wind's engineering group would establish a set of construction specifications for the various aspects of the project. The design specifications would be based on established sets of construction standards set forth by the various industry practice groups such as the American Concrete Institute, Institute for Electrical and Electronic Engineers, National Electric Code, NFPA, and Construction Specifications Institute. The project engineering team would also ensure that all aspects of the specifications, as well as the actual on-site construction, comply with applicable federal, state, and local codes and good industry practices. This approach ensures that the project would be designed and constructed to meet a minimum 20-year operational life.

Equipment and Water Requirements

Heavy equipment would be needed to clear the sites, build roads and WTG pads, haul and lift materials, and pull power line. The heavy equipment would be the same as that described for the construction of the Proposed Action above. In addition, specialized large cranes are also used to erect the WTGs. Seven to ten truckloads of parts would be required per WTG. Thus, approximately 280 to 400 trucks hauling WTG parts, each with a gross weight ranging between 30,000 and 150,000 pounds, would travel to and from the project site. For 52 turbines, approximately 731 truck trips would also be necessary for delivering concrete, sand, gravel, steel, bolts, and water for foundation construction. This equates to approximately 6 truck trips per day. After traveling on Highway 20 or 27, the trucks would enter the site from Highway 20 and proceed to designated-areas where a crane would unload them.

Total water demand for the project's construction activities is estimated to be 12.4 million gallons over an eight-month period, with an average use of 51,600 gallons per day. Construction water needs would be supplied by three existing state permitted wells located on the West Butte Ranch (private lands in Crook County). The wells produce 60+ gallons per minute (86,400 gallons per day). Up to 5,000 gallons of water per day may be drawn from each well for commercial use without any further water rights or permits (ORS 537.545). Up to 9,000 gallons of water per day would be necessary to control dust under certain conditions. Water needed for concrete preparation is described under "Concrete Batch Plant" below. West Butte Wind would obtain a Limited License from the Oregon State Water Resources Department for any water to be used in excess of the permitted well capacity. West Butte Wind would closely monitor water use and would purchase mitigation credits through the Deschutes River Conservancy to offset any impacts to water in the basin.

West Butte Wind would also consider using water or dust abatement chemicals for dust suppression when construction requires movement of earth during wind conditions. The chemicals used would be from naturally occurring substances such as magnesium chloride, selected for its effectiveness in controlling fugitive dust, as well as minimizing potential environmental impacts. Prior to the use of any chemicals for dust abatement, West Butte Wind would confer with BLM's authorized officer to obtain approval.

Temporary Construction Storage Areas

Two graveled, temporary storage areas about two acres in size are proposed on private land in Crook County. Additionally, a two-acre graveled storage area would be located on private land in Deschutes County. Both areas would be used for construction vehicle parking and parts storage, and one would also be used for a temporary batch plant to mix concrete for the turbine foundations. After construction, gravel would be removed and these areas would be revegetated.

Concrete Batch Plant

Foundations for each WTG require several hundred yards of concrete using strength and mix designs as required by the design engineer. The engineer generally requires placement of the mix within 45 minutes of being made or "batched." Because of the distances concrete trucks may have to travel to each WTG foundation, and the quantities of concrete required, it would be necessary to set up a concrete batch plant on the project site to meet construction needs. The batch plant would be located at the temporary storage area located across the main road from the substation location on private land in Crook County. The batch plant area must be level and provide room for trucks to load and unload materials.

Gravel may be placed over the area to support the weight of equipment. Some sand and aggregates would be obtained from within the project area, and the remaining materials needed would be trucked into the site from outside local sources. No sand or aggregates would be taken from BLM property.

The batch plant equipment would be powered by a diesel motor and materials would be loaded by a front end loader. For each turbine, concrete foundation construction would use

150 cubic yards of concrete and slurry, which requires 30 gallons of water per cubic yard of concrete. This equates to 4,500 gallons of water per concrete foundation, which totals 234,000 gallons of water for 52 turbines (0.7 acre feet). Water would be brought in by tanker truck and stored in a portable construction site tank.

Cement, aggregate, sand, water, and admixtures would be mixed together in the batch plant and then loaded into ready-mix trucks in the loading area. The concrete would then be delivered throughout the site as needed.

The batch plant would include a washdown pit where water and solid material resulting from washout of the concrete trucks are buried, or collected to be hauled off-site after construction is completed. Water and solid material from concrete truck washdown at each turbine foundation would be placed in a corner of the foundation excavation area for burial after the concrete has dried.

After removal of the batch plant from the project site, the area would be returned to the original condition by removing gravel, regrading, and reseeding as necessary.

Construction Activities

West Butte Wind would utilize engineering practices that limit disturbance and related impacts on the surrounding environment and land uses. Erosion control practices would be used in areas impacted by proposed construction and a project-specific SWPPP would be prepared and implemented to prevent off-site migration of contaminated stormwater or increased soil erosion.

Project construction would be performed in several stages and would include the following main elements:

- site preparation and road construction;
- foundation construction;
- turbine assembly and erection;
- electrical collector system and transmission line installation;
- project substation construction; and,
- O&M facility construction.

Site Preparation and Road Construction

Construction activities would begin with site preparation, including the construction of project site access entryways from public roads, rough grading of the roads, leveling of the field construction site office parking area, and the installation of six to eight temporary site office trailers. Temporary trailers may also be located at the temporary storage areas. Temporary sanitation facilities would be available at the O&M facility location, described below.

Roads that are part of the Connected Action would be constructed in the same way as described above for the Proposed Action. Excess soils and excavated rock would be managed as for the Proposed Action.

Foundation Construction

Each WTG requires a concrete and steel reinforced foundation situated below ground, to which the tower is anchored. The area required and the type of foundation necessary to support the loads generated would be determined by site-specific geotechnical constraints, wind patterns at the site, site access, material availability, and the type of WTG selected. Commonly, foundations would be octagonal spread-footing designs that are about 60 feet in diameter and 7 to 10 feet in depth. Two other possible foundation designs considered for this project are a Patrick & Henderson Inc. (P&H) patented post tensioned foundation, or a rock anchor type.

The P&H foundation is drilled and/or dug to approximately 19 to 33 feet deep, depending on geotechnical conditions and loadings, and is approximately 18 feet in diameter. The foundation is in the configuration of two concentric steel cylinders. The central core of the smaller inner cylinder is filled with soil removed during excavation. The cavity between the rings has bolts used to anchor the tower to the foundation and it is filled with concrete. Bolting the tower to the foundation provides post-tensioning to the concrete.

A rock-anchor type foundation may be an alternative. Six to 20 holes, depending on geotechnical data, are drilled up to 33 feet into the bedrock and steel anchors are epoxy-grouted in place. A reinforced concrete cap containing the anchor bolts is poured on the top of the steel anchors to support the tower structure.

Any of the above foundation types may be used on any of the project WTGs. The selection would be determined after completion of geotechnical studies. Manufacturer's foundation loads for the site, material availability, and site access are also issues which must be fully analyzed to determine the best choice of foundation for each WTG.

Turbine Assembly and Erection

After the WTG foundations are completed and concrete has cured, turbine assembly can begin. To construct each WTG, a flat area adjacent to the foundation must be established. The cleared pad area is used to assemble wind turbine sections and host a construction crane, which is used to hoist the turbine sections into place. Each pad may have unique characteristics regarding size and construction in order to address site topography. Figure 2-4 illustrates a WTG crane pad and typical construction layout.

All WTG components would be delivered to the project site on flatbed transport trucks. Components would be off-loaded at the individual turbine sites or possibly staged elsewhere on the site before transport to the final location.

WTG erection is performed in multiple stages including: setting of the buss cabinet and ground control panels on the foundation, erection of the tower (usually in three to four sections), erection of the nacelle, assembly and erection of the rotor, connection and termination of the internal cables, and inspection and testing of the electrical system prior to energization. WTG assembly and erection mainly involves the use of large truck or track mounted cranes, smaller rough terrain cranes, boom trucks, rough terrain fork-lifts for

loading and off-loading materials and equipment, and flat-bed and low-boy trucks for transporting materials to the project site.

The cranes used in turbine assembly and tower erection would be trucked to the project site in pieces. They would then be assembled on site in an area as close as possible to their first required use. Cranes are then moved as assembled ("walked") from one turbine location to the next. "Walking" requires a 35- to 40-foot-wide "walking path" between the WTG locations. These walking paths would generally follow the WTG access roads.

After construction, all assembly areas would be revegetated with native species appropriate for the type of habitat being restored, except for a 12-foot area immediately around each tower, which would be maintained for access and fire prevention.

Electrical Collector System and Transmission Line Installation

An underground or overhead electrical collector system would be constructed to connect the WTGs to the project substation. The majority of the electrical collector system would be underground. Underground electrical and communication cables would be placed in 3- to 5-foot-wide and 3- to 5-foot-deep trenches, generally along the WTG access roads. Depending on site conditions, trenches would be cut with a backhoe, trenching machine, or rock trencher. Due to the rocky conditions at the project site, several inches of clean fill or concrete slurry would be placed above and below the cables to prevent cable pinching. All cables and trenches would be inspected before backfilling. Once the clean fill covers the cables, the excavated material would be used to complete the backfilling. In areas where solid rock is encountered close to the surface, blasting may be done, or a shallower trench may be cut using rock cutting equipment. The cables would be covered with a concrete slurry mix to protect them and to comply with code and engineering specifications. Excavated soil and rock and larger excess excavated rocks that are not reused in backfilling the trenches would be disposed of at an approved site within the project area.

Overhead pole lines would be used as part of the collector system to avoid trenching in areas of extensive rock or across steep drainages. Additionally, all of the transmission line from the project substation to the BPA switchyard would be constructed using overhead poles. Overhead pole lines require a detailed field survey to determine exact pole locations. As with the underground collector system, overhead poles would generally be routed along the main or WTG access roads.

The sequence for assembling and constructing the wooden overhead poles for the Connected Actions is the same as described above for the Proposed Action.

Project Substation

Construction of the substation and interconnection facilities would involve several stages of work including, but not limited to, grading of the substation area, installing a ground mat, constructing several foundations for the transformers, steel work, breakers, control houses, and other outdoor equipment, erecting and placing the steel work and all outdoor equipment, and completing the electrical work for all of the required terminations.

O&M Facility Construction

The O&M building would have a foundation footprint of approximately 50 by 100 feet. During construction, the O&M facility area would be leveled and graded and would serve as a central base of construction operations with portable toilets and up to eight temporary office trailers in place during the construction phase of approximately eight months.

Any wastewater generated in association with temporary, portable sanitary facilities would be periodically removed by a licensed hauler and brought to an existing municipal sewage treatment facility. Temporary, portable sanitary facilities provided for construction crews would be adequate to support expected on-site personnel and would be removed at completion of construction activities.

A permanent septic system servicing the O&M facility would be constructed in accordance with county and state standards.

Site Clean-up and Habitat Restoration

West Butte Wind would conduct the same site clean-up and habitat restoration activities for the Connected Actions as described for the Proposed Action above.

Other Connected Action clean-up activities might include interior finishing of the O&M building, landscaping around the O&M area, washing of towers, painting of scratches and exposed bolts on WTGs, as well as other miscellaneous tasks that are part of normal construction clean-up.

Construction Compliance and Monitoring

West Butte Wind would use the same construction compliance and monitoring procedures for the Connected Actions as for the Proposed Action.

Energization and Commissioning

When installation of each WTG is complete, it would be inspected and checked for mechanical, electrical, and control completion in accordance with the manufacturer's specifications before being released for start-up testing. A series of start-up procedures would then be performed by the manufacturer's technicians to check systems and commission each WTG to produce power and convey it to the utility power grid. Commissioning is a process requiring approximately 4 to 6 hours per turbine, depending on turbine type and crew size. It would require approximately 1 to 2 months to commission all 52 WTGs. Final testing involves mechanical, electrical, control, and communications inspections and tests to ensure that all systems are working properly.

Electrical tests on the transformers, power lines, and substation are performed by qualified engineers, electricians, and test personnel to ensure that all equipment is operating within industry and manufacturer's tolerances and has been installed in accordance with design specifications. BPA would perform such inspections and tests on the interconnection facilities under their jurisdiction, including their switchyard facility, prior to energizing.

Where necessary, safety signing would be posted around all turbines, transformers, and other high voltage facilities, and along roads, in conformance with applicable state and federal regulations.

2.2.3 Temporary and Permanent Ground Disturbance

The Project Area encompasses about 9 square miles.

Table 2.2-1 summarizes the acreage of temporary and permanent disturbances associated with Alternative 1. This acreage was calculated based on Project design information provided by West Butte Wind or estimates based on industry wide practices.

Table 2.2-1. Land Disturbances Associated with Alternative 1

Project Component	Number or Length of Project Components for Proposed and Connected Actions		Area Temporarily Disturbed (acres) for Proposed and Connected Actions		Area Permanently Occupied (acres) for Proposed and Connected Actions	
	Private Land	Public Land	Private Land	Public Land	Private Land	Public Land
Wind Turbine Generators[1]	52 turbines	0 turbines	104.0	0	3.0	0
Turbine Access Roads[2]	18.0 miles	0 miles	87.0	0	52.0	0
Electrical Collector System[3]	12.5 miles	0 miles	0	0	0	0
Temporary Storage Yards[4]	3 storage yards	0 storage yards	6.0	0	0	0
Main Access Road[5]	4.5 miles	3.9 miles	13.4	11.4	13.4	11.4
O&M Facility[6]	1 building and surrounding area	0 buildings	1.5	0	0.75	0
Electric Substation[7]	1 substation	0 substations	2.0	0	1.0	0
BPA switchyard[8]	1 switchyard	0 switchyards	2.0	0	2.0	0
Above ground 115kV Transmission Line[9]	1.1 miles of line 22 pole structures	3.9 miles of line 69 pole structures	0.9	2.9	0.05	0.16
Meteorological Towers[10]	Up to 3 towers	0 towers	0.06	0	0.06	0
Totals			**216.9**	**14.3**	**72.3**	**11.6**

[1] *Temporary impacts include laydown areas for equipment and cranes (see Figure 2-4). Temporary impact/turbine = 2 acres. Permanent impact/turbine = 2,800 sq feet.*

[2] *No grading necessary for crane path. 18.0 miles of new roads. For impact analysis purposes, it was assumed that during construction the turbine access road width is 40 feet wide throughout its entire length (temporary impact). After construction road shoulders would be revegetated resulting in a permanent 24-foot-wide turbine access road (permanent impact).*

[3] *12.5 miles of new collector lines (assumes 10% is above, 90% buried). The Applicant is staying within the 40-foot temporary impact width for turbine access roads for above and below ground collector line.*

[4] *Area included for concrete batch plant. Temporary impact/storage yard = 2 acres. Permanent impact/storage yard = 0 acres.*

[5] *8.3 miles (3.6 miles on BLM-managed lands and 4.5 miles on private lands) of widening and/or improving existing road; 0.25 miles of new road on BLM-managed land. Temporary impact is 24-foot-wide main access road (.25 miles of new road on BLM-managed land is assumed to temporarily impact the 100-foot right-of-way width). Permanent impact is 24-foot-wide main access road.*

[6] *Temporary impact is 1.5 acres/building. Permanent impact is 0.75 acres/building.*

[7] *Temporary impact is 2 acres/substation. Permanent impact is 1 acre/substation.*

[8] *Temporary impact is 2 acres/switchyard. Permanent impact is 2.0 acres/switchyard.*

[9] *5.0 miles of new transmission line. Temporary impact is 6-foot-wide construction corridor adjacent to the main access road construction corridor (total construction corridor for transmission line and main access road is 30-feet-wide). Permanent impact is 100 sq ft/structure. Overhead transmission line structures assumed to have 100 sq ft of permanent impact per structure; structures assumed to be approximately 300 feet apart, totaling approximately 91 structures for a 5-mile transmission line. For the BLM portion of the transmission line, 3.9 miles of 14.4 kV utility line would be strung with the transmission line from the substation to the switchyard.*

[10] *Up to 3 meteorological towers may be located on private land. Temporary impact is 900 sq ft/tower. Permanent impact is 900 sq ft/tower.*

2.3 ALTERNATIVE 1 - OPERATIONS AND MAINTENANCE

2.3.1 Proposed Action

Operation of the access road and transmission line constructed as part of the Proposed Action would be concurrent to, and necessary for, operation of the Connected Actions.

Roads and Rights-of-Way

To ensure access for maintenance and operation of the Connected Actions, the road located in the BLM ROW would be subject to a periodic servicing plan. Snow removal would be required on higher elevations in the project area. The road would be maintained to ensure the design, safety, and environmental (stormwater and erosion control for example) requirements are met during the life of the project. Maintenance activities could include, as appropriate and needed: periodic grading and compacting of the road surface, maintenance of cut and fill slopes or culverts, grade separations and engineered drainage area maintenance, or replacement of materials such as rip-rap used to prevent soil erosion.

During operation of the facilities located on private and BLM-managed public land, West Butte Wind would undertake ongoing coordination to minimize potential conflicts with current and future uses of these lands.

Transmission Line

Operating the Proposed Action transmission line would be subject to the same requirements as the operating plan for the Connected Actions. The project operating plan includes a 6-month routine of electrical industry standard inspections and maintenance of the electrical transmission facilities. Electrical equipment such as breakers, relays, and transformers generally require weekly visual inspection, which does not affect overall availability, and testing or calibration every 1-3 years, which may force outages. To the extent practical, the short-term off-line routine maintenance procedures are coordinated with periods of little or no generation by the wind farm to minimize the impact to the amount of overall project generation.

Compliance and Monitoring

Design features established for the Proposed Action would be maintained and implemented throughout the operational phase.

2.3.2 Connected Actions

Operations and Maintenance Facility

Approximately 8 to10 permanent employees would staff the O&M facility and supervise operations and maintenance of the West Butte Wind Power Project. Maintenance supplies and spare components would be stored inside the O&M facility. Water for the O&M facility operations would be obtained from one of the existing state permitted wells on private property. Permanent employees would access the O&M facility via the main access road.

Project operation is controlled by a complex, integrated, automatic control system (SCADA) capable of monitoring all operational parameters and starting and stopping each WTG.

Within the O&M facility, a control room would enable staff to remotely troubleshoot WTG faults, start and stop each wind turbine as necessary, and monitor the operation of the project 24 hours a day. Although the project may not be staffed 24 hours a day, operations can be monitored and controlled from a remote control center from which personnel can be dispatched to the site.

Scheduled Maintenance

The project operating plan includes a planned outage cycle that consists of WTG inspections and maintenance after the first two months of operation, a break-in diagnostic inspection, and subsequent servicing every six months. The six-month service routines generally take each WTG offline for just one day. The six-month routines are very rigorous and consist of inspections and testing of all safety systems, inspection of wear-and-tear components such as seals, bearings, bushings, etc., lubrication of the mechanical systems, electronic diagnostics on the control systems, pre-tension verification of mechanical fasteners, and overall inspection of the structural components. Blades are inspected and, if heavily soiled, rinsed once per year to maintain overall aerodynamic efficiency. Electrical equipment such as breakers, relays, transformers, etc. generally require weekly visual inspection, which does not affect overall availability, and testing or calibration every 1-3 years, which may force outages. To the extent practical, the short-term off-line routine maintenance procedures are coordinated with periods of little or no generation to minimize the impact to the amount of overall generation.

In any one day, facility maintenance technicians would be working on only a few of the turbines at a time. Equipment needed for maintenance would be similar to that used during construction, i.e. trucks to move around the site, and hand tools. In rare occasions, if a sizeable component must be removed or replaced, a specialized crane may need to be brought on-site to conduct the needed repairs. Noise emissions from maintenance activities would therefore be related to on-site vehicles and hand tool use. Once or twice a year grading equipment would be brought on the site to maintain the access roads. The noise associated with road maintenance would be similar to that during construction but for a much shorter period of time.

Roads and Rights-of-Way

Maintenance of main and turbine access roads associated with the Connected would be the same as those described above for access roads that are part of the Proposed Action. Under rare circumstances, when a large crane is needed for turbine component maintenance, a 40- to 60-foot-long section of a turbine access road may need to be widened from 24 to 40 feet to accommodate temporary crane installation. After the maintenance activities are completed, the road width would be returned to 24 feet and the disturbed areas would be revegetated in a manner similar to the habitat restoration activities described above. During operation, access to the Connected Action facilities from Highway 20 would be through a locked gate (also limiting access to the Project's main access road that crosses BLM-managed lands).

2.4 ALTERNATIVE 2

If West Butte Wind decides to repower the Project, it would request renewal or extension of the ROW granted by BLM.Alternative 2, the Northern Access Road Alternative and Connected Actions, was developed in response to comments received during the EIS scoping process and to analyze the effects of a project configuration that would further avoid impacts to BLM-managed lands. Based on comments received during the Draft EIS comment period and additional review by BLM staff, Alternative 2 was modified to reduce potential environmental impacts (See Figure 2-1C). This Final EIS characterizes the environmental impacts of Alternative 2 as modified.

The northern access road focuses on providing access to the Connected Action facilities in Crook County from the north. To fully analyze the potential impacts of Alternative 2 in this EIS, assumptions were made as to the location of project facilities that would be located in Deschutes County in Alternative 1; for example, to avoid impacts to BLM lands under Alternative 2, it was assumed that the O&M Facility would be located on private lands in the vicinity of the wind project facilities. It was further assumed that a 14.4 kV Oregon Central Electric Cooperative utility line would be needed to provide lighting and heat for the substation, O&M Facility, and the switchyard. West Butte Wind has not secured access to any of the parcels along the northern access road.

In addition to this northern access road, Alternative 2 would incorporate some elements that are identical to the Proposed and Connected Actions as described for Alternative 1 above, and some that are different, as follows:

Proposed Action – Facilities Identical to Alternative 1

The transmission line described above in Section 2.1.1 would still be proposed on BLM-administered public land to allow interconnection of the wind generation facilities with the BPA transmission system. The facilities and location of the transmission line would be the same as those described above. An Oregon Central Electric Cooperative 14.4 kV line and a communication system line would continue to be strung on the transmission line structures.

Proposed Action – Alternative 2 Specific Differences

It is assumed that the existing BLM road would be acceptable for construction vehicle access to construct the transmission line, and that few, if any, improvements to the existing road would be needed to accommodate these vehicles. The existing road would also be used to provide access to vehicles for maintenance of the transmission line and the BPA switchyard in Deschutes County.

It is assumed that for construction of the transmission line a 12-foot-wide corridor would be needed adjacent to the existing road. Some vegetation may be removed from this temporary construction corridor. Once the transmission line is constructed, the 12 foot corridor would be revegetated.

Connected Actions – Facilities Identical to Alternative 1

The following facilities identical to those in Alternative 1 would be included in Alternative 2:

- 34 to 52 2.0 to 3.0 MW WTGs (total project generating capacity would not exceed 104 MW), located in Crook County;
- about 12.5 miles of underground and overhead 34.5 kV collector lines from the WTG transformers to the project substation, all located in Crook County;
- a project substation located in Crook County which would boost the 34.5 kV turbine production power to 115 kV transmission power;
- 1.1 miles of the 5-mile new overhead 115 kV transmission line to interconnect the project with the existing BPA Redmond-Harney 115 kV line would be constructed on private lands (0.6 miles in Crook County, and 0.5 miles in Deschutes County, 3.9 miles on BLM-managed lands);
- an overhead 14.4 kV power line (owned and operated by Central Electric Cooperative) under-hung with the 115 kV transmission line to supply the switchyard and substation;
- a switchyard located in Deschutes County (to be built, owned, and operated by BPA) at the project interconnect at the existing BPA Redmond-Harney 115 kV line that generally consists of a single line termination, disconnect switches, power circuit breaker, and a 115 kV takeoff structure;
- approximately 18 miles of new turbine access roads (in Crook County);
- up to 3 meteorological towers, about 262 feet high, to collect wind condition data at the site, all located in Crook County.

Connected Actions – Alternative 2 Specific Differences

Northern Access Road

Approximately 7.8 miles of main access roads would be constructed from Reservoir Road to intersect with the turbine access roads in Crook County (widening or improving existing roads). The northern access road would originate at Reservoir Road and travel south along Cascade Way through the Juniper Acres Development. After leaving the Juniper Acres Development, the road would generally follow a southeasterly course for approximately 1.5 miles and climb the north slope of West Butte to provide access to the portion of the Connected Action WTG facilities. The northern access road would require West Butte Wind to acquire or obtain an easement through approximately 60 parcels along Cascade Way currently in private ownership (zoned EFU1 or Exclusive Farm Use Juniper Acres (EFUJA);see Figure 2-2) (Crook County GIS, 2010).

The main access road would be designed and constructed using the same design features described in Section 2.2.1 for Alternative 1. Approximately 6 miles of the road (primarily the area along Cascade Way) would have a temporary and permanent construction width of 24 feet. The existing roadbed of Cascade Way would be widened and upgraded. Approximately 1.8 miles of road would be located in the steep areas on the northern slope of West Butte and would require a 40-foot construction width to accommodate typical maximum 8 percent grades needed for transportation of wind turbine parts. The permanent width of the road in this steep section would be 24 feet.

Operations and Maintenance Facility

The Project O&M facility would be located in Crook County; however, the configuration, construction, and operation of the facility would be identical to that described above for Alternative 1. The O&M facility would require West Butte Wind to acquire or obtain an easement through approximately four parcels along Cascade Way currently in private ownership (zoned EFU1; see Figure 2-2) (Crook County GIS, 2010).

Central Electric Cooperative Utility Line

A 5.5 mile overhead 14.4 kV power line (owned and operated by Oregon Central Electric Cooperative) would be constructed to supply the O&M building in Crook County. The line would be located adjacent to the northern access road and would extend from the substation and end at the O&M building. It is estimated that the line would be hung on single wooden pole structures with dimensions and installation similar to the transmission line described in Section 2.1.1, spaced 300 feet apart, resulting in approximately 96 poles. For construction, a 6-foot corridor adjacent to the road construction corridor would be needed, with some removal of vegetation to accommodate equipment needed to install the poles and string the lines. This corridor would be revegetated after construction is completed. The line would be located entirely within Crook County.

The corresponding temporary and permanent footprint associated with Alternative 2 is shown in Table 2.4-1. The acreages presented in this table were calculated based on Project design information provided by West Butte Wind or estimates based on industry wide practices.

Table 2.4-1. Land Disturbances Associated with Alternative 2

Project Component	Number or Length of Project Components for Proposed and Connected Actions		Area Temporarily Disturbed (acres) for Proposed and Connected Actions		Area Permanently Occupied (acres) for Proposed and Connected Actions	
	Private Land	Public Land	Private Land	Public Land	Private Land	Public Land
Wind Turbine Generators[1]	52 turbines	0 turbines	104.0	0	3.0	0
Turbine Access Roads[2]	18.0 miles	0 miles	87.0	0	52.0	0
Electrical Collector System[3]	12.5 miles	0 miles	0	0	0	0
Temporary Storage Yards[4]	3 storage yards	0 storage yards	6.0	0	0	0
Main Access Road[5]	8.4 miles	0.9 miles	23.5	2.8	20.7	2.8
O&M Facility[6]	1 building and surrounding area	0 buildings	1.5	0	0.75	0
Electric Substation[7]	1 substation	0 substations	2.0	0	1.0	0
BPA switchyard[8]	1 switchyard	0 switchyards	2.0	0	2.0	0
Above ground 115kV Transmission Line[9]	1.1 miles of line; 22 pole structures	3.9 miles of line; 69 pole structures	1.8	5.7	0.05	0.16
Aboveground 14.4 kV Utility Line[10]	5.5 miles of line; 96 pole structures	0.0 miles of line; 0 pole structures	4	0.0	0.2	0.0
Meteorological Towers[11]	Up to 3 towers	0 towers	0.06	0	0.06	0
		TOTAL	**231.9**	**8.5**	**79.8**	**3**

[1] *Temporary impacts include laydown areas for equipment and cranes (see Figure 2-4). Temporary impact/turbine = 2 acres. Permanent impact/turbine = 2,800 sq feet.*

[2] *No grading necessary for crane path. 18.0 miles of new roads. For impact analysis purposes, it was assumed that during construction the turbine access road width is 40 feet -wide throughout its entire length (temporary impact). After construction road shoulders would be revegetated resulting in a permanent 24-foot-wide turbine access road (permanent impact).*

[3] *12.5 miles of new collector lines (assumes 10% is above, 90% buried). The Applicant is staying within the 40-foot temporary impact width for turbine access roads for above and below ground collector line.*

[4] *Includes area for concrete batch plant. Temporary impact/storage yard = 2 acres. Permanent impact/storage yard = 0 acres.*

[5] *Six miles of 24-foot-wide temporary and permanent impact and 1.8 miles of 40-foot-wide temporary and 24-foot-wide permanent impact.*

[6] *Temporary impact is 1.5 acres/building. Permanent impact is 0.75 acres/building.*

[7] *Temporary impact is 2 acres/substation. Permanent impact is 1 acre/substation*

[8] *Temporary impact is 2 acres/switchyard. Permanent impact is 2.0 acres/switchyard.*

[9] *5.0 miles of new transmission line. This impact includes a 12-foot wide construction (temporary) corridor for purposes of developing the transmission line. Overhead transmission line structures assumed to have 100 sq ft of permanent impact per structure; structures assumed to be approximately 300 feet apart, totaling approximately 91 structures for a 5-mile transmission line. A 14.4 kV utility line and a fiber optic line would be strung with the transmission line from the substation to the switchyard.*

[10] *5.5 miles of 14.4 kV utility line would be strung adjacent to the road (approximately 96 poles:); Up to 6-foot-wide construction corridor would be used as a temporary construction corridorfor stringing the overhead transmission line. Overhead transmission line structures are assumed to have 100 sq ft of permanent impact per structure; structures are assumed to be approximately 300 feet apart.*

[11] *Up to 3 meteorological towers may be located on private land. Temporary impact is 900 sq ft/tower. Permanent impact is 900 sq ft/tower.*

2.5 ALTERNATIVES 1 AND 2 - POTENTIAL MITIGATION MEASURES

Mitigation measures are actions that may reduce, avoid, or compensate for effects of the Alternatives. Actions are only termed mitigation measures if they have not been incorporated into the Proposed Action or Alternatives. If mitigation measures are incorporated, they are called design features, not mitigation measures. A large number of mitigation measures have already been agreed to by West Butte Wind and incorporated into the design features of the Alternatives. For example, to limit effects on birds and bats, the Applicant agreed to bury 90% of the electric collector lines between turbines, and to install raptor protection devices on all overhead electric transmission lines.

BLM must explore all "relevant, reasonable mitigation measures that could improve the project," even if they are outside the jurisdiction of BLM (see Question 19b, CEQ, Forty Most Asked Questions Concerning CEQ's NEPA Regulations, March 23, 1981). BLM must explore mitigation measures that would reduce or eliminate the effects of a non-federal action when it is a Connected Action to BLM Proposed Action. For such non-federal actions, the relevant, reasonable mitigation measures are likely to include mitigation measures that would be carried out or enforced by other federal, state or local regulatory agencies or tribes. Identifying mitigation outside of BLM jurisdiction serves to alert other agencies that can implement the mitigation.

BLM must consider onsite mitigation (within the Project Area), as well as offsite mitigation. BLM Instruction Memorandum (IM) No. 2008-204 says,

> BLM has an obligation to approve only land use authorizations that are consistent with its mission and objectives. This may mean that BLM may be unable to permit certain land use authorizations without appropriate mitigation measures. Onsite mitigation alone may not always be possible or sufficient…offsite mitigation may be an effective management tool to ensure appropriate land use authorizations.

Offsite mitigation may be performed on federal lands, or on non-federal lands with the agreement of the owner. BLM must obtain written assurances from the owner that mitigation conducted on non-federal lands will receive adequate management and will provide adequate protection during the expected lifetime of the development project.

IM No. 2008-204 directs BLM to,"…mitigate impacts to an acceptable level onsite whenever possible…Offsite mitigation is not to become the default practice…"

While the EIS must identify potential mitigation, and describe the effects of implementing (or not) such mitigation, the Prineville District Manager may decide to include many, few, or none of these measures in the Record of Decision (ROD). If the decision is to select Alternative 1 or 2, the ROD will describe the mitigation to be adopted, the effects that will be mitigated, the effects that remain unmitigated, and an explanation of why the selected Alternative will not cause unnecessary or undue degradation. If the District Manager believes the mitigation that is likely to occur would not adequately mitigate Project effects, the decision is likely to be for Alternative 3, No Action (deny the ROW).The table below summarizes potential mitigation measures and the concern behind the proposal. Effects of mitigation are discussed in Chapter 4.

Table 2.5-1. Potential Mitigation Measures

Concern	Potential mitigation measures . . .	
	…that would reduce or avoid impacts	**…that would compensate for impacts**
Effects of turbine noise and/or habitat fragmentation (from roads, powerlines, turbines) on **sage grouse.** Most habitat within the Project Area is high quality nesting/summer habitat critical for sage grouse survival and production and is key in providing connectivity for the central Oregon sage-grouse population. The affected habitat in the Project Area is resilient, above 5,000 feet elevation, in good or better ecological condition (as defined by NRCS site guides), and is used year round by sage grouse. The proposed turbines (in Alternatives 1 and 2) are within ¼ mile of a sage grouse lek ODFW defines the area within 3 miles of a lek as Category 1 Habitat, and encourages no development in these areas.	**Modify turbine layout:** do not place turbines within 1 mile of sage grouse leks	**Purchase conservation easements** on private land of comparable value and condition as land in Project Area before implementation. The easement would be on land at risk of development.
		Cut juniper on private land of comparable value and condition as land in Project Area before implementation.
		Construct and maintain wildlife watering facilities at least 3 miles away from turbines and powerlines, in occupied sage grouse habitat within the central Oregon population, in an area where water is currently limiting.
Effects of turbine noise and/or habitat fragmentation (from roads, powerlines, turbines) on **shrub steppe habitat** (important to a number of wildlife species).	**Consolidate turbines, reduce number of turbines, or utilize larger turbine generators**	**Purchase conservation easements** on private land of comparable value and condition as land in Project Area before implementation. The easement would be on land at risk of development.
		Cut juniper on land of comparable value and condition as land in Project Area before implementation.
		Construct and maintain wildlife watering facilities on comparable land at least 3 miles away from turbines and powerlines.
Effects of aboveground electrical lines on **raptors** (collision, electrocution) and **sage grouse** (powerlines and other tall structures can serve as perches for raptors that hunt sage grouse).	**Bury all electric lines** (transmission and collector).	**Implement an avian fatality monitoring plan** designed by ODFW, USFWS and BLM to increase knowledge of local avian population and the effects of this and similar projects. Institute additional mitigation to benefit birds if fatality thresholds are reached.

Concern	Potential mitigation measures . . .	
	…that would reduce or avoid impacts	…that would compensate for impacts
Effects of turbines on **bats** (bats can be killed by direct collision with turbine towers and blades, and by damage to lungs from low pressure created by rotating turbine blades).	**Limit turbine cut in speeds** on all turbines to 6.5 mph year round	**Implement a bat fatality monitoring plan** designed by ODFW, USFWS and BLM to increase knowledge of local bat population and the effects of this and similar projects. Plan would include acoustical surveys at a minimum of 10 sites within Project Area to determine bat migration pattern and local movement, and surveys at 30 meters above ground level for 14 consecutive nights during migration period.
	Limit turbine operations (season, time of day, cut in speeds) to reduce bat fatalities (when monitoring indicates mortality over a certain threshold).	

2.6 PROJECT DECOMMISSIONING

At the end of the project lifetime, West Butte Wind would initiate project decommissioning. The activities associated with decommissioning are described below. The BLM will only have control over the decommissioning actions conducted on BLM-administered public land.

Proposed Action

The design life of the Proposed Action is concurrent with the design life of the Connected Actions. As described below, the Proposed Action would therefore have an initial expected lifetime of 20 years, which could be extended to 30 years or more. At the end of its useful life, the Proposed Action would either undergo renovation to support a repowering of the Connected Actions, decommissioning or re-evaluation of project features (roads)

If West Butte Wind decides to repower the Project, it would request renewal or extension of the ROW granted by BLM. If BLM renews or extends the ROW authorization the roads would continue to be used without any changes If BLM terminates the ROW, the project would proceed to decommissioning.

If West Butte Wind decides to decommission the wind farm, the Proposed Action would also be decommissioned. The short-term goal of reclamation would be to stabilize disturbed areas as rapidly as possible, thereby protecting sites and adjacent undisturbed areas from degradation. The long-term goal would be to return the land to approximate pre-disturbance conditions. The following actions would be expected to be implemented as part of decommissioning of the Proposed Action:

- Prior to the termination of the ROW authorization, a decommissioning plan would be developed by West Butte Wind and approved by the BLM. The decommissioning plan would include a site reclamation plan and monitoring program. This plan would

identify and discuss the proposed decommissioning activities and how they would comply with the applicable regulatory requirements

- All management plans, design features, and stipulations developed for the construction phase would be applied to similar activities during the decommissioning phase.
- All structures associated with the Proposed Action would be dismantled and removed from the site. This would include all transmission structures and equipment.
- The access road constructed as part of the Proposed Action would be reclaimed and reseeded to its original use, unless the public/BLM wishes to use it for other purposes.
- Topsoil from all decommissioning activities would be salvaged and reapplied during final reclamation. If additional topsoil is necessary, it would be imported from private property.
- All areas of disturbed soil would be reclaimed using weed-free native shrubs, grasses, and forbs, in accordance with BLM requirements.
- The vegetation cover, composition, and diversity would be restored to approximate predisturbance conditions.

Connected Actions

The design life of the wind energy facilities making up the Connected Actions is generally 20 years. However, assuming that there is future demand for the electricity generated by the project, old or worn components could be replaced or upgraded. As such, the operation life could be extended to 30 or more years (note that West Butte Wind has established an agreement with the private landowner to operate the project for 30 years). As noted above, West Butte Wind would make the decision to decommission or repower the project. The BLM would not have control over decommissioning activities conducted by West Butte Wind on privately owned land.

If decommissioned, all structures and equipment at the project site would be dismantled and removed, and the land surface would be restored as close to the original condition as practical. Reclamation would be completed on all disturbed areas to comply with county policies. The short-term goal of reclamation would be to stabilize disturbed areas as rapidly as possible, thereby protecting sites and adjacent undisturbed areas from degradation. The long-term goal would be to return the land to approximate predisturbance conditions. Distribution lines and structures would also be dismantled and removed.

As described above, West Butte Wind would prepare a decommissioning and reclamation plan. The following Connected Action facilities would be removed at decommissioning:

- Nacelles, blades and towers would be removed (some roads may need to be widened for equipment access during removal if equipment is to be reused by another owner, but may not be if units are fully “scrapped” out).
- Foundations would be removed to a level 3 feet below the existing grade. Concrete within 3 feet of the surface would be jack-hammered out and bolts cut off, and the material would be disposed of at an approved location.

- Overhead poles and electric lines would be completely removed.
- If the substation is utility owned, it may remain to be used as part of the utility service for other projects or businesses. This would be a utility decision. A project owned-substation would be removed at decommissioning.
- Underground collection lines would be cut off 3 feet below grade. The buried cable would be left in place.
- Roads would be reclaimed and reseeded to their original use, unless the private landowner wishes to use them for ranching or other purposes.

At the end of the projected life of the wind farm and expiration of leases, leases that were not renewed would require full decommissioning of that portion of the project as described above. If a portion of the project were to remain in operation and some new leases negotiated, some units may have to be decommissioned and collection lines rerouted if new ROW cannot be negotiated.

2.7 ALTERNATIVE 3

Alternative 3 is the No Action Alternative. For this analysis, the No Action Alternative would be for the BLM to deny the ROW authorization, preventing the construction of the West Butte Wind Power Project on BLM or private lands. The effects to the environment (both positive and negative) that would result due to construction and operation of the project, that are described in detail in Chapter 3, would not occur as part of the No Action Alternative, and existing land uses in the project area would be unchanged. The environmental effects of the No Action Alternative are discussed in Chapter 3.

2.8 SUMMARY OF EFFECTS

Table 2.8-1 summarizes the effects of Alternatives 1 and 2 on the elements of the environment considered in detail in Chapter 3. Alternative 3 would not result in a change to the existing conditions of any of the resources characterized in Chapter 3.

Table 2.8-1. Summary of Effects Identified and Analyzed in Chapter 3 for each Affected Resource

Affected Resource and Issue	Alternative 1 Proposed and Connected Actions	Alternative 2 Northern Access Road Alternative and Connected Actions	
Soils - Erosion and compaction	• Soil disturbance (mixed soil horizons, increased erosion, and compaction).	• Same impacts as Alternative 1.	•
Soils - Temporary and permanent soil disturbance	• Approximately 224 acres of soil temporarily disturbed. • Approximately 82 acres of soil permanently disturbed.	• Approximately 223 acres of soil temporarily disturbed. • Approximately 80 acres of soil permanently.	•
Water Quality and Quantity - Impacts to Surface Water	• 13 drainage crossings, with potential increased runoff, sedimentation, and peak flow rates alternations.	• 14 drainage crossings with potential increased runoff, sedimentation, and peak flow rates alternations.	•
Water Quality and Quantity - Ground Water	• Estimated 12.4 million gallons of construction water over an eight-month period. • Less than 500 gallons of O&M facility operations water per day.	• Effects would be the same as described for Alternative 1.	•
Vegetation - Temporary and permanent vegetation disturbance	• Temporary disturbance of 224 acres of vegetation; permanent removal of approximately 82 acres.	• Temporary disturbance of 223 acres of vegetation; permanent removal of approximately 80 acres.	•

Affected Resource and Issue	Alternative 1 Proposed and Connected Actions	Alternative 2 Northern Access Road Alternative and Connected Actions	
Vegetation - Role in soil stabilization	• Vegetation removal would reduce evapotranspiration, water uptake, and soil stabilization.	• Effects would be the same as described for Alternative 1.	•
Vegetation - Introduction of Invasive Species	• Potential for propagation of invasive and noxious plant species.	• Effects would be the same as described for Alternative 1.	•
Birds - Fatalities due to collisions	• Small number of collisions with construction vehicles. • Possibly 25 to 150 passerine fatalities per year from wind energy facilities and operation equipment.	• Effects would be the same as described for Alternative 1.	•
Birds - Displacement	• Approximately 211 acres of construction area with noise impacts within 2,500 feet. • Facility operations and activity noise.	• Effects would be the same as described for Alternative 1.	•
Birds - Habitat Fragmentation and Loss	• Habitat fragmentation. • Changes in bird behaviors. • Approximately 42 acres reduction in sagebrush habitat. • Approximately 12 acres reduction IN juniper woodland habitat.	• Effects would be the same as described for Alternative 1.	•

Affected Resource and Issue	Alternative 1 Proposed and Connected Actions	Alternative 2 Northern Access Road Alternative and Connected Actions	
Bats – Collisions	• Possibly 36 to 177 bat fatalities per year from turbine collisions.	• Effects would be the same as described for Alternative 1.	•
Bats - Displacement	• Potential displacement caused by operation activity, noise.	• Effects would be the same as described for Alternative 1.	•
Bats – Loss of Habitat	• Approximately 0.4 acre reduction in ponderosa pine habitat.	• Effects would be the same as described for Alternative 1.	•
Big game and Other Mammals – Displacement	• Temporary displacement of big game during construction and human presence.	• Effects would be the same as described for Alternative 1.	•
Big game and Other Mammals – Habitat Fragmentation and Loss	• Approximately 194 acres loss of winter range habitats for pronghorn, mule deer, and elk.	• Effects would be the same as described for Alternative 1.	•
Special Status Bird Species	• Impacts described for birds above would apply to special status bird species.	• See description for birds above.	•
Greater Sage Grouse – Mortality and Lek Abandonment	• A slight increase in sage grouse mortality could result from wind turbine collisions, transmission interconnect lines, and vehicles. • Potential abandonment of West Butte leks.	• Effects would be the same as described for Alternative 1.	•

Affected Resource and Issue	Alternative 1 Proposed and Connected Actions	Alternative 2 Northern Access Road Alternative and Connected Actions	
Greater Sage Grouse – Habitat Fragmentation and Loss	• Some localized impacts caused by fragmentation. • 1 percent reduction of sagebrush within 3 miles of known leks. • Limited access to adjacent habitat, particularly Bear Butte leks.	• Effects would be the same as described for Alternative 1.	•

Affected Resource and Issue	Alternative 1 Proposed and Connected Actions	Alternative 2 Northern Access Road Alternative and Connected Actions	
Greater Sage Grouse – Displacement	• Transmission lines and wind turbines could be used as perch locations by raptors, causing sage-grouse to avoid these areas. • Noise from increased road density could result in reduction of sage-grouse use of leks within 0.8 mile of roads. • The area from which sage-grouse would be displaced can not be quantified because of the variable conditions of the natural environment and the project features (e.g., location of birds relative to project facility, type and timing of project operations at each facility, presence of raptors, and topographical or micro-habitat features of the area that may protect or reduce potential disturbance from the project).	• Effects would be the same as described for Alternative 1. • Additional 5.5 miles of overhead utility line along northern access road could cause displacement over a larger area than Alternative 1.	•

Affected Resource and Issue	Alternative 1 Proposed and Connected Actions	Alternative 2 Northern Access Road Alternative and Connected Actions	
Special Status Species: Green-tinged paintbrush	• Temporary disturbance of about 1 percent and the permanent removal of about 1 percent of habitat.	• Effects would be the same as described for Alternative 1.	•
Special Status Species: Pygmy Rabbit	• Potential impacts to habitat and small number of individuals from construction activity. • Loss of sagebrush habitat.	• Similar impacts to Alternative 1.	•
Recreation – Access to BLM-Managed Lands	• Temporary construction access restrictions to main access road on BLM lands.	• Temporary construction access restrictions to BLM road adjacent to new 115 kV transmission line corridor.	•
Recreation – Noise	• Recreationists may perceive noise during construction and operation.	• Same as described for Alternative 1.	•
Recreation –Other	• Elimination of 3.65 miles of rugged trail miles. Reduction of 0.25 trail miles. • Potential long term reduction of 3.90 trail miles.	• Same as described for Alternative 1	•

Affected Resource and Issue	Alternative 1 Proposed and Connected Actions	Alternative 2 Northern Access Road Alternative and Connected Actions	
Visual Resources	• Temporary construction impact to the visual quality of the landscape. • Operation impacts to visual quality from WTGs=. • Depending on location and distance, neighboring residences could experience visual impacts.	• Effects would be the same as described for Alternative 1. • Operation impacts to residential visual quality from northern access road and 14.4kV utility line to • O&M building.	•
Cultural Resources	• Historic period and archeological resource sites were identified during surveys. Avoidance of identified resources will be performed; however, where avoidance is not practicable, additional field investigations and research would be undertaken to assess resource significance. • Potential impacts on historic Prineville to Lakeview Wagon Road.	• Effects would be the same as described for Alternative 1.	•

Affected Resource and Issue	Alternative 1 Proposed and Connected Actions	Alternative 2 Northern Access Road Alternative and Connected Actions	
Socioeconomic/Environmental Justice – Economic Conditions	• Depending on location and distance, neighboring residences could experience noise, traffic, and visual impacts. • Construction and operations jobs created: approximately 76 direct, full time equivalent (FTE) positions, 354 indirect FTE positions, and 151 induced FTE positions. • Construction spending in Oregon would reach approximately $38 million; O&M spending would be approximately $1.6 million annually. • Minor increase in the need for short-term housing, goods, services, and community facilities in Bend, Redmond, and Prineville during construction.	• Effects would be the same as described for Alternative 1.	•

Affected Resource and Issue	Alternative 1 Proposed and Connected Actions	Alternative 2 Northern Access Road Alternative and Connected Actions	
Socioeconomic/Environmental Justice – Environmental Justice	• No disproportionate impact would occur on any population, including low-income or minority populations.	• Effects would be the same as described for Alternative 1.	•
Greenhouse Gas Emissions	• Construction would produce approximately 1227.0 metric tons of CO_2. • Operation would produce 2839.7 metric tons of CO_2.	• Effects would be the same as described for Alternative 1.	•

Chapter 3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

An environmental impact is a change in the status of the existing environment as a result of the Project. Impacts can be direct, indirect, or cumulative; positive (beneficial) or negative (adverse); and permanent (long-term) or temporary (short-term). Direct impacts are those that are the result of construction, operation and/or maintenance, whereas indirect impacts generally occur following construction and may not be directly related to the Project Area. Short-term impacts are associated with the construction phase of the Project, while long-term impacts remain for the life of the Project and potentially beyond. Cumulative impacts are the impacts on the environment which result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions.

The Proposed Action under consideration in this EIS is BLM's authorization of a 3.9-mile ROW across federal administered lands for the construction and operation of an access road and transmission line. As noted in Chapter 2, CEQ regulations and BLM's National Environmental Policy Act (NEPA) implementing policy also require that the analysis consider actions that are connected to BLM's issuance of a ROW authorization. This chapter therefore discusses the affected environment and environmental consequences associated with the Proposed and Connected Actions (together making up Alternative 1), the Northern Access Road Alternative and Connected Actions (Alternative 2) and the No Action Alternative (Alternative 3).

Potential impacts on the following elements were considered in this EIS:

- Soils
- Water Quality and Quantity (Surface, Ground, Drinking)
- Vegetation
- Wildlife
- Special Status Species
- Recreation
- Visual Resources
- Cultural Resources
- Socioeconomics/Environmental Justice
- Greenhouse Gas Emissions

As appropriate, the analysis of the alternatives incorporates by reference the analysis in the BLM Wind Energy Development Programmatic EIS and the associated Record of Decision (BLM, 2005b). The BLM Wind Energy Development Programmatic EIS analyzes potential adverse impacts to natural and cultural resources that could occur during each phase of wind energy development as well as possible mitigation measures. The analysis in this Draft EIS builds on the analysis in the BLM Wind Energy Development Programmatic EIS and is more site-specific in nature.

3.2 SOILS

3.2.1 Affected Environment

The Project Area is located in the Bear Buttes complex, an area that consists of several geological formations. The main large area of West Butte itself consists of Neogene Volcanic Rock. The east portion of the ridges running northeast to Bear Buttes is part of the Harney Basin Volcanic field structure. Neogene sedimentary rock is located on the south immediate flank of West Butte. The intermediate plateau to the south of West Butte is made up of the High Lava Planes Volcanics. Quaternary surficial deposits are located on the Millican Valley floor adjacent to Highway 20.

Figures 3-1A and 3-1B illustrate soil mapping units in the Project Area. According to the Natural Resource Conservation Service (NRCS) Soil Survey (Myhrum and Ferry, 1999) for the Upper Deschutes River Area, the majority of bedrock in the vicinity of the Project Area is covered by a relatively thin soil layer up to 20 inches thick. The majority of the soils are indicated as being poor relative to construction use due to shallow depth, erosion potential, and/or low strength (NRCS, 2009). Soils in the Project Area consist primarily of well-drained sandy loam, loam, and rocky outcrops. Slopes range from nearly flat to up to 70 percent (NRCS, 2010c). Soils are generally moderately to highly susceptible to water or wind erosion throughout the Project Area, due to the lack of thick vegetative cover and dry conditions. Over the past 100 years, soil resources in the region have been used to support vegetation consumed by grazing activities.

Soil mapping units and their characteristics in the Project Area are identified in Appendix D. Forty-seven soils are within the Project Area. The study area for the analysis of soil impacts is the temporary and permanent footprint of Alternatives 1 and 2, respectively.

3.2.2 Impacts of Alternative 1 — Proposed and Connected Actions

The Project would impact soils during construction, maintenance, and decommissioning activities. Appendix D-2 identifies the acreages of soil mapping units that would be impacted by the temporary or permanent footprint of Project components for Alternative 1, as identified in Table 2.1-1 in Chapter 2. As a result of Alternative 1, approximately 223.5 acres of soil would be temporarily impacted, and 81.5 acres would be permanently impacted.

Direct impacts to soils would include vegetation removal, soil exposure, mixing of soil horizons, and short-term susceptibility to wind and water erosion. Soil disturbance would result from site clearing, excavation activities, and access road construction/grading. After construction is complete, the disturbed areas outside the permanent road width for the Proposed Action would be restored to 24 feet wide.

Erosion is a continual natural process that can be accelerated by human disturbance. Soils most susceptible to wind and water erosion are those with low cohesion, low permeability, high surface slope and/or long slope lengths, and soils exposed to water and wind with little vegetation or surface protection. Disturbances may result from overgrazing, hot burns in dry and less resilient soil areas, motorized recreational use, and road clearing without erosion

control measures. Drought and dry conditions would reduce the vigor of vegetation and increase the bare interspaces between plants. Drought conditions would increase the soils susceptibility to erosion under intense summer thunderstorms and wind events. During construction, existing vegetation would be removed and the risk of erosion from water or wind may increase. All of these disturbance activities would lead to conditions that could cause moderate to severe erosion potential of soils.

Heavy construction equipment traffic may result in soil compaction, which results in degraded soil structure and reduced soil porosity. This may increase runoff potential. Construction equipment traffic during wet soil conditions may also result in soil rutting, which displaces the soil from its natural position. Although surface soils may not need to be removed from the construction zone, regrading may occur to create relatively level working areas, and rock and/or gravel are expected to be laid down to give these areas all-weather accessibility and to support the weights of vehicles and staged equipment. Regardless of whether regrading occurs, the soils in these lay-down areas may be compacted as a result of construction and transportation vehicle traffic and the temporary storage of equipment and construction materials.

The implementation of design features (Chapter 2 and Appendix B) and revegetation of temporarily disturbed land would minimize impacts to soil resources from construction and operation of the Project.

Excess excavated rock that arises through the activities described above would be disposed of on private land in the Project site at approved (and if appropriate, permitted) disposal areas. Excess excavated soils would be segregated and used for habitat restoration activities at the site. Larger excavated rocks would be disposed of at approved sites or crushed and re-used on-site as backfill or roadway material. Placement of excess rocks in jurisdictional waterways would only occur if permitted by appropriate state and federal agencies.

During trenching or other excavating operations, the topsoil and subsoil would be separated from the underlying less productive soil substratum and bedrock. Refilling of the trench would occur first with soil substratum and bedrock, followed by subsoil material, and finally with topsoil that contains organic matter and live soil organisms to increase the success of seeding and rehabilitation efforts. Soils found to be less resilient may require numerous reseeding efforts to be successful. The higher areas on West Butte will be more resilient to rehabilitation efforts than the dryer lower elevation areas on BLM-managed land.

After construction, the soil conditions would stabilize with time, particularly with implementation of design features during the construction phase. Once stabilization has occurred, the environmental impact during the operation phase would largely be limited to soil erosion induced by vehicle traffic on unpaved roads.

3.2.3 Impacts of Alternative 2 – Northern Access Road Alternative and Connected Actions

The types of impacts to soils resulting from Alternative 2, the Northern Access Road Alternative and Connected Actions would be the same as for Alternative 1, including

vegetation removal, soil exposure, mixing of soil horizons, and short-term susceptibility to wind and water erosion. The area affected would also be similar to but slightly less than the area affected by Alternative 1 because the length of the main access road would be slightly shorter (7.8 miles, versus 8.4 miles for Alternative 1). While most of the access road would be on existing road requiring only a 24-foot wide construction area, larger constructions areas (40-foot width) are needed in the steeply sloped section up to the top of the butte to provide adequate stabilization of the roadbed and adjacent slopes. The total area of temporary soil disturbance would be approximately 223.3 acres for Alternative 2, nearly identical to the approximately 223.5 acres for Alternative 1. Approximately 79.5 acres would be permanently affected, compared with 81.4 acres for Alternative 1. Similar to the Proposed Action, the areas temporarily disturbed by construction would be restored and the permanent access road would be maintained at 24 feet wide. Future maintenance or decommissioning activities would require further disturbance of soils to temporarily widen the access road (40 feet) to accommodate large equipment.

Soil disturbance would increase the risk of erosion, which is of particular concern in areas where the northern access road crosses streams. Increased erosion in these areas could lead to increased sedimentation in streams and increased water turbidity, which adversely affects water quality.

The implementation of design features (described in Chapter 2 and Appendix B) and revegetation of temporarily disturbed land would reduce impacts to soil resources from construction and operation of Alternative 2. Once stabilization has occurred the environmental impact during the operation phase would largely be limited to soil erosion induced by vehicle traffic on unpaved roads.

Appendix D-3 identifies the acreages of soil mapping units that would be impacted by the temporary or permanent footprint of Project components for Alternative 2, as identified in Table 2.1-2 in Chapter 2.

3.2.4 Impacts of the No Action Alternative

No facilities would be built under this scenario. Over the past 100 years, soil resources in the region have been used to support vegetation consumed by grazing activities. This would remain the primary use of soils for the reasonably foreseeable future and would account for impacts under the No Action Alternative.

3.3 WATER QUALITY AND QUANTITY (SURFACE, GROUND, DRINKING)

3.3.1 Affected Environment

The Project Area is within the Deschutes Basin Groundwater Study Area[1] (Deschutes River Conservancy (DRC), 2010a). Geologic and hydrologic investigation suggests that surface water and groundwater in this basin are hydraulically connected. A study entitled *Ground-Water Hydrology of the Upper Deschutes Basin, Oregon* was completed by the U.S.

[1] http://or.water.usgs.gov/projs_dir/deschutes_gw/basin_map.pdf

Geological Survey (Gannett et al., 2001). The study confirmed that underlying aquifers are recharged by snowmelt and that aquifer discharge provides much of the surface water to streams in the Deschutes Basin (DRC, 2010a). The study area for water resources is the Project Area.

Surface Water

The Project is located in the Bear Creek Buttes system. Most of the development activity would take place on West Butte and its adjacent ridges. Generally the Project is in an area that is relatively dry, with flowing surface water limited to snowmelt or storm events. There are no major streams or waterways in the Project Area. The minor drainage channels and arroyos that cross the Project Area drain into the Millican Valley to the south and the Williamson Creek drainage to the north. Some of the access roads would cross minor dry drainage channels and arroyos.

Figures 3-2A and 3-2B illustrate watersheds and spring locations in the Project Area. A single pond of less than 0.1 acre is located in the northeast portion of the Project Area. Its presence is likely a source of year-round water for wildlife (Northwest Wildlife Consultants (NWC), 2008). The Project is not located within a 100-year floodplain as determined by review of local County Flood Control Department maps (FEMA, 2009).

Groundwater

Figures 3-2A and 3-2B illustrate well locations in the Project Area. The Deschutes Formation is the principal aquifer unit in the upper Deschutes Basin (Gannett et al., 2001). Existing groundwater supplies are used for household uses, a rock quarry, and for supply of water for cattle ranching operations. No irrigation of crops occurs in the Project Area.

Multiple observation wells lie within the vicinity of the Project Area. The observation well DESC 5751 in Section 4 of T19S R14E had a static water level of 950 feet below land surface (Gorman, 2009). DESC 5757 in Section 34 of T19S R16E had a static water level of 462 feet below land surface and yielded 15 gallons per minute with 1 foot drawdown (Gorman, 2009). A well (DESC 45210) in Section 5 of T20S R16E was drilled in 2007 and yielded 35 gallons per minute at a depth of 565 feet below land surface (Gorman, 2009).

Most municipal water systems in the Upper Deschutes Basin continuously pump between 1,000 and 2,000 gallons per minute, or 2.23 and 4.45 cubic feet per second (cfs) (Gorman, 2009). The cumulative total of all consumptive uses of groundwater in the basin as of the mid 1990's was estimated at 30 cfs (Gannett et al., 2001). Most municipal water systems in the basin pump continuously between 1,000 and 2,000 gallons per minute (Gorman, 2009). This equates to approximately 2,880,000 gallons per day, and the sum total of all municipal pumping has not caused water levels to decline in the basin (Gorman, 2009). The groundwater in the area is recharged by rainfall or snowmelt. The aquifer's average annual recharge is about 3,800 cfs (Gannett et al., 2001).

3.3.2 Impacts of Alternative 1 - Proposed and Connected Actions

Construction of the Project would require water for road construction, dust abatement, concrete batch plant operation, and the wash-out facility for noxious weed control. Total maximum water usage for construction of the Project is estimated at about 9,842,000 gallons (30 acre feet).

Road construction for the main access road and turbine access roads would require approximately 15 truck trips per day hauling 2,000 gallons for 120 days (30,000 gallons per day, or 3,600,000 total gallons for construction, 11 acre feet). Dust control during road construction would require similar volumes of water – approximately 15 truck trips per day hauling 2,000 gallons for 120 days (30,000 gallons per day, or 3,600,000 total gallons for construction, 11 acre feet). After road construction is completed, dust abatement during the rest of the construction process would require about 10 truck trips per day hauling 2,000 gallons for another 120 days (20,000 gallons per day, or 2,400,000 total gallons, 7.3 acre feet).

For each turbine, concrete foundation construction would use 150 cubic yards of concrete and slurry, which requires 30 gallons of water per cubic yard of concrete. This equates to 4,500 gallons of water per concrete foundation, which totals 234,000 gallons of water for 52 turbines (0.7 acre feet). Water would be brought in by tanker truck and stored in a portable construction site tank. Truck washing for noxious weed control would require between 4 and 20 gallons per truck, assuming 90 percent recovery of the water (USDA, 2005). Approximately 280 to 400 trucks would be used throughout construction, totaling approximately 8,000 gallons used for noxious weed control.

Operation of the Project would require water use. Water for the O&M facility operations would be obtained from one of the existing state permitted wells on private property. Operations would use less than 500 gallons per day at the O&M building, which can be accommodated by the on-site well.

Surface Water

The Project has the potential to impact existing drainages and downstream watercourses through increased runoff, sedimentation, and alterations of peak flow rates. However, appropriate design features would be incorporated into the Project that would minimize the potential for such impacts (Appendix B). These design features include installing culverts at access road crossings of drainages and implementing a project-specific SWPPP in compliance with state standards. For Alternative 1, the main access road crosses 10 stream locations (five intermittent and five ephemeral) and the turbine access roads cross three stream locations (one intermittent and two ephemeral). Up to 13 culverts would be installed, depending upon the conditions of these stream crossings. Additionally, areas temporarily disturbed by construction would be revegetated to help control surface runoff.

The single pond found within the Project Area would not be impacted. During operation of the Project, surface water control methods installed during construction would be maintained to ensure proper operation.

Groundwater

Construction water needs would be supplied by three existing state-permitted wells located on the West Butte Ranch (private lands). Up to 5,000 gallons of water per day may be drawn from each well for commercial use without any further water rights or permits (ORS 537.545). The Project Area falls within the Deschutes Groundwater Mitigation Area (OAR 690-505). Water use within this area requires groundwater permit applicants to acquire groundwater mitigation credits to receive groundwater permits (DRC, 2010a). These credits mitigate for the effects of new water use on stream flow in the lower Deschutes River (DRC, 2010a). Temporary credits are established through instream leases; clients purchase credits annually to mitigate for their water use (DRC, 2010a).West Butte Wind would monitor and track construction water use and would purchase mitigation credits through the DRC to offset withdrawals in excess of the permitted amount for these wells. West Butte Wind may also use magnesium chloride or another dust abatement product for dust control, which would reduce the amount of water needed.

Most municipal water systems in the basin pump continuously between 1,000 and 2,000 gallons per minute (Gorman, 2009). This equates to approximately 2,880,000 gallons/day and the sum total of all municipal pumping has not caused water levels to decline in the basin (Gorman, 2009). The groundwater in the area is recharged by rainfall or snowmelt (Gorman, 2009).

Operation of the Project would not adversely affect groundwater quantities and groundwater quality. Ground water would be extracted in accordance with the limits of the state-administered well permits. As described in Chapter 2 and Appendix B, West Butte Wind would implement design features to prevent and control spills of hazardous materials to avoid contamination of groundwater supplies.

3.3.3 Impacts of Alternative 2 -Northern Access Road Alternative and Connected Actions

The Northern Access Alternative and Connected Actions would have the same types of impacts to surface water and groundwater as those described for Alternative 1. Water demand for construction would be within the range identified for the Proposed and Connected Actions and would be brought in by tanker truck. It is assumed that water for the O&M facility operations would be obtained from an existing or new domestic well.

Surface Water

Building new road segments and upgrade existing road segments (i.e., along Cascade Way) would require placement of culverts at stream crossings to manage flow during wet seasons. For Alternative 2, the main access road crosses 11 stream locations (seven intermittent, three ephemeral and one perennial) and the turbine access roads cross three stream locations (one intermittent and two ephemeral). Up to 14 culverts would be installed, depending upon the conditions of these stream crossings.

Cascade Way crosses the 100-year floodplain of Perry Creek (FEMA, 1989). Measures to minimize effects on water quantity and quality would be implemented, as described in

Chapter 2 and Appendix B. Stream crossings would be designed to avoid changes to stream hydrology and the floodplain of Perry Creek.

Groundwater

As noted for Alternative 1, potential impacts on ground water would result from groundwater withdrawals or from contamination resulting from uncontrolled spills of hazardous materials. It is anticipated that ground water withdrawals for constructing and operating Alternative 2 would be approximately the same as for Alternative 1. The Northern Access Alternative would therefore have the same effects on groundwater quality and hydrology as noted for Alternative 1 and the same design features would apply. Spill prevention and control design features implemented for Alternative 1 would also be used in Alternative 2, and the risks and impacts of such spills to ground water quality would therefore be minimized.

3.3.4 Impacts of the No Action Alternative

No facilities would be built under this scenario and no additional impacts on water resources would result. Use of water resources under this alternative would primarily support grazing activities on BLM-managed land and possible future residential development on private land.

3.4 VEGETATION

3.4.1 Affected Environment

The Project Area is located where several ecoregions converge (Omernik, 1987). Generally, the region is dominated by arid tablelands, intermontane basins, dissected lava plains, and scattered mountains. The Project Area consists of a series of buttes and draws. The topography is rather gentle with very little in the way of escarpments, cliffs, or talus, with none being of a size large enough to warrant mapping. Temperature and precipitation in the Project Area are dependent on elevation but are generally arid, with the area receiving approximately 11 inches of precipitation annually (Western Regional Climate Center, 2009). During the driest months (July through September) precipitation averages less than an inch a month (Myhrum and Ferry, 1999). This arid landscape is dominated by drought-tolerant species such as cool season grasses, sagebrush, juniper, and ponderosa pine.

Field surveys of vegetative communities and habitats were conducted from spring to early fall 2008 in the Project Area (NWC, 2008). The primary vegetative community is shrub-steppe, with sagebrush throughout. However, there is a large—and increasing—western juniper component. It is likely weeds, such as knapweed, are scattered in patches throughout the Project Area. In 2009, prescribed burns occurred on the north and west slopes of West Butte on BLM-managed lands.

Figures 3-3A and 3-3B illustrate vegetative communities in the Project Area. Table 3.4-1 displays vegetative communities for the Project Area. Data from the 2008 field surveys and Gap Analysis Program (GAP) were combined to display vegetative communities for the entire Project Area (field survey data alone was inadequate). The study area for the analysis of impacts to vegetation is the temporary and permanent footprint of Alternatives 1 and 2 respectively.

Table 3.4-1. Vegetative Communities in the West Butte Wind Power Project Area

Vegetative Community[1]	GAP (acres)	Northwest Wildlife Consultants, Inc. 2008 (acres)	Total Acres In Project Area (acres)
Riparian Meadow	0.0	51.2	51.2
Big Sagebrush Shrubland/Steppe	19913.1	2459.2	22372.3
Low or Dwarf Sagebrush Steppe	1049.2	1216.5	2265.7
Ponderosa Pine Forest and Woodland	18.3	63.6	81.9
Western Juniper Woodland	19486.2	1251.9	20738.1
Pond	0.0	0.1	0.1
Developed	0.0	24.6	24.6
Total	**40466.8**	**5067.1**	**45533.9**

1 Data provided by NW Wildlife Consultants inc. and the Oregon GAP Analysis Program.

Based on 2008 field surveys, native vegetation remains in good ecological condition (NWC, 2008). Juniper woodlands are increasing due to fire suppression and other factors such as drier climatic conditions, decrease in proportion of grasses (primarily from grazing), and increasing CO2 levels that benefit large, woody perennial plants. The plant species present are those appropriate to healthy, undisturbed areas, though it is difficult to assess whether the proportions of those species have changed as a result of grazing. Non-native plant species are confined to relatively small areas primarily adjacent to existing roads.

In general, the Project Area is susceptible to the introduction of invasive species through existing grazing practices and road usage. Both Crook County and Deschutes County maintain a list of Class A, Class B, and Class C noxious weeds. Table 3.4-2 lists the Class A (those receiving highest priority for control) noxious weeds, by county.

Table 3.4-2. Class A Noxious Weeds in Crook and Deschutes Counties

Class A Noxious Weeds	Crook County	Deschutes County
African rue (*Peganum harmala*)	X	X
Buffaloburr (*Solanum rostratum*)		X
Common houndstongue (*Cynoglossum officinale*)		X
Dalmation toadflax (*Linaria dalmatica*)	X	
Dyers woad (*Isatis tinctoria*)		X
False brome (*Brachypodium sylvaticum*)		X
Hydrilla (*Hydrilla verticillata*)		X
Jointed goatgrass (*Aegilops cylindrical*)	X	

Class A Noxious Weeds	Crook County	Deschutes County
Leafy spurge (*Euphorbia esula*)	X	X
Meadow knapweed (*Centaurea pratensis*)		X
Mediterranean sage (*Salvia aethiopis*)	X	X
Medusashead rye (*Taeniatherum caput-medusae*)		X
Musk thistle (*Carduus nutans*)	X	X
Orange hawkweed (*Hieracium aurantiacum*)		X
Perennial pepperweed (*Lepidium latifolium*)	X	X
Purple loosestrife (*Lythrum salicaria*)	X	X
Rush skeleton weed (*Chondrilla juncea*)	X	X
Russian knapweed (*Centaurea repens*)		X
Saltcedar tamarix (*Tamarix ramosissma*)		X
Scotch thistle (*Onopordum acanthium*)	X	X
Squarrose knapweed (*Centaurea virgata*)	X	X
Sulfur cinquefoil (*Potentilla recta*)		X
Tansy ragwort (*Senecio jacobaea*)	X	X
Whitetop hoary cress (*Cardaria spp.*)		X
Wild carrot (*Caucus carota*)	X	X
Yellow starthistle (*Centaurea solsititialis*)	X	X

Source: Deschutes County Noxious Weed List (2010) and Crook County Noxious Weed List (2007)

A review of NWI maps identified approximately 15 acres of NWI wetlands within the Project Area (NWI, 2009). The NWI wetlands are generally in the same locations as the springs identified on Figures 3-2A and 3-2B. There are several springs within the area that have been diverted into cattle troughs/tanks. Cattle use of the springs has not been controlled by fences or other methods; therefore, the concentrated use of springs by cattle likely precludes suitable conditions for wetland or riparian vegetation. A single pond of less than 0.1 acre is located in the northeast portion of the Project Area. However, the pond does not support wetland or riparian vegetation and therefore is not classified as a wetland (NWC, 2008).

Minor drainage channels and arroyos along West Butte drain into the Millican Valley to the south and the Williamson Creek drainage to the north. While most of the development activity would take place on the top of West Butte and its adjacent ridges, access roads would cross minor dry drainage channels and arroyos. Based on NWI data, there is an intermittent stream that flows into Daly Reservoir. This stream crosses the existing access road on BLM-managed public land, about a half mile south of the Project Area. Given the limited consistent water, riparian vegetation in these drainages is limited.

3.4.2 Impacts of Alternative 1 - Proposed and Connected Actions

Table 3.4-3 identifies the acreages of vegetation types that would be impacted. Direct impacts on vegetation would include temporary and permanent vegetative loss associated with the construction, operation, and maintenance of the Project. Temporary impacts on vegetation would be minimized and possibly avoided during construction by implementing the design features described in Chapter 2 and Appendix B.

Table 3.4-3. Alternative 1 Temporary and Permanent Vegetative Community Disturbances

Vegetative Community	Temporary Disturbance BLM Land (acres)	Temporary Disturbance Private Land (acres)	Total Temporary Disturbance (acres)	Permanent Disturbance BLM Land (acres)	Permanent Disturbance Private land (acres)	Total Permanent Disturbance (acres)
Riparian Meadow	0.0	0.9	0.9	0.0	0.9	0.9
Big Sagebrush Shrubland/Steppe	4.2	108.9	113.1	3.1	37.3	40.4
Low or Dwarf Sagebrush Steppe	1.4	65.6	67	1	21.5	22.4
Ponderosa Pine Forest and Woodland	0.0	1.6	1.6	0.0	0.4	0.4
Western Juniper Woodland	8.7	28.2	36.9	2.3	9.7	12
Developed	5.3	6.1	11.4	5.3	6.0	11.3
Total	**19.6**	**211.3**	**230.9**	**11.7**	**75.8**	**87.4**

The impacts of temporarily removing vegetation would include a temporary reduction in evapotranspiration, water uptake, and soil stabilization, which would lead to increased water runoff and erosion. Temporary impacts to vegetation would be avoided and minimized during construction by following the design features described in Chapter 2 and Appendix B. The impacts of permanently removing vegetation for turbines and access roads would also include a reduction in evapotranspiration, water uptake, and soil stabilization, which would lead to increased water runoff and erosion. Routine maintenance of the access road and turbines would include trimming grasses or shrubs and trees along the edges of the permanent footprint of the Project.

Any ground disturbing or construction activity has the potential to further propagate invasive and noxious plant species populations in the location of the Project, either through introduction from other areas or through natural propagation. Seeds can easily be introduced into these areas via construction vehicles that have been in other areas where invasive species are present. Construction activities could introduce invasive species not only into the disturbed areas of the Project site itself, but also into the surrounding vegetation

communities. Invasive vegetation could also be introduced in the soils used to backfill and grade portions of the construction site. Depending on the source of the fill, it may contain seeds or other propagules that could result in the introduction of invasive species.

West Butte Wind would develop and implement a plan for control of noxious weeds and invasive species. The plan would address monitoring, education of personnel on weed identification, the manner in which weeds spread, and methods for treating infestations. The use of certified weed-free mulching would be required. If trucks and construction equipment arrive from locations with known noxious weed problems, a containment area would be established to inspect construction equipment arriving at the Project Area, and clean contaminated equipment by washing to remove and collect seeds from tires and other equipment surfaces. Wash water and soil/seeds collected during the washing would be disposed of at an approved location, such as a landfill, to ensure the seeds are not re-introduced into the environment. Additionally, only clean fill material from a weed-free source would be used.

As previously discussed, the concentrated use of springs by cattle likely precludes suitable conditions for wetland plant species. Because there are no wetlands in the vicinity of facilities to be located on BLM or private lands for the Project, no impacts to riparian vegetation would occur. The access road and transmission line corridor would be built on uplands, avoiding springs and minor dry drainage channels. The design features described in Chapter 2 and Appendix B would minimize impacts to riparian vegetation, if encountered.

3.4.3 Impacts of Alternative 2 – Northern Access Road Alternative and Connected Actions

The Northern Access Alternative and Connected Actions would have the same types of impacts on vegetation as those described for Alternative 1. Vegetation loss would result in reduction in evapotranspiration, water uptake, and soil stabilization, which would lead to increased water runoff and erosion. As noted in Table 3.4-4 (and as compared to Table 3.4-3) construction and long-term use of the access road would require short- and long-term removal of vegetation similar to Alternative 1. As for Alternative 1, vegetation in areas used temporarily for construction of Alternative 2 would be replanted and restored to preconstruction conditions to the extent practicable.

There are no wetlands in the vicinity of the proposed Northern Access Road Alternative or Connected Actions (USFWS, 2010). Riparian vegetation may exist along the stream corridors in the vicinity of the access road alignment (e.g., along Williamson Creek). However, no construction activity would occur within the riparian area and no impacts to riparian vegetation would occur.

Design features to minimize vegetation impacts and plans to control propagation of noxious weeds and invasive species, as presented in Chapter 2 and Appendix B, would also be implemented under Alternative 2.

Table 3.4-4. Alternative 2 Temporary and Permanent Vegetative Community Disturbances

Vegetative Community	Temporary Disturbance BLM Land (acres)	Temporary Disturbance Private Land (acres)	Total Temporary Disturbance (acres)	Permanent Disturbance BLM Land (acres)	Permanent Disturbance Private land (acres)	Total Permanent Disturbance (acres)
Riparian Meadow	0.0	0.0	0.0	0.0	0.0	0.0
Big Sagebrush Shrubland	1.9	4.4	6.3	1.9	4.4	6.3
Big Sagebrush Steppe	2.3	96.7	99.0	0.1	26.3	26.3
Developed	0.1	0.1	0.2	0.0	0.0	0.0
Dwarf Shrub-Steppe	1.0	63.2	64.2	0.0	19.7	19.8
Juniper Woodland	1.9	24.7	26.6	0.1	8.8	8.8
Low-Dwarf Sagebrush	0.0	1.7	1.7	0.0	1.7	1.7
Ponderosa Woodland	0.0	1.4	1.4	0.0	0.4	0.4
Western Juniper Woodland	1.2	22.6	23.8	0.9	15.2	16.1
Total	**8.5**	**214.9**	**223.3**	**2.9**	**76.6**	**79.5**

3.4.4 Impacts of the No Action Alternative

No facilities would be built under this scenario. Wildlife use, continued livestock grazing, recreation in accordance with approved management plans on BLM-managed lands and prescribed burns may impact vegetation under the No Action Alternative. On BLM-managed lands, grazing is expected to continue as the primary land use. Future residential developments on private lands may also impact vegetation.

3.5 WILDLIFE

This section describes the general wildlife species either known to occur or to potentially occur in the vicinity of the Alternative 1 (Proposed and Connected Action) and Alternative 2 (North Access Road Alternative), summarizes results of the wildlife studies that characterize the existing wildlife present at the Project site, and describes potential impacts on wildlife and their habitats from construction and operation of the Project. The wildlife species that are considered by the agencies to have a special status are discussed in more detail in Section 3.6.

Information on wildlife resources in the Project Area were obtained from a variety of sources including species lists, recovery and management plans, technical reports, and peer-reviewed journal articles. Local wildlife biologists with the BLM and ODFW provided information on

species and habitats within the Project Area. Additionally, NWC conducted field investigations and biological studies of the Project Area between November 2007 and October 2008 (NWC, 2008) and again during the spring of 2009 (NWC, 2010). These studies represent the best available information specific to the Proposed and Connected Actions. The field investigations and biological studies included:

- avian use surveys (large-plot, using variable circular-plot method (Reynolds et al., 1980));
- small-plot avian surveys (fixed-radius points (Ralph et al., 1993), breeding passerines);
- special status wildlife surveys (fixed transects);
- ground-based lek censuses (ground-based censuses (Connelly et al., 2003));
- aerial raptor nest survey; and
- bat species inventories (acoustical monitoring).

The field investigations and biological studies did not specifically focus on the route of the Northern Access Road Alternative. However, inferences on the general wildlife found in the vicinity of Alternative 2 were drawn from the NWC studies and agency biologists.

3.5.1 Affected Environment

Direction for management of BLM administered lands within the Project Area is "primary wildlife emphasis area" (see Upper Deschutes RMP). Management direction is to provide habitat that benefits wildlife and retains high wildlife use. Specifically this plan directs BLM to 1) maintain large unfragmented patches (1,000 to 2,000 acres), 2) advance habitat effectiveness toward 70 percent or greater, 3) maintain seasonal closures, 4) manage for low densities of open motorized travel routes, 5) apply group use restrictions, and 6) prioritize restoration treatments here if necessary.

The habitat within and adjacent to the Project Area includes big-sagebrush steppe, low sagebrush-steppe, juniper woodland, riparian meadow, and isolated patches of ponderosa pine woodland. These habitats are described in detail in Section 3.4. Much of the juniper currently found in the Project Area is relatively young, suggesting recent encroachment facilitated by fire suppression and active cattle grazing. Due to the lack of development on and around West Butte, habitat in the Project Area is in relatively good condition. Most of West Butte has been managed for cattle grazing, while management of the surrounding area has included seasonally restricted OHV use.

Generally, wildlife species in the Project Area are those associated with shrub-steppe habitat including both big sagebrush and low sagebrush steppe, but also includes species that use areas of juniper and ponderosa pine. Alternative 1 and 2 lies on the border of two separate ecoregions of central Oregon's high desert plateau: the Blue Mountain Ecoregion and the Northern Basin and Range Ecoregion (Thorson et al., 2003). More specifically, the Project lies within the John Day/Clarno Uplands and Deschutes River Valley. West Butte is a

prominent feature in the area – an extinct volcano that rises more than 2,000 feet above the valley floor to an elevation of about 5,800 feet. Included below is a discussion of birds, bats, other mammals, and reptiles and amphibians, and their use of the Project Area.

Birds

Various migratory and resident bird species can be found resting, foraging, and/or breeding in the Project Area. Approximately 56 native landbird species are highly associated breeding species in shrub steppe habitats. Relatively few species of landbirds are supported by shrub-steppe habitat (Altman and Holmes, 2000), but several species are dependent upon this vegetation type for specific life history traits. These include the shrub-steppe obligates (such as greater sage grouse, sage sparrow, sage thrasher, and Brewer's sparrow) and other non-obligate species (such as burrowing owl, Swainson's hawk, ferruginous hawk, loggerhead shrike, long-billed curlew, upland sandpiper, and black-throated sparrow). Within the Columbia Plateau, Greater sage grouse, loggerhead shrike, and Brewer's sparrow are all showing declining trends due to loss of habitat, while others, including the sage thrasher and ferruginous hawk, find their numbers increasing (Altman and Holmes, 2000). More specific to the Project Area, ferruginous hawks in the Brother's area (Millican-Hampton-Christmas Valley) appear to be stable.

Migration Routes

Oregon lies within the Pacific Flyway, a major bird migration route. From north to south, this flyway comprises the western Arctic, including Alaska and the Aleutian Islands, the Rocky Mountain and Pacific Coast regions of Canada, the United States and Mexico, and finally south in Central and South America, where it becomes blended with other flyways. This broad flyway covers coastline, mountains, and rivers that provide food supplies, and a visual "map" for the birds to follow. Birds migrating from the Alaskan Peninsula follow the coastline to near the mouth of the Columbia River, then travel inland to the Willamette River Valley before continuing southward through interior California (as cited in BLM, 2005b). Birds migrating south from central Canada pass through portions of Montana and Idaho and then migrate either eastward to enter the Central Flyway, or turn southwest along the Snake and Columbia River valleys and then continue south across central Oregon and the interior valleys of California. The central Canada to California route is not as heavily used as some of the other migratory routes in North America (as cited in BLM, 2005b).

Although the Project site is located east of the main migration corridor, a number of migratory bird species pass through the Project Area during the spring or fall migration, or during other seasonal movements. Based on the species and species density data collected during field surveys, the area does not appear to be within a major migratory pathway (NWC, 2008). There are no distinct topographic or landscape features that would funnel or concentrate migrating birds through the Project Area. Further, the Project Area does not appear to provide important stopover habitat for migrating birds dependent on open water and forested environments as stopover habitat. Studies show an increase in seasonal use by passerines and other typical migrants as would be expected for this area, but overall use appears to be low in relation to major migratory corridors within the Pacific Flyway that

contain more water sources (including the Willamette Valley and the foothills of the Cascade Mountains).

More than 90 percent of all western birds use riparian zones as stopover habitat. Due to late summer heat and aridity across much of the Intermountain West and Great Basin areas, montane habitats (highland areas located below the subalpine zone) also serve an important role for many landbird migrants during the late summer molt period and autumn migration, a time period when many lowland areas of the west, including some riparian systems, are extremely arid (Skagen et al., 2004). Neither of these types of habitats is present in the Project Area.

General Bird Use

Survey protocols used to determine bird presence and use of the area were similar to those used at other wind energy development projects in the region. However, no surveys for nocturnal migrating birds were completed as part of these surveys (NWC, 2009; NWC, 2010).

A total of 74 avian species were identified (seven additional species were seen but not identified) during the yearlong surveys (combined small- and large-plot avian surveys), including 69 native species and five non-native species. Eleven species of birds, both resident and migratory were detected during winter surveys, with Townsend's solitaire being by far the most abundant wintering bird. Spring brought an influx of species with 37 different species detected. Twenty-five avian species were detected during summer season surveys and 31 species were detected during fall. The most common species breeding at West Butte appears to be Brewer's sparrow; it was abundant throughout the Project Area. Another common breeder was the vesper sparrow. Both of these species are ground nesters and were commonly observed near or on the ground throughout the Project Area. Passerines were the most numerous group and comprised 85-95 percent of all birds observed (NWC, 2008).

During the winter months four species (Townsend's solitaire, house finch, American robin, and common raven) made up more than 80 percent of all bird detections, with Townsend's solitaire comprising 52 percent of the total. Two species (Brewer's sparrow and mountain bluebird) accounted for more than 50 percent of all summer detections. During fall monitoring, mountain bluebird, American robin, and Townsend's solitaire comprised more than 57 percent of detections.

Townsend's solitaire was the most observed bird species during the studies, being accounted for based on the presence of juniper woodlands in the Project Area. Of the obligate shrub-steppe species, Brewer's sparrow was observed most often, with loggerhead shrike, lark sparrow, sage sparrow, and sage thrasher also being observed but in relatively low numbers. Brewer's sparrow was observed in the surveys with a percent composition of passerines of 5.5 in the spring, 29.75 percent in the summer, and 5.48 percent in the fall. The other species were observed in relative low numbers with a total of 1 sage sparrow (observed in the spring; 0.26 percent composition of passerines), 7 sage thrashers (observed during the summer; 1.7 percent composition of passerines), 1 loggerhead shrike (and 2 nests), and 10 lark sparrows

being observed during the 229 surveys performed. Key habitat features for these species include sagebrush cover (Brewer's sparrow) and sagebrush height (sage thrasher), large unfragmented patches (sage sparrow), interspersion of tall shrubs and openings (loggerhead shrike) and ecotonal edges of herb, shrub and tree habitats (lark sparrow).

Other birds (waterfowl, game birds, non-passerines) comprised about 1 to 3 percent of the total bird species observed. The Project Area does not appear to be a major waterfowl staging area or migration route due to lack of open water or wetland habitats. Two Canada geese flew over during one spring avian use survey. These represent the only waterfowl recorded during any of these studies conducted at the Project. The nearest area regularly used by waterfowl is likely Prineville Reservoir, approximately 10 miles northeast of the Project Area.

Many of the species mentioned above are protected under the Migratory Bird Treaty Act. Additional information about protected or special status species is presented in Section 3.6.

Raptor Use

Raptors accounted for between 1.3 to 3.15 percent of the birds observed depending on the season of all avian detections during the NWC field studies: 1.6 percent during winter; 3.15 percent during the spring; 3.0 percent during the summer; and 1.3 percent during the fall. Mean use of West Butte for all raptor species ranged from 0.03/20-min survey in the winter to 0.23/20-min survey in spring. Raptors observed in the Project Area include American kestrels, prairie falcon, red-tailed hawks, rough-legged hawks, turkey vultures, Cooper's hawks, and golden eagles. Most common raptors were red-tailed hawk and American kestrel but it is likely that other raptor species could also occur in the Project Area, particularly during the winter months or migration periods. These include Swainson's and ferruginous hawks, merlins, peregrine falcons, and great horned owls.

Only one golden eagle was observed during surveys, but a total of four other golden eagle sightings were noted during transit to avian plot locations. Golden eagle use is mostMean use of West Butte for all raptor species ranged from 0.03/20-min survey in the winter to 0.23/20-min survey in spring. prevalent between Horse Ridge and Bear Creek and south to Highway 20. Both West Butte and Bear Butte to the northeast are documented nesting areas. Additional monitoring in 2010 concluded presence of an active golden eagle nest within close proximity to the private land within the project area. Prineville District records documenting golden eagle activity within a 10-mile buffer of the Project Area and proposed ROW indicate that, for decades, this area has been associated with several (at least six) nesting territories and several concentration areas, in all cardinal directions (Hanf 2010b).

Raptor Nests

To evaluate the numbers and distribution of raptors nesting in the area, nest surveys were conducted on May 21 and 22, 2008, and May 22, 2009 (NWC, 2008; NWC, 2010). Helicopter aerial surveys, along with ground surveys were used to locate active raptor nests within a 2-mile radius surrounding the outermost edge of the proposed turbine strings and the

access road route. However, golden eagle territories are much larger than 2 miles, and. USFWS golden eagle protocol is a 10 mile radius.

Twenty-eight nests (5 active, 23 inactive) were observed during the most recent survey (NWC, 2010). This included five active nests of three different species: one Cooper's hawk, one ferruginous hawk, and thee red-tailed hawks. NWC reported two of the nests observed during their surveys appeared to be built by golden eagles but were inactive during 2008 and 2009. However, an April 2010 BLM observation confirmed an occupied golden eagle nest within 2 miles of the Project Area and BLM suspects the nest consisted of an incubating female or a female with small chicks. Later surveys indicate that the nest was abandoned.

As reported by NWC (2008), a nesting attempt could have occurred, but failed by the time of the aerial survey flight. It is also possible that alternate nests are being used by the eagles in this area, within this eagle's home range, but outside of the area covered by the aerial survey. One of these could have been used for nesting the year of the raptor nest survey, indicating inactivity at the site this particular year, but activity could be present at the Project site in future years.

Since 2001, there has been good user compliance with the seasonal closure restricting trail access to OHVs in the vicinity of the nest (Phelps, 2010). No recent population level surveys have been completed specific to golden eagles in the Project Area and adjacent lands. However, earlier studies indicated significant declines in local populations up until the mid-1980s (Kochert, 2002). Good et al. (2004) recently finished survey work that estimated population size and found an overall decline in western North America since the early 1980s as well, with an acceleration of declines coinciding with widespread drought from 1998 to the present.

Bats

Field investigations, conducted by NWC using acoustical monitoring devices for detecting and recording bat echolocation, were conducted July 30, August 29, and September 11, 2008. These dates were all within the period of the year during which bats are known to collide with turbines in the Pacific Northwest and other regions. The objectives of the NWC study were to:

- identify, via acoustical methods, which bat species may be using the study area, and,
- determine if the Project Area is used by silver-haired bat and/or hoary bat, which are migratory species that are known to be impacted by wind turbines located in the Pacific Northwest.

This study was not designed to quantify the number of bats within the Project Area and does not represent a comprehensive survey of the bat species and bat populations that may be using the Project Area. Bat survey effort was extremely limited due to duration of surveys as well as the limited vertical height of the actual survey for detection of high-flying migratory bat species. One water trough survey location did not actually have water in it during the survey.

Four locations within the Project Area were selected for conducting bat inventories. These areas were selected based on a bat habitat field review conducted by NWC in June 2008. Habitat review found that combinations of bat habitat components (food, water, and/or roosting areas) are limited within the Project Area, but potential water sources (cattle troughs) and a ponderosa pine stand have the potential to support bat activity (NWC, 2008).

There are 14 species of bat that inhabit central Oregon. During the surveys, five different bat species were positively identified, and five others were tentatively identified. The species positively identified include: little brown bat, small-footed myotis, long-eared myotis, pallid bat, and Townsend's big-eared bat. The species tentatively identified include: hoary bat, silver-haired bat, big brown bat, California myotis, and Yuma myotis. Surveys for bats outside of summer and early fall were not conducted, nor were hibernaculum searches completed as part the survey (NWC, 2008).

Big Game and Other Mammals

In addition to bats, other mammals present within the Project Area are typical of grazed desert scrub habitat and pinyon/juniper woodlands of the Blue Mountain Ecoregion and the Northern Basin and Range Ecoregion. Mammals occurring in these habitats include pronghorn antelope, mule deer, coyote, elk, black-tailed jackrabbit, raccoon, deer mouse, Belding's ground squirrel, and striped skunk.

Upper Deschutes Resource Management Plan (Upper Deschutes RMP) identifies the Proposed Action in an area of "primary wildlife emphasis" for deer and elk winter range and pronghorn year-round and connectivity habitats." Further, both the Proposed and Connected Actions fall within an area that the Upper Deschutes RMP maps as mule deer and elk winter range. Objective W-4 in the Upper Deschutes RMP, states that "where consistent with habitat capabilities, meet ODFW management objective numbers for deer, elk, and pronghorn."

ODFW data on population estimates for mule deer use of the North Paulina Wildlife Management Subunit (the subunit includes the Project Area and a large part of Crook and Deschutes counties) show a winter population of about 2,500 mule deer – about 45 percent of the management objective for that subunit. The ODFW data indicates that mule deer populations in this subunit, while variable, have shown general pattern of decline since the late 1950s. The North Paulina population appears to have reached a historic low in 2007 (40 percent of management objective), followed by slight increases in 2008 and 2009.

Similar mule deer population trends have occurred statewide. While not fully understood, ODFW believes that recent statewide population declines may likely be attributed to the combined effects of drought and severe winters, which coincided with increased numbers of predators. Historically, mule deer populations have rebounded quickly from these declines; however, in recent years, climatic extremes, low fawn recruitment, changing predator/prey relationships, and increased habitat loss have pushed deer populations lower than ODFW and the public desire. A *Mule Deer Initiative Plan* is currently being developed by ODFW to explore strategies to reverse this trend in five eastern management units. Successful strategies are expected to be applied to other Oregon mule deer units (ODFW, 2009). The presence of

mule deer, pronghorn, and elk was confirmed during the field studies conducted by NWC. No site-specific surveys were conducted for big game, although incidental sightings in the Project were recorded. There were a total of 59 detections of mule deer, primarily during the winter and early spring months. Sightings were all of multiple individuals and group size ranged from 2 to 14 individuals.

Pronghorn were observed during late winter and early spring (with one sighting of a male in July); a total of 99 detections of pronghorn, and group size ranged from 1 to 35 individual pronghorn. Pronghorn were detected on BLM-managed lands (along the proposed access road) at lower elevations in late winter and early spring, especially near a seasonal pond.

Elk were not encountered during the year in which surveys were conducted, but droppings and a shed antler were found.. A water hole located in the Project Area may be important to pronghorn and mule deer – particularly during the fawning season that typically peaks in May to June at this elevation and latitude (Ticer et al., 1999).

The ODFW data indicates that mule deer populations in this subunit, while variable, have shown general pattern of decline since the late 1950s. The North Paulina population appears to have reached a historic low in 2007 (40 percent of management objective), followed by slight increases in 2008 and 2009.

Similar mule deer population trends have occurred statewide. While not fully understood, ODFW believes that recent statewide population declines may likely be attributed to the combined effects of drought and Historically, mule deer populations have rebounded quickly from these declines; however, in recent years, climatic extremes, low fawn recruitment, changing predator/prey relationships, and increased habitat loss have pushed deer populations lower than ODFW and the public desire. A *Mule Deer Initiative Plan* is currently being developed by ODFW to explore strategies to reverse this trend in five eastern management units. Successful strategies are expected to be applied to other Oregon mule deer units (ODFW)

Reptiles and Amphibians

Up to 25 species of reptiles and amphibians occur in the region. Some more common species include western toad, collared lizard, sagebrush lizard, short-horned lizard, western skink, common garter snake, western rattlesnake, rubber boa, western toad. A special status species, sagebrush lizard, was identified during surveys (see Section 3.6).

Based on this lack of habitat it can be assumed amphibian populations on the butte are small. Reptile use on West Butte has not been intensively studied or surveyed. General observations were made of reptile use of the area during special status species surveys but specific reptile studies were not completed (NWC, 2008). Although the area exhibits potential habitat for various species, including the sagebrush lizard, the local geological relief has a low probability of a hibernacula being present due to a lack of rock structure. A single area of rock relief is present in the general Project Area, but this is not in an area that would be disturbed by construction of the Proposed or Connected Actions. The Project Area has limited water supply that would attract amphibians for breeding purposes, however species

such as spadefoot toad may use ponded water during the spring breeding season. Water on the butte is isolated to ephemeral drainages, a single pond in the northeast corner of the Project Area and two spring fed streams less than 3 feet (1 meter) in width. Based on this lack of habitat it can be assumed amphibian populations on the butte are small.

There are currently no known critical breeding habitats or hibernacula for any reptiles or amphibians within or in the vicinity of the project area.

3.5.2 Impacts of Alternative 1 - Proposed and Connected Actions

This section describes the environmental impacts, or potential impacts, on wildlife within the Project Area from implementation of the Proposed and Connected Actions. The impact analysis for all wildlife species follows the same general approach. Impacts were developed based on individual resource effects and if applicable the duration (short-term, long-term) of those effects. The impacts were then identified and assessed based on Project conditions and overall impact through a review of relevant scientific literature, previously prepared environmental documents (e.g., Upper Deschutes RMP), and the best professional judgment of the Project team's resource specialists. Much of the information on the affected environment and potential environmental consequences is derived from detailed technical reports prepared previously by BLM specialists and West Butte Wind and associated subconsultants. These reports are available for review, as they relate to the West Butte Wind Project, at the Prineville District Office.

General wildlife impacts that can be associated with construction and operation of wind energy facilities and related infrastructure are summarized in the BLM Wind Energy Development Programmatic EIS (BLM, 2005b). As specifically addressed within the BLM Wind Energy Development Programmatic EIS, Project related impacts can be broken down between construction and operational effects. Construction related impacts are summarized as follows within the BLM Wind Energy Development Programmatic EIS (BLM, 2005b):

"**Construction activities** may adversely affect wildlife through (1) habitat reduction, alteration, or fragmentation; (2) introduction of invasive vegetation; (3) injury or mortality of wildlife; (4) decrease in water quality from erosion and runoff; (5) fugitive dust; (6) noise; (7) exposure to contaminants; and (8) interference with behavioral activities."

Operational related impacts are summarized as follows within the BLM Wind Energy Development Programmatic EIS (BLM, 2005b):

"Wildlife may be affected by wind energy project operations through (1) electrocution from transmission lines; (2) noise; (3) the presence of, or collision with, turbines, meteorological towers, and transmission lines; (4) site maintenance activities; (5) exposure to contaminants; (6) disturbance associated with activities of the wind energy project workforce; (7) interference with migratory behavior; and (8) increased potential for fire."

These effects are dependent on the location and timing of construction and operational activities that could affect the migratory and other behavioral activities of some species. The collective impact of construction and operational activities on wildlife habitat, individuals,

and/or populations at a wind energy site is dependent on the type and amount of wildlife habitat that could be disturbed, the nature of the disturbance (e.g., temporarily (short- or long-term) or permanently), and the wildlife that occupy the Project site and surrounding areas. Among all Project-related impacts associated to the Proposed and Connected Actions, collisions with facility related structures probably represent the most probable direct impact to wildlife, along with the disturbance to migratory and flight patterns through habitat fragmentation. The construction and operation of turbines, transmission lines, and other facility structures may interfere with behavioral activities, including migratory movements (of bird and bat species), and may provide additional perch sites for raptors, thereby increasing predatory levels on other wildlife (BLM, 2005b).

Both direct and indirect effects could occur to wildlife species as a result of the Proposed and Connected Actions in the Project Area. Direct effects to wildlife are those effects that occur immediately or in close proximity in time of the activity. Indirect effects are those effects that are likely to occur later in time as a result of the activity.

Direct effects could include:

- direct habitat modification and reduction associated with construction clearing or grading;
- introduction of sediment and fugitive dust through erosion and runoff during construction and operation;
- exposure to contaminants that are used during construction and operation; and
- injury or mortality associated with collisions with construction equipment and/or turbines, meteorological towers, and overhead transmission lines.

Indirect effects could include:

- human and habitat disturbances and/or loss that result in habitat fragmentation and/or species crowding in adjacent habitat, interfering with behavior and/or migration;
- introduction of invasive vegetation that could change on-site habitat conditions; and
- interference with behavior or migration from noise created by Project facilities and human activity.

Wildlife that inhabits the Project Area could be affected in the short-term within the immediate area of construction, and in the long-term by the presence of turbines and other Project facilities and the continued maintenance of the Project facilities. Wildlife in surrounding habitats might also be affected if the construction activity (and associated noise) disturbs normal behaviors, such as feeding and reproduction.

Based on studies of existing wind power projects throughout the United States, direct effects are primarily expected to be associated with some bird and bat species. Indirect effects associated with the reduction, modification, and fragmentation of habitat can also be a concern in some cases. For Project related habitat impacts see Table 3.4-3.

Measured use of the site by avian and bat species, in addition to mortality estimates from other existing wind projects, is used to predict mortality of birds from the Project. Post-construction monitoring is proposed to validate mortality predictions and monitor the actual level of mortality resulting from the Project. Long-term monitoring of the Project would assist in understanding the relationships between the Project design, and operation of the facility and its effects on birds and bats in particular.

West Butte Wind is currently proposing to complete systematic post-construction fatality searches for birds and bats during a two-year study period. This monitoring would help determine what avian and bat fatalities or casualties are attributable to the operating wind Project throughout the monitoring period. A sampling approach (a select group of turbines) would be used. Fatalities are defined as any find where death occurred, such as a carcass, carcass parts, bones, or feather spot. Also included are injured birds and bats where cause of the casualty is likely attributable to the operating wind Project. Additionally, avian use and displacement surveys would take place at previously surveyed plots within the wind farm Project boundary during the first and third spring after construction. The purpose of observing and recording avian use on these plots would be to try and determine if any displacement effects have taken place since construction. In addition, these surveys would provide a basis to evaluate, in general terms, whether the species with the highest fatality numbers are also the most common species using the site.

Birds

The regulatory framework for protecting birds includes the Endangered Species Act (ESA), the Migratory Bird Treaty Act (MBTA), Bald and Golden Eagle Protection Act of 1940 (BGEPA), and Executive Order (EO) 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds." No ESA listed species occur in the Project Area. The other regulations are discussed below:

- The MBTA implements a variety of treaties and conventions among the United States, Canada, Mexico, Japan, and Russia. This treaty makes the take, killing, or possession of migratory birds, their eggs, or nests unlawful, except as authorized under a valid permit. ("Take" includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb.) Most of the bird species reported from the 11 western states are classified as migratory under this act. The USFWS maintains a list of migratory birds protected by the MBTA.
- The BGEPA provides for the protection of both bald and golden eagles by prohibiting the take, possession, sale, purchase, barter, offer to sell, purchase or barter, transport, export or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit. USFWS Interim Golden Eagle Inventory and Monitoring Protocols (February 2010) describe subtasks to determine the likely effects of a project of activity on eagles (Pagel et al., 2010).
- Under EO 13186, each federal agency that is taking an action that has or is likely to have negative impacts on migratory bird populations must work with the USFWS to

develop an agreement to conserve those birds. The protocols developed by this consultation are intended to guide future agency regulatory actions and policy decisions.

It is important to note that concerns over avian mortality reflect quality as well as quantity: any loss of neo-tropical migrants or protected birds is cause for concern because these populations are already stressed by habitat loss and other impacts (Johnson et al., 2002).

Direct impacts of wind-energy facilities refer to fatalities resulting from flying birds being killed directly by collisions with wind turbine rotors, meteorological towers, transmission lines and their structures, and construction equipment; habitat loss (resulting in direct bird/nest mortality related to clearing and grading); and introduction of contaminants (through erosion and spills).

Indirect impacts of wind-energy development include disruptions of foraging behavior, roosting, breeding and nesting activities that result from habitat fragmentation, and change in migratory patterns resulting from alterations in landscapes used by birds. Direct and indirect impacts on birds can contribute to increased mortality, alterations in the availability of food, roost and nest resources, increased risk of predation, and potentially altered demographics, genetic structure, and population viability (Kunz et al., 2007a). A 1995 study of wind farm impacts determined that species-specific flight behavior and morphology, presence of migration corridors, aerial extent, topography, and prey abundance, can all influence the potential for avian mortality at a wind power facility (Nelson and Curry, 1995).

Direct Impacts

Collisions

The selection of a wind power Project site in specific types of habitat, number, and diversity of birds in the area, and the behavior of an individual species plays a large role in its risk of collision (USFWS 2003). This is specifically why the BLM Wind Energy Development Programmatic EIS identifies mitigation that encourages developers to identify important, sensitive, or unique habitat and biota in the vicinity of project and sites, and design projects to avoid (if possible), minimize, or mitigate potential impacts to these resources. Once the Project begins operation, the greatest potential for bird impacts is associated with collisions with turbines, meteorological towers, and overhead transmission lines.

Turbine Collisions:

Information about bird fatalities at other wind projects suggests that a wide variety of species and groups are susceptible to collision with turbines. Migrating passerines have been the most abundant avian fatality at other wind projects studied (Johnson et al., 2000a; Erickson et al., 2000; Erickson et al., 2008; Erickson et al., 2004; as cited in NWC, 2008) often comprising more than 80 percent of the avian fatalities (Erickson et al., 2001). Given that passerines make up the majority of the avian observations on-site, it is expected passerines would make up the largest proportion of fatalities at the Project. Species most common to the study area would likely be most at risk, including the American robin, mountain blue bird,

and Townsend's solitaire. Other common species on the site such as the Brewer's or vesper sparrow may also be at risk to colliding with turbine blades; however, these species generally tend to be observed close to the ground and outside of the rotor swept area. Some waterfowl mortality has been documented at other wind projects. However, because of the very low use of the site by waterfowl (one sighting of a pair of Canadian geese flying over the site), little or no mortality to waterfowl is expected from the Project.

For raptors, the specific relationship among flight behavior, topography, and wind movement is central in determining potential fatalities at any wind energy facility (Hoover and Morrison, 2005). Raptors often fly at heights within the blade sweep area (Kinglsey and Whittam, 2003 as cited in BLM, 2005b). Collisions may also be influenced by poor visibility. This has been shown in research where little empirical support has been seen that blade visibility is influential on mortality (Young et al., 2003b). It was observed that birds are usually hit at the outer limits of the rotors where wind vortex effects are greatest and that poor visibility does not appear to increase mortality rates (Barrios and Rodríguez, 2004). Several studies indicate that during fog, birds take flight actions (e.g. change in flight pattern or reduction in flight) which compensate for the reduced visibility (Moyle and Heppner, 1998, Richardson 2000, Piersma et al., 2002). In foggy or inclement weather conditions, golden eagle collisions are not likely to increase. Golden eagle displacement is not expected because golden eagles will continue to be attracted to the wind currents on and around the butte. This is especially important in considering migrant golden eagles. They have not "learned" the site and will be attracted to the butte by the wind.

High raptor collision rates at some wind farms (example, Altamont Pass wind facility as cited in NWCC, 2010) often correlates with high raptor use which in-turn, correlates with high density of small mammal prey and the conditions favorable to high prey densities (Smallwood and Thelander, 2004 and 2008). Golden eagles are open country hunters and shrub-steppe and native grassland communities provide important foraging habitat (Marzluff et al., 1997 and Kochert et al., 2002). Prey density at the West Butte Wind Project was not developed, but would include ground squirrel, sage-grouse, black-tailed jackrabbit and cottontail rabbit, all of which occur at both the high elevation area of the project and the proposed ROW. The Project area consists primarily of big sagebrush and juniper woodland that could preclude or hamper hunting efforts on the slopes of the butte; however, the upper open top and meadow area of the butte and portions of the ROW do provide optimum foraging habitat. Golden eagles need good visibility to spot and then pursue prey; they can cover 100 square miles in any given day. Hunt (2002) points out the role of prey base as an attractant, which puts golden eagle and other raptors at greater risk. Construction of the wind turbines would create open areas and thus hunting opportunities, which could result in higher use of the area by golden eagles for hunting purposes and could lead to additional impacts through collisions within the rotor sweep area. Even though there is an overall loss of habitat due to turbine and road construction, the new environment could actually create more hunting habitat by opening up viable hunting grounds.

Recent studies have indicated that relatively low raptor (e.g., hawks, eagles) fatality rates exist at most modern wind energy developments with the exception of some facilities in parts of California (as cited in NWCC, 2010). As reported in the NWCC (2010) report, the collective raptor deaths associated to collisions with wind turbines reported fewer than 0.2 raptor (all raptor species combined) fatalities per nameplate MW per year at most modern wind farms around the country. Considering these mortality results as well as raptor use estimates at West Butte Wind Project, it is estimated that potential raptor mortality at the project will be within the range of raptor mortality observed at other wind projects in the West and Midwest. However, raptor deaths have been higher than predicted in some instances. For example, in Washington, Klickitat counties Big Horn Wind Energy Project, resulted in an estimated 49 raptor deaths in its first year of operation compared to a predicted number of 33 (Seattle Times, 2009). Estimating bird mortality is difficult quantify as bird abundance and bird mortality through collisions with wind turbines collision are not closely related (Lucas et al., 2008), Similarly, Thelander and Rugge (2000 as cited in BLM, 2005b) determined the relative abundance of a raptor species does not predict the relative frequency of fatalities per species.

Golden eagle fatalities have been recorded at other western wind projects, including the Altamont Pass and Montezuma Hills areas of California, and have also been reported at various wind farms in Oregon, though raptor mortality at modern wind farm facilities is much lower (as cited in NWCC, 2010) due to advances in wind technology, which have been incorporated into the West Butte Wind Project.

Data compiled at various wind farms (WEST, 2006) point to golden eagles flying within the rotor sweep area of modern wind turbines; this indicates that golden eagles could be at relatively high risk of colliding with wind turbine blades within the Project Area due to the local topography and use of the area by breeding and non-breeding birds. Topographic features, including ridge tops and upwind sides of slopes that generate high wind energy, may be especially attractive to raptors, specifically golden eagles, because these areas are favorable for hunting, soaring and flying, as well as for migratory flights (Barrios and Rodríguez, 2004; Hoover and Morrison, 2005); all of which are present in the Project Area.

The NWC study (2008) found that raptor use in the Project Area is lower than at other wind farms operating in the region; however, many of the other wind farms are in cultivated agricultural fields and do not include eagle nest territories or concentration areas.

Although golden eagle use at West Butte is relatively low compared to other wind farms, effects locally could be important due to the close proximity of multiple nests and breeding pairs of golden eagles relative to the Project Area, as well as the relative low population number in the area as reported by BLM staff (2010). As reported by de Lucas et al. (2008), there is no clear relationship between species mortality and species abundance, indicating mortality is more likely to be related to species-specific flight behavior and morphology and/or weather and topography around the wind farm rather than abundance and use of the area. Construction of the Project will result in loss of golden eagle habitat.

Any fatalities to golden eagle as a result of the West Butte Wind Project could result in an incidental taking of an eagle. West Butte Wind would coordinate with the USFWS regarding the potential need to obtain an incidental take permit under the Bald and Golden Eagle Protection Act (see Section 3.6). Additionally, under Executive Order 13186, BLM has responsibility to avoid or minimize unintentional take of golden eagles and take reasonable steps that may include restoring and enhancing habitat. The recent IM 2010-156 Golden Eagle National Environmental Policy Act and Avian Protection Plan Guidance for Renewable Energy provided direction for compliance with the Bald and Golden Eagle Protection Act and is policy targeted at the immediate needs of the golden eagle associated with renewable energy development on BLM administered lands and identifies steps that may be necessary within the habitat of golden eagles to ensure environmentally responsible authorization and development of renewable energy resources. General guidelines for seasonal restriction and distance buffers for golden eagle nests are ¼ to ½ mile during February 1 – August 31 (BLM, 2005a).

Transmission Lines:

Collisions with transmission lines pose a risk to bird species, particularly large bird species (BLM, 2005b). The level of mortality resulting from direct collisions with transmission lines that could occur as a result of a Project depends on the types of birds present at the site, the location of the site with regard to migratory routes, and local weather conditions (e.g., fog, rain, and snow). Some localized mortality to individual birds is expected [this sentence seems to be incomplete or needs a period]

Collisions with powerlines and electrocutions associated with power poles and power lines (APLIC, 2006) have been reported for golden eagles and are expected impacts from the Project. It has been well-documented that avian interactions with powerlines, including electrocutions, collisions, and nest construction, has occurred ever since electrical companies began constructing power lines in rural areas (APLIC, 2006). Seasonal fog and rain coupled with wind have been suggested as contributing to high electrocution risks (Stemer, 2002 as cited in BLM, 2005b). Golden eagles are especially vulnerable due to their size, hunting strategy, and nesting preference. Studies presented in APLIC (2006) indicate between the 1960s and 1990s, 25 percent of all electrocutions and collisions with powerlines and power poles were golden eagles. But this value has been tempered lately with incorporating new technologies and concerted efforts through design and BMPs. An example of this is the Klamath Basin (specifically the Butte Valley) in Southern Oregon and Northern California, which attracts one of North America's largest concentrations of raptors in the lower 48 states. Ninety electrocuted eagles were found between 1986 and 1992 (as cited in APLIC, 2006). During the 1990s, extensive pole retrofitting was complete in the Butte Valley and comprehensive surveys following the retrofit found only four eagle carcasses in 2004. This was mainly attributed to modern design of pole structures. While detection efforts have increased in recent years, modernization of power line design and construction has resulted in a reduction of impact by 22 percent from the early 1990s to the 2000s.

The Project will result in powerline and power pole installation that could cause mortality to golden eagles. Concerted efforts to minimize above-ground line installations combined with incorporating new power pole construction designs will reduce impacts on golden eagle, but not eliminate them. If a fatality were to occur, West Butte Wind would coordinate with the USFWS regarding the potential need to obtain an incidental take permit under the Bald and Golden Eagle Protection Act (see Section 3.6).

According to the Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States (BLM, 2005b), underground (buried) or raptor-safe transmission lines should be used to reduce collision and electrocution. To minimize the risk of collisions with Project structures, West Butte Wind would implement the following design features:

- Within the wind turbine grid, 90 percent buried (vs. overhead) electrical lines near turbine strings, would be used to minimize perching locations and electrocution hazards to birds (no burial of transmission line on BLM);
- all overhead power line conductors would be spaced to minimize potential for raptor electrocution;
- perch guards would be installed on the transmission line structures to minimize risks to raptors; and

Construction Phase:

Other collisions would occur during the construction of the site through activities related to clearing and grading, driving to and from the Project site, and equipment and product delivery and during operation through collisions with turbines, meteorological towers , and operational equipment used to monitor and fix Project equipment (e.g., trucks and cranes).

Information about bird fatalities at other wind projects suggests that a wide variety of species and groups are susceptible to collision with turbines. Design features would be implemented to minimize impact mortalities during the construction of the project: driving speeds would be limited to 25 mph or less; construction grading and clearing would be timed to minimize disturbance during the breeding season; and the relatively slow nature of clearing sites would allow displacement of birds into adjacent habitats limiting collisions of birds with moving construction equipment. Impacts by direct mortality are expected to be much higher during the operation of the facility. Given that passerines make up the majority of the avian observations on-site, it is expected passerines would make up the largest proportion of fatalities at the Project. Species most common to the study area would likely be most at risk, including the American robin, mountain blue bird, and Townsend's solitaire. Other common species on the site such as the Brewer's or vesper sparrow may also be at risk to colliding with turbine blades; however, these species generally tend to be observed close to the ground and outside of the rotor swept area. Some waterfowl mortality has been documented at other wind projects. However, because of the very low use of the site by waterfowl (one sighting of

a pair of Canadian geese flying over the site), little or no mortality to waterfowl is expected from the Project.

West Butte Wind would coordinate with the USFWS regarding the potential need to obtain an incidental take permit under the Bald and Golden Eagle Protection Act (see Section 3.6).

Loss of Habitat and Displacement

Most of the species identified in the surveys conducted for this Project are not dependent on the Project Area to provide all of their habitat requirements (USDA and Hanf, 1994). Many of the bird species are adapted to changing habitat conditions and possess the capability to temporarily expand or shift their home ranges to find alternative sources of food, water, and shelter until habitats become reestablished or the construction action subsides (Taulman, 1998; ODF, 2001).

Some individual birds may be temporarily displaced during construction. However, disturbance would be limited to the duration of construction activities. Project phasing and design features (listed below) would allow individuals to move into undisturbed portions of the Project Area or adjacent habitat during construction and return to the Project Area upon completion of construction, limiting direct mortality associated to land clearing and grading.

Table 3.4-3 lists habitat impacts for sagebrush. Sagebrush impacts would directly impact Brewer's sparrow, sage sparrow, sage thrasher, lark sparrow, and greater sage grouse. Impacts to juniper woodland habitat are shown in Table 3.4-3, which directly impacts birds such as the Ferruginous hawk. West Butte Wind would minimize displacement impacts by using the following design features:

- Prior to construction flagging of any sensitive habitat areas (e.g., raptor nests, greater sage grouse leks, etc.) near proposed areas of construction activity would be completed and such areas designated as "off limits" to all construction personnel;
- Construction in sensitive areas, near active raptor nest sites, would be restricted;
- Prior to construction, training would be provided to construction staff explaining restrictions that protect wildlife, habitat, and critical area features in or near the construction zones;
- Designated construction zones would be enforced and construction personnel would avoid driving over or otherwise disturbing areas outside the designated construction areas; and
- During Project operations, vehicular access to the West Butte area during the sage grouse lekking season (generally late February to late May) would be limited. Maintenance vehicles and general access onto West Butte proper would be restricted until after 11:00 a.m. during lekking season, each year.

Exposure to Contaminants, Erosion and Runoff, and Fugitive Dust

Accidental fuel spills or releases of hazardous materials could result in the exposure of birds at the Project site. Potential impacts to birds would vary according to the material spilled, the volume of the spill, the location of the spill, and the species that could be exposed. Spills could contaminate soils and surface water and could affect birds associated to them. A spill would be expected to have a population-level adverse impact only if the spill was very large or contaminated a crucial habitat area where a large number of individuals were concentrated, conditions of which do not occur within the Project Area. The potential for a population-level event is very unlikely because the amount of fuels and hazardous materials on-site are small, and Project design features include appropriate spill containment measures. An uncontained spill would affect only a limited area. In addition, bird use of the direct construction area would be reduced because birds would be temporarily displaced due to construction activities, thereby reducing the potential for exposure.

Construction activities may also result in increased erosion and runoff from cleared and graded sites. This erosion and runoff could reduce surface water quality in on-site and surrounding water bodies that are used by birds, thereby affecting reproduction, growth, and survival. Surface water in the Project Area is limited and runoff is expected to be non-existent due to the local topography and limited habitat disturbance. The potential for water quality impacts during construction would be short-term in nature for the construction activities and post-construction site restoration. Any impacts to bird populations would be localized to the surface waters receiving site runoff, which only include ephemeral and seasonal streams and spring sources. These sites would be protected using erosion control nest management practices during the Project to minimize these affects.

Limited information is available regarding the effects of fugitive dust from site construction on bird species. Prolonged and high-level exposures to fugitive dust can be expected to cause respiratory symptoms, damage to lung tissue, and depending on the type of dust emissions, carcinogenesis, all of which could lead to premature death. The occurrence of such worst case impacts would be unlikely for the Project as design features would be implemented to minimize construction-related fugitive dust. In addition, birds would avoid direct construction areas where dust emissions would be highest.

Indirect Impacts

Construction activities associated with both the Proposed and Connected Actions could result in indirect impacts to birds species, from Project operation, disruptions of foraging behavior and breeding activities that result from habitat fragmentation, and change in migratory patterns resulting from alterations in landscapes used by birds.

Habitat Fragmentation

Construction activities could result in indirect impacts to golden eagle foraging habitat and disruption of foraging behavior and breeding activities. Long-term habitat impacts would result from permanent changes to vegetation structure, primarily where vegetation would be prevented from re-occupying the area of the Proposed and Connected Action facilities.

Creation of permanent structures and non-natural ground cover areas would convert many habitats to early seral vegetation stages. The mature vegetation removed by clearing would be revegetated with native grasses, which may provide seeds and foliage as food for terrestrial birds, as well as habitat for ground-nesting birds. Where disturbed areas are restored to preconstruction conditions, the effects on habitat support functions would be minimal. Construction disturbances to woody species (sage brush, juniper) would require longer periods to restore to pre-construction conditions.

Land clearing to establish permanent facilities may result in habitat discontinuity or fragmentation of surrounding areas. The amount of habitat that would be physically disturbed by construction would be limited to the temporary disturbance footprint of the Proposed and Connected Actions (see Table 3.4-3). The impacts represent a small fraction of the entire wind energy development site, but of particular importance as it relates to habitat fragmentation is the area within the string of turbines. There is some evidence that some species of birds could avoid areas in and around the WTGs, even if habitat is not directly disturbed.

Clearing of sagebrush habitats associated with construction of the Proposed and Connected Actions, and operations and maintenance activities at the Project would increase the amount of edge habitat in the area. In some situations, habitat fragmentation can have negative effects on species, causing individuals to crowd into remaining patches of habitat or not use available habitat due to the fragmentation (Rich et al., 2005; Altman and Holmes, 2000; Connelly et al., 2004; Knick et al., 2003; Cade and Wood, 1997). This can lead to increased competition for nesting habitat, breeding habitat, and food resources (Piatt et al., 2006; BLM, 2004a; BLM, 2004b; Bird and Schenk, 2005; Hagen, 2005; Rich et al., 2005; Connelly et al., 2004). These cases are most common in forested settings and forest-adapted species where the change in the structure of the habitat can be extreme.

Because the species found in the area are generally adapted to open country, most species are expected to continue to move freely about the landscape. Even though adverse impacts to individuals could be expected based on habitat fragmentation, population level effect are not expected due to the distance at which the turbines are spaced limiting the effect of habitat fragmentation that could occur as a result of the Project. Sage grouse, a species occurring in the Project Area that could be more sensitive to habitat fragmentation is discussed in more detail in Section 3.6.

The Project would be expected to introduce new habitat conditions not already present in the Proposed and Connected Action areas, but it is not expected to interfere with the integrity of interior habitats and/or adjacent habitats based on the minimal footprint of the impact areas. Some areas within the Project Area would be managed to early seral vegetation, but these areas are isolated to roadways, turbine locations, and associated facilities. The conversion of sagebrush and juniper woodland habitat to herbaceous/grassland habitats would not be expected to have an adverse impact on bird populations, specifically sagebrush obligate and raptors in the area. Compatibility with surrounding habitats would be promoted to the extent that the Project Area would temporarily disturb 230.9 acres and permanently disturb 87.4

acres of total of habitat. Birds would be expected to return and resume normal activities consistent with the availability of post-construction habitats in the Project Area with limited changes to local flight and movement patterns over time.

Temporary impacts on sagebrush (low and big) habitat due to construction of the Proposed and Connected Actions would be more short-term than the impacts on forest lands, but regeneration of these areas would still take up to 30 years. Although the structural component of sagebrush habitats would recover slowly, successful restoration of non-woody vegetation may improve the value of forage for some birds within a relatively short time (Paige and Ritter ,1999).

Noise

Noise from wind turbines has diminished as the technology of turbines has improved. Newer turbine blade design results in wind energy being converted into greater rotational torque with less acoustic noise versus early-model turbines. Under most conditions, modern wind turbines are quiet (BLM, 2005b). The relatively remote Project Area has no industrial or commercial noise sources. Existing background noise in the Project Area is expected to be about 32 to 39 dBA; which is common for unpopulated areas. Existing human generated noise in the Project Area vicinity is attributable to: recreational users such as OHVs; occasional low flying aircraft; and traffic on area roads such as State Highway 20.

Noise during the construction phase can be generated by site clearing/excavation, construction of facilities, mechanical, and cleanup activities. For the majority of species, information is unavailable regarding the thresholds at which birds respond to noise (LaGory et al., 2001), with bald eagle being one of the exceptions (Steidl and Anthony, 1996; USFWS, 2007). Sage-grouse sensitivity to noise is discussed in Section 3.6. Research has shown that noise may affect territory selection, territorial defense, dispersal, foraging success, nesting and fledging success, and song learning (as cited in BLM, 2005b). Birds are sensitive to noise levels at 0-10 dB (USDOT, 2010). Birds respond to human activity through three adaptation mechanisms: avoidance, habituation, or attraction (Knight and Temple, 1995).

Avoidance of the area may result in: (a) no measurable effect, (b) reduced fitness, potentially decreasing overwinter survival, or (c) decreased reproduction (that is, individuals may not reproduce or reproduction may be unsuccessful because of decreased available resources or abandonment of offspring to escape disturbance). Sporadic noise associated with heavy equipment, blasting, and construction probably would cause many species to abandon areas directly adjacent to construction, alter use patterns to access habitat when construction would not be occurring, or cause increased energy expenditure.

Abrupt, very loud noise (e.g., blasting) probably would result in “startle” response by all individuals within some distance from the source. The response impact distance is dependent on sound quality, the individual, and the species’ hearing acuity. These events may cause temporary cessation of feeding and perhaps movement away from the disturbance. For nesting birds, “startle” response may cause them to abandon their nest momentarily, which

would lead to increased risk of nest and nestling predation (Bowles, 1995). However, most nest abandonments last for less than 5 minutes (Knight and Temple, 1995). If species adapt by shifting their normal range to avoid disturbance or by occupying unoccupied habitat, the total amount of available habitat for the species would be decreased, unless other individuals of that species are more tolerant of disturbance and occupy the abandoned habitat. If individuals of a species are displaced and do not find unoccupied habitat, that population would suffer from reduced reproduction and, eventually, from decreased population size. As stated above, a variety of adverse effects of blasting noise on birds could be expected, but research on raptors, which could be used to determine effect to passerines and other small birds, indicates these effects to be temporary, with the raptors becoming habituated to the noise (BLM, 2005b).

High levels of continuous noise (e.g., use of diesel generators or operation of the batch plant during construction) may adversely affect foraging, social interaction, and rearing of young (Knight and Temple, 1995). They may reduce reproductive success of individuals, particularly birds, potentially resulting in abandonment of otherwise functional nesting habitat or increased predation (Knight and Temple, 1995; LaGory et al., 2001). Over time, some species or individuals may adapt to the continuous noise either through changes in temporal allocation of resources or by reoccupying some portions of their habitat as they become accustomed to the disturbance (Peeke and Herz, 1973; Borg, 1981; LaGory et al., 2001). Reproduction should rebound over the long-term as the animals become habituated (Andersen, 1990).

The response of birds exposed to the same disturbance repeatedly with no accompanying harassment declines rapidly over time (LaGory et al., 2001). Most nesting birds appear to become at least partially habituated if direct harassment would not occur. After habituation, birds generally show minimal increased nesting failure because of disturbance (Andersen, 1990; Black et al., 1984). This would not mean that wildlife would continue to use the area as they did before the noise, but that their avoidance distance is expected to decline as they habituate to the disturbance.

The distance at which the disturbance effect would abate is dependent on the tolerance levels of the species and individuals within species but in general the threshold of sound level of disturbance impacts is 42 to 47 dBA. With respect to construction activities, this threshold (which is somewhat below the EPA-recommended limit for residential areas) is at or below the sound levels generated by truck traffic that would likely occur at distances of 250 ft (76 m) or more from the construction area or access roads, or the levels generated by typical construction equipment at distances of 2,500 ft (762 m) or more from the construction site. Noise during construction would be limited to daylight hours and abate to background levels within 2,500 feet of the source for most of the activities.

During operation of the Project, it is also possible for noise generated from the WTGs, transmission lines, and truck and maintenance equipment to impact avian use of the Project Area. In a study of grassland birds and wind farms, higher bird population densities were reported from control areas and areas that were 591 feet away from WTGs than in areas that

were within 262 feet of WTGs – potentially due to the noise, the presence of an access road, and the physical movement of the WTGs (Leddy et al., 1999). As reported in the BLM Wind Energy Development Programmatic EIS (BLM, 2005b), the results of various studies on the effects of noise on wildlife/birds suggests that the densities of bird populations in the vicinity of wind energy projects may be reduced near turbines, transmission lines, and other facility equipment if continuous noise levels are in the range of 40 dBA or higher. While the specific behavioral responses of birds in the Project Area to turbines are unknown, there could be some displacement of passerines and raptors in the immediate vicinity of wind turbines. Because the Project is sited in a region where the habitat is relatively homogenous for extensive areas surrounding the direct Project Area, it is unlikely that a small-scale displacement of birds would result in population-level impacts to most species.

Operational noise (turbines) is expected to not be distinguishable from the ambient wind condition noise levels which on a windy day are 70 dBA. Noise emissions would also vary from one area of the Project to the other, limiting impacts caused overall to individuals. Operational noise is different than construction noise, as wind turbines produce noise over a larger range of frequencies, thereby adding noise more evenly across the noise spectrum. Turbines make noise when the wind is blowing creating a strong relationship between the level of turbine noise and the level of ambient wind noise. As a result, turbine and background noise in windy conditions is often hard to distinguish (BLM, 2004a).

As indicated in the BLM Wind Energy Development Programmatic EIS (BLM, 2005b) birds may not be able to distinguish blade noise from ambient wind noise when the blade and wind noise levels are within 1.5 dB of each other. For example, overall noise levels measured during an average wind day at the Altamont Pass wind energy Project were about 70 dBA, which is above bird noise threshold for disturbance effects. The blade noise measured at the Altamont Pass wind energy Project on an average wind day was spread relatively evenly across the spectrum of bird hearing (typically 1 to 5 kilohertz). Therefore, under average wind conditions, blade noise from a normally operating turbine would just add to the background noise evenly across a bird's sound spectrum and be inaudible to the bird at a distance of 82 ft (25 m) from the base of the turbine (BLM, 2004a).

Bird in areas adjacent to a wind energy Project may also be disturbed by increased noise levels associated with maintenance activities. The greatest noise levels would be associated with vehicle use. Noise during activities such as hiking would be primarily associated with speech. In all cases, the noise levels would be temporary and would be present only during the time Project employees or visitors were present.

Based on the available information, it is probable that some disturbance or displacement effects may occur to the bird species occupying the Project Area. The extent of these effects and their significance is unknown and difficult to predict but could range from none to several hundred feet. Noise impacts, as it relates to greater sage grouse, is discussed in detail in Section 3.6.

West Butte Wind would implement the following efforts to minimize noise impacts to avian species, especially raptors:

- In the spring, and prior to construction, a helicopter survey of raptor nests would be conducted and sensitive raptor nest trees would be flagged and monitored.
- The construction contractor would not work in these areas when the nests are active.

In summary, both direct and indirect impacts are expected to local and migrating bird species that use the Project Area for portions or all their life history. Even though there would be impacts from direct mortality and habitat loss and through indirect habitat alteration and resulting behavioral changes, the Project is not expected to have a population level impact on any of the bird species using the site. This was determined through the collected use of the Project site in comparison to other wind farms in the regional vicinity and the composition of bird use at the Project site, both of which indicate low levels of bird fatalities in relation to other wind farm projects in the region. Specific to the Project Area are obligate species that use the regional limited sagebrush habitat for certain portions of their life history, but each of these species has not been documented as being highly affected by wind development (NWC, 2008; Altman and Holmes, 2000). Section 3.6 presents additional information regarding population impacts to special status bird species.

Bats

Direct Impacts

Collisions and Barotrauma

The Proposed Action, resulting in construction and operation of an access road and transmission line, would not likely result in adverse impacts to individual bats or bat populations.

The Connected Actions, including construction and operation of WTGs on private lands is expected to cause direct mortality to both resident and migratory bat species. Survey methodology was not completed to standards in the northwest, which is the use of full spectrum acoustics, using a Pederson D500. Limited seasonal bat survey work performed in the area (i.e. no survey work performed 30 meters above ground level, no consecutive nights of survey, and no surveys during the months of May and October) makes it difficult to fully assess species impacts. However, the BLM Wind Energy Development Programmatic EIS (BLM, 2005b) does cite the work of Young and Erickson (2003) which states that actual levels of mortality could vary, depending on regional migratory patterns, patterns of local movements through the area, and the response of bats to turbines individually and collectively. Effects on migrant bat populations from sustained collision mortality over an extended period of years, however, are not known (Erickson et al., 2002). Direct impacts from construction activity, such as mortality from collisions with construction vehicles, is expected to be low and of short duration. As such, the primary impact of the Connected Actions on bats would be during operation of the wind energy Project.

Bats are killed by some wind energy facilities in large numbers, especially at facilities with newer, taller turbines (Barclay et al., 2007). Bats are expected to be killed or injured through collisions with turbine blades and transmission lines; however, barotrauma (tissue damage to air-containing structures caused by rapid or excessive pressure change) is also the cause of death in a high proportion of bats found at wind energy facilities. Baerwald et al. (2008) concluded that 90 percent of bat fatalities involved internal hemorrhaging consistent with barotrauma and that direct contact with turbine blades only accounted for about half of the fatalities. Air pressure change at turbine blades is an undetectable hazard and helps explain high bat fatality rates. Research by Baerwald et al. (2008) found that by altering when turbine rotors begin turning in low winds, either by changing the wind-speed trigger at which the turbine rotors are allowed to begin turning or by altering blade angles to reduce rotor speed, blades were near motionless in low wind speeds, which resulted in a significant reduction in bat fatalities (by 60 percent and 57.5 percent, respectively). Further, Arnett et al. (2008), after review of mortality studies, consistently found that most bats were killed on nights with low wind speed (6m/sec) and that fatalities increased immediately before and after passage of storm fronts. When turbines did not operate until winds were 6.5 mph or more, there was a 53 to 87 percent reduction in bat deaths. This study estimated annual power loss associated with this cut-in speed limit at 1 percent.

Multiple studies suggest that it is the migratory, foliage-, and tree-roosting species such as the hoary bat, silver-haired bat, and eastern red bat that are most frequently killed at wind energy facilities across North America, and they are killed during the autumn migration (Arnett et al., 2008). Both hoary and silver-haired bats were tentatively identified in the NWC study (NWC, 2008). Again, with the limited seasonal bat survey work performed in the area, it is difficult to fully assess species impacts to bats given their sensitivity to changes in mortality rates.

Loss of Habitat

Potential roosting habitat within Project is found in the form of trees, primarily ponderosa pine, and rock crevices or fissures. Other common roost sites include caves and mine shafts, neither of which was observed during site visits of field studies. Although bats may forage over the entire Project Area, they generally forage over water and open spaces such as agricultural fields, grasslands, streams, and wetlands/ponds. Bats prey on insects that frequently concentrate over water in arid regions. Water within the Project Area is limited to cattle tanks, which is where three of the NWC bat survey points were established. The fourth NWC bat survey point is within ponderosa pine habitat. Habitat impacts to ponderosa pine are shown in Table 3.4-3.

Indirect Impacts

The indirect impacts on bats associated with the Proposed and Connected Actions are difficult to predict. While it is conceivable that displacement, habitat fragmentation, or noise could all indirectly impact bat use of the area, there are few useful studies that could be used

to draw inferences specific to wind energy and transmission facilities in relatively open sage-steppe habitats and also the lack of adequate survey coverage.

Big Game and Other Mammals

Direct Impacts

Collisions

The Proposed and Connected Actions are not expected to cause direct adverse impacts to individual big game animals and big game populations, including pronghorn, mule deer, and elk. Individuals of less mobile species (e.g., mice, gophers) may be injured or killed by construction equipment. As discussed above, a 25 mph driving limit would be established to reduce the potential for collisions with all wildlife species at the Project site during construction and operation.

Loss of Habitat

The amount of habitat that would be directly disturbed by construction would be limited to the disturbance footprint of the Proposed and Connected Actions. This area would include the loss of winter range habitats for pronghorn, mule deer, and elk, and habitat mapped in the Upper Deschutes RMP as having a primary wildlife emphasis. However, this habitat loss represents a small fraction (3.8 percent) of the entire wind energy development site and an even smaller fraction (0.4 percent) of habitat within 3 miles of the Project boundary.

Indirect Impacts

Displacement

Disturbance of normal behavior of big game is to be expected during the construction phase of this Project because of the influx of humans and heavy construction equipment and associated disturbance. Following construction, disturbance levels from heavy equipment and humans would diminish and the primary disturbances would be associated with operations and maintenance personnel, occasional vehicular traffic, and the presence of turbines and other facilities.

Recent big game monitoring associated with the Elkhorn Wind Project in Oregon showed shifts in mule deer distribution on winter range, where deer were further from turbine strings (ODFW, 2010) Compared to pre-construction use, counts of mule deer during post construction surveys was reduced in the first seven distance bands evaluated, 0 to 500m out to 3,000 to 3,500m.This shift in distribution is consistent with deer response to natural gas development in Wyoming (Sawyer et al. 2009) Actual numbers of mule deer counted within the Elkhorn Wind Project survey area decreased from 1.560 counted in three flights in 2004-2005 to 1,170 counted in four flights in 2008-2009.

Increased activity along roads is associated with the displacement of big game species (Rowland et al., 2005; Forman and Alexander, 1998)Johnson et al. (2000) showed differing traffic levels have different impacts on deer and elk habitat use. After a literature review of linear recreation route effects on wildlife, Gaines et al. (2003) reported that as traffic volumes

increased, the mean distance elk moved away from roads increased (Johnson et al., 2000 in Gaines et al., 2003). Table 3.5-1 displays the mean distance elk moved away from roads.

Table 3.5-1. Mean distance from roads for elk reported by Gaines et al. (2003).

Traffic Volume	Vehicles Per Time	Mean Distance Elk Moved Away from Roads
Low Traffic	0-1 vehicles/ 12 hours	869-890 meters
Moderate Traffic	2-4 vehicles/ 12 hours	909-1032 meters
High Traffic	>4 vehicles/12 hours	1103-1560 meters

Johnson et al. (2000) also showed differing traffic levels have different impacts on deer and elk habitat use as shown in Table 3.5-2.

Table 3.5-2. Zone of Influence applied to each side of road for deer and elk (Gaines et al. 2003).

Trail or Road Type and Status	Zone of Influence*
Motorized trails	300 meters
Closed road (no vehicle traffic but open to ATVs)	300 meters
Low Traffic (0-1 vehicles/12 hours)	900 meters
Moderate Traffic (2-4 vehicles/12 hours)	1000 meters
High Traffic (>4 vehicles/12 hours)	1300 meters

**Zone of Influence – similar definition as road effect distance.*

Prior to the above referenced Elkhorn Wind Project, the long-term displacement effects of wind development on the habitats and wintering habitats of big game species was largely unknown (Wyoming Game and Fish Department (WGFD), 2009). Preliminary wind-specific studies suggested that big game continue to use habitats within wind farm sites (as cited in NWC, 2008; Johnson et al., 2000b; Walter, 2006). At the Big Horn Wind Project in Washington, very young mule deer fawns (only a few days to a week old) were observed on 8 occasions in May and June during post-construction wildlife fatality monitoring conducted on turbine search plots indicating that mule deer birthing activities occurred near turbines (as cited in NWC, 2008).

At the Foote Creek Rim Wind Project in Wyoming, pronghorn antelope use, within 800 meters of survey points within the site, did not change significantly about one-year after construction (Johnson et al., 2000b).

However, Beckman et al. (2008) suggested that pronghorn distribution in the Upper Green River Basin of Wyoming was being negatively influenced by habitat loss and fragmentation.

A 2006 study of 10 radio-collared Rocky Mountain elk at a southwest Oklahoma wind farm concluded that, while disturbance and loss of some grassland habitat was apparent, the elk herd was not adversely affected by wind-power development (45 turbines) as determined by home range and dietary quality (Walter et al., 2006). However, because this study was

performed on a non-migratory elk herd, it may be difficult to draw clear inferences to large free-roaming elk herds (WGFD, 2009). Recent big game monitoring conducted on Elkhorn Wind Project, showed a statistically significant increase in distance from turbines for elk and mule deer between pre and post construction surveys and that facility presence and human disturbance likely impacted big game distribution and habitat selection (ODFW, 2010)

To help minimize operational impacts to big game use, gates allowing access to the Project Area would be maintained and locked. While operations personnel would access the Project Area on a regular basis, the Proposed and Connected Actions would not result in increased access opportunities for the general public.

Habitat Fragmentation

"Construction activities may adversely affect wildlife through (1) habitat reduction, alteration, or fragmentation; (2) introduction of invasive vegetation; (3) injury or mortality of wildlife; (4) decrease in water quality from erosion and runoff; (5) fugitive dust; (6) noise; (7) exposure to contaminants; and (8) interference with behavioral activities." (BLM, 2005b)

Lacking an abundance of specific research related to wind energy development, studies of other developments involving similar infrastructure components and disturbances indicate that industrial scale wind development will negatively impact big game as a result of habitat fragmentation from turbine placement and new roads.

Rowland et al. (2005) reported the primary effect of roads on elk was habitat fragmentation. Lyon (1979) reported the area of avoidance for elk is generally 0.25 to 0.5 miles from a road depending on the amount of traffic, road quality and density of cover near roads.

The finding of Beckman et al. (2008) for pronghorn in the Upper Green River Basin of Wyoming, suggested both habitat loss and habitat fragmentation are influencing pronghorn distribution through reduced usage of habitat with the highest proportion of disturbance.

Sawyer et al. (2005) found well field development caused abandonment of mule deer crucial winter ranges for years at a time, and ultimately resulted in a 46 percent decline in mule deer populations, while herds in undeveloped areas showed a much smaller decline over the same period.

Reptiles and Amphibians

Neither the Proposed nor Connected Actions are expected to adversely impact reptile or amphibian populations. However, individuals may be crushed by construction equipment and/or temporarily displaced from occupied habitats because they are either inconspicuous or have limited mobility. Project phasing (clearing and grading prior to most heavy equipment traffic) would allow individuals to move into undisturbed portions of the Project Area or adjacent habitat during construction and return to the area upon completion of construction and site restoration.

3.5.3 Impacts of Alternative 2 - Northern Access Road Alternative and Connected Actions

The acreages of wildlife habitats (based on vegetation regime) that would be temporarily and permanently impacted by Alternative 2 are listed in Table 3.4-4. These values indicate that Alternative 2 would have similar impacts to Alternative 1. A specific discussion of direct and indirect effects to birds, bats, and other wildlife is included below.

Birds

The potential collision effects on birds would be the same as those described for Alternative 1, with the exception of impacts related to the addition of an overhead utility line from the substation at to the wind farm to the O&M station at the southern end of the Juniper Acres development. The 14.4 kV Oregon Central Electric Cooperative utility line would add 5.5 miles of overhead wire to the Project area. The number of electrocutions resulting from direct collisions with the utility line along the Northern Access Road depends on the types of birds present at the site, the location of the site with regard to migratory routes, and local weather conditions (fog, rain, and snow). The accidental collision and resulting electrocution of birds from contact with the utility line is not expected to adversely affect overall bird populations.

Construction activities for the northern access road, utility line, and O&M facility could temporarily disrupt bird use of these areas. Many of the bird species are adapted to changing habitat conditions and possess the capability to temporarily expand or shift their home ranges to find alternative sources of food, water, and shelter until habitats become reestablished or the construction action subsides (Taulman, 1998; ODF, 2001). A 1.5-mile segment of the Northern Access Road would be parallel to Williamson Creek, but would be separated from the creek by a ridgeline. Williamson Creek is one of few perennial streams in the vicinity of the Project area and attracts birds and other wildlife to water and resting habitat. Birds using Williamson Creek where the northern access road runs parallel could be temporarily displaced by construction move upstream or downstream; however, the geographic separation would likely reduce the potential for this impact.

The design features described as part of Alternative 1 to minimize construction impacts to birds would be implemented under Alternative 2. The conservation easements described under Alternative 1 also apply to Alternative 2.

Sediment transport processes in streams and creeks crossed by the access road could extend the area of potential effect from erosion and runoff to downstream areas. Spills or other releases near stream and creek crossings could enter the surface water pathway and affect bird habitat downstream of the release location. The extent of the impact area would depend on stream flows, size, and type of release, and spill response. As noted for Alternative 1, the potential for release and exposure of birds to contaminants is very unlikely. Use of design features as described in Chapter 2 and Appendix B would minimize the risk of contamination, erosion, and fugitive dust.

The northern access road and utility line would contribute slightly to habitat fragmentation. A portion of the access road would be developed in existing corridor. The maintained width of the road would be slightly larger than the current width and low frequency use during Project operations (a few vehicle trips per day) in the long-term in combination create a relatively small impediment to overall habitat connectivity for birds in the Project area.

The effects of noise on birds would be the same under Alternatives 1 and 2. Construction traffic and O&M vehicles on the northern access road would shift impacts from the south to the north, when compared with anticipated use of the Main Access Road described for Alternative 1. The type and magnitude of noise effects associated with access construction and long-term use would not have an effect on bird populations in the Project area.

Bats

The construction and operation of the northern access road and utility line would not likely result in adverse impacts to individual bats or bat populations. The loss in bat habitat with Alternative 2 is relatively the same as the loss described for Alternative 1. Bat populations may use the area near Williamson Creek for feeding, and construction of the segment of roadway and utility line near Williamson Creek could deter bats from using the area. However, bat feeding activity would likely occur outside of daytime construction hours, reducing the potential impact on bat feeding activity.

Big Game and other Mammals, Reptiles, and Amphibians

Impacts to these species would be the same as those described for Alternative 1. The northern access road would make use of an existing corridor and would not be an impediment to big game and other mammals. Smaller mammals, reptiles, and amphibians in the Project area could be disturbed by construction activities, as described under Alternative 1; however, design features would reduce the effect. Some individuals may be affected by collision with vehicles on the access road; however, no long-term effects to populations of these species are anticipated.

3.5.4 Impacts of the No Action Alternative

There would be no new facilities built or other activities under the No Action Alternative. As such, there would be no change – either positive or negative – to wildlife or wildlife habitats under this alternative.

3.6 SPECIAL STATUS SPECIES

Based on reviews of the USFWS county lists of endangered and threatened species and the Oregon Natural Heritage Inventory Information Center (ORNHIC) database, as well as field surveys completed within the Proposed and Connected Actions (Project Area), no federally listed endangered or threatened species, as listed under Section 7 of the Endangered Species Act (ESA), as amended, or their critical habitat is present in the Project Area. As such, no federally listed endangered or threatened species would be affected by the Alternative 1 or 2. Similarly, there are no federally proposed species known to occur in the Project Area. On March 5, 2010, the USFWS indicated that the greater sage grouse warrants protection of the

ESA but that listing the species as endangered or threatened at this time is precluded by the need to address higher priority species first. The greater sage grouse will be placed on the candidate list for future action by the USFWS. There are a total of 19 other species of concern or special status species potentially occurring in the Project Area. These species are listed as BLM Special Status Species (covered by BLM Manual 6840 (2001)), USFWS Species of Concern, USFWS Birds of Conservation Concern, or ODFW Sensitive Species. See Section 3.5.1 for a discussion on the regulatory framework protecting birds.

National policy directs BLM State Directors to designate sensitive species in cooperation with the state fish and wildlife agency (BLM Manual 6840 (2001)). The sensitive species designation is normally used for species that occur on BLM public lands and for which BLM has the capability to affect the conservation status of the species through management. This policy (BLM Manual 6840 Section 06.2) provides clear direction to further the conservation of special status species by stating that:

> "BLM will conserve federally listed, proposed, candidate, sensitive and State listed species by fulfilling the requirements of the ESA and by using other authorized methods to ensure that the actions authorized by BLM are consistent with the conservation of such species and that they do not contribute to the need to list any special status species under provisions of the ESA, or designate additional sensitive species under provisions of this policy."

To help identify special status species use of the Project Area, NWC completed a series of field surveys for this Project (NWC, 2008; NWC, 2010). These surveys included large and small-plot avian use surveys, meandering transect surveys, lek censuses, and raptor nest surveys. Another component of these surveys conducted by NWC (2008) was special status species surveys conducted between May 15 and June 9, 2008. The area covered was 451 acres associated with the Proposed Action and 1,785 acres associated with Connected Action. However, because the most recent Project layout has changed since that survey was completed, the acreage surveyed only covers about 76 percent of the area potentially impacted by construction of the Connected Action and about 93 percent of the area potentially impacted by construction of the Proposed Action. This survey included walking meandering transects averaging 150 feet apart from one another throughout the Project Area. The area covered within the Connected Action included a 200-foot buffer around proposed turbine strings and the roads connecting them and a 200-foot buffer on either side of the road and transmission line associated with the Proposed Action. Since exact placement of WTGs had not yet been confirmed, the survey also included more than 1,000 acres of West Butte. While the special status species surveys did not cover the entire area that could be disturbed by construction, the results likely provide a good representation of species potentially found within the Project Area.

Additional surveys would be completed prior to Project construction to further assess the presence of special status species (and identify appropriate avoidance or design features) in the Project Area.

The discussion in this section focuses on the special status species that are likely to be present in or use the Project Area.

3.6.1 Affected Environment

Appendix C includes a list of all of the BLM sensitive species that are documented or suspected to occur in the Prineville District. Based on the habitat conditions in the Project Area and the results of the NWC studies, there are 13 BLM sensitive species that are known or reasonably expected to occur in the vicinity of the Proposed or Connected Actions. Additionally, there are seven other special status species that occur in the Project Area. These species are listed in Table 3.6-1. The table also describes suitable habitat and lists the likelihood of occurrence within the Project Area. Deschutes and Crook County species of concern include mule deer, elk, antelope, prairie falcon, sage grouse, and golden eagle (Ferry, 2010).

Relevant to these BLM Special Status Species are objectives within the Upper Deschutes ROD/RMP. Objective W–1 of the Ecosystem Health and Diversity – Wildlife Chapter states:

> Conserve federally listed species and the ecosystems on which they depend. Ensure that actions requiring authorization or approval by the BLM are consistent with the conservation needs of special status species and do not contribute to the need to designate additional special status species.

Objective V–3 of the Ecosystem Health and Diversity – Vegetation Chapter states:

> Manage special status plant species such that BLM actions do not contribute to the need to federally list as threatened or endangered.

Table 3.6-1. BLM Special Status Species Known or Expected to be in the Project Area

Common Name (Scientific Name)	Ranking	Species/Habitat Associations	Species Occurrence in the Project Area
Birds			
Northern goshawk (*Accipiter gentilis*)	USFWS Species of Concern; Sate Sensitive-Vulnerable	Inhabits mixed hardwood and coniferous forests in temperate and boreal regions, from sea level to tree line. Prefers woodlands with intermediate canopy coverage interspersed with fields or wetlands, especially in remote areas.	Observed in-transit to avian use survey (recorded in winter). Overall use of the Project Area by breeding and transient northern goshawks appears to be relatively low.
Sage sparrow (*Amphispiza belli*)	USFWS Bird of Conservation Concern; State Sensitive-Critical (Columbia Plateau Ecoregion); Bureau Tracking Species (in the Upper Deschutes RMP)	Prefers sage habitat where sagebrush, saltbush, and chaparral are found.	One observed in spring during avian use surveys (at low elevations along the access road), and one observed in-transit to avian use surveys. Also, one observed during special status wildlife species surveys.
Ferruginous hawk (*Buteo regalis*)	USFWS Species of Concern and Bird of Conservation; State Sensitive-Vulnerable (Blue Mountain Ecoregion); BLM Sensitive	Inhabits the semi-arid western plains and arid intermountain regions; prefers relatively unbroken terrain, with scattered trees, rock outcrops, or tall trees along creek bottoms available for nesting sites.	Observed at lower elevations within two miles of access road in-transit to avian use surveys. Five inactive nests identified (all in same general area east of access road) and a pair observed near the nests during the raptor nest survey. Ferruginous hawk numbers are stable in this area.
Greater sage grouse (*Centrocercus urophasianus*)	USFWS Candidate; State Sensitive-Vulnerable; BLM Sensitive	Inhabits sagebrush-dominated rangelands, from the plains to the mountains, preferably where sagebrush provides 15 to 50 percent of the ground cover.	Observed during avian use study and special status wildlife species surveys – occurs in Project Area throughout the year. One nest documented during ground transects surveys. One lek identified within the Project Area, active in spring of 2008 (3 males). A BLM study (Hanf, 1994) indicates year round use.

Common Name (Scientific Name)	Ranking	Species/Habitat Associations	Species Occurrence in the Project Area
Peregrine falcon (*Falco peregrinus*)	State Sensitive-Vulnerable; BLM Sensitive	Open areas, especially along the coast and near other bodies of water that provide habitat for their prey. They nest on cliffs and cliff-like structures, so during the breeding season they are usually found near mountainous or rocky areas, or man-made structures that substitute as cliffs.	Potential exists for species to rarely fly through the Project Area during migration or rarely to forage in breeding season. No peregrine falcons were observed during raptor nest, fixed-point, in-transit count surveys.
Bald eagle (*Haliaeetus leucocephalus*)	OR – State listed as Threatened; BLM Sensitive	Prefers deciduous forests located near bodies of water along rivers, lakes, or the sea coast and coastal marshes, reservoirs, and large lakes. This bird selects hardwood trees for roosting and nesting.	Bald eagles may fly through Project Area. A new nest was documented within 12 miles of the Project Area. It is uncertain at this time where foraging habitat for this pair is located. It is unknown at this time if other bald eagle nests may be within a 10-mile radius of the Project Area. Project surveys were only conducted within a 2-mile radius of the Project Area.
Loggerhead shrike (*Lanius ludovicianus*)	USFWS Birds of Conservation Concern; State Sensitive-Vulnerable (Blue Mountains Ecoregion); Bureau Tracking Species [in the Upper Deschutes RMP]	Strongly prefers forest edges, open willow brush, and brush-bordered swamps and bogs. Prefers semi-open country with short grasses and scattered trees or shrubs during winter.	Shrikes and two nests were documented on either side of access road during spring special status wildlife surveys, and in-transit to summer avian use surveys. Found near proposed turbines only in early winter. Overall use of the Project Area by breeding loggerhead shrikes appears to be relatively moderate, but due to available habitat adjacent and within the Project Area impacts on the species is anticipated to be low.

Common Name (Scientific Name)	Ranking	Species/Habitat Associations	Species Occurrence in the Project Area
Lewis' woodpecker (*Melanerpes lewis*)	USFWS Species of Concern; State Sensitive-Critical; BLM Sensitive	Prefers open forests of pine or cottonwood with ground cover, snags, and insects. Ponderosa pine forests are preferred at higher elevations, while riparian woodlands dominated by cottonwoods are preferred at lower elevations. Winter sites are usually oak woodlands or commercial orchards and are chosen for available food storage places.	The Project occurs within the potential range of the Lewis' woodpecker. Suitable habitat exists for the species within patches of ponderosa and juniper woodland within the Project Area. However, no Lewis' woodpeckers were observed during surveys.
Mountain Quail (*Oreortyx pictus*)	USFWS Species of Concern; State Sensitive-Vulnerable; BLM Sensitive	Inhabits open montane forests with a well-developed brushy understory, steep slopes around edges of mountain meadows, and in logged or burned-over forests, from 1,500 to 10,000 feet.	Observed in various parts of Project Area on avian use and small plot avian surveys. Observed with very young chicks during special status wildlife surveys confirming that this species breeds on-site.
MAMMALS			
Pallid bat (*Antrozous pallidus pacificus*)	USFWS Species of Concern; State Sensitive-Vulnerable; BLM Sensitive	Common in arid regions, particularly near water, may also found in open forests. Roosts in colonies in: cliff faces, rock crevices, buildings, and trees; forages low, near the ground.	Positively detected through echolocation call near the meadow cattle watering trough.
Pygmy rabbit (*Brachylagus idahoensis*)	USFWS Species of Concern; State Vulnerable; BLM Sensitive	Associated with tall, dense stands of big sagebrush in areas with deep, loose soil.	Although not observed during NWC surveys, BLM has records of two sitings on the south slope of West Butte indicating possible presence throughout the Project Area.
Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)	USFWS Species of Concern; State Sensitive-Critical; BLM Sensitive	Desert scrub and juniper, ponderosa pine forest are the most common habitats. Roosting areas include, caves, buildings and mine tunnels.	Positively identified at two survey points, the meadow watering trough and the stand of ponderosa trees survey point.

Common Name (Scientific Name)	Ranking	Species/Habitat Associations	Species Occurrence in the Project Area
Spotted bat (*Euderma maculatum*)	BLM Sensitive; State Sensitive-Vulnerable	Found in a variety of habitats from low desert to high elevation conifer forests.	Although not detected during the NWC inventory, this species is known to occur in similar habitats in central Oregon.
Silver-haired bat (*Lasionycteris noctivagansyotis*)	USFWS Species of Concern; State Sensitive-Vulnerable	Associated with all coniferous forests, also found on rangelands near riparian areas, and mixed deciduous-coniferous forests.	Tentatively, but would not be confirmed, detected as using the higher elevation meadow water tank and the lower elevation corral water tank.
Small-footed- myotis (*Myotis ciliolabrum*)	USFWS Species of Concern	Seems to prefer arid habitats, associated with cliff faces, rocky crevices, will retreat under bark or barns after foraging.	This species was positively identified as present at the survey points in the lower elevation corrals and the higher elevation meadow water tank.
Long-eared myotis (*Myotis evotis*)	USFWS Species of Concern	Most common in dense coniferous forests, and desert scrubland.	This species was positively detected at all of the survey stations.
Fringed myotis (*Myotis thysanodes*)	BLM Sensitive; State Sensitive-Vulnerable	Hot desert scrubland, grassland, xeric woodland, sage-grass steppe, mesic old-growth forest, and multi-aged subalpine coniferous and mixed-deciduous forest.	Although not detected during the NWC inventory, this species is known to occur in similar habitats in central Oregon.
Yuma myotis (*Myotis yumanensis*)	USFWS Species of Concern	Open water nearby seems to be the number one habitat requirement. Caves, tunnels or buildings in arid regions, provide night roosting areas.	Potentially identified during bat inventories, but echolocation call would not be confirmed.
Reptiles			
Northern sagebrush lizard (*Sceloparus graciosus graciosus*)	USFWS Species of Concern; State Sensitive-Vulnerable; BLM Sensitive	Occur primarily in sagebrush plains, but also in stands of greased or other desert shrubs.	Found associated with sandy soils in various parts of the Project Area during special status wildlife surveys.
Plants			

Common Name (Scientific Name)	Ranking	Species/Habitat Associations	Species Occurrence in the Project Area
Green-tinged paintbrush (*Castilleja chlorotica*)	BLM Sensitive	Moderate slope, dry hillsides with late-seral shrubs in western juniper, big sagebrush and Idaho fescue plant associations. (documented on adjacent BLM managed public land)	West Butte proper, an extensive population containing in excess of 50,000 plants was delineated, and the perimeters of four smaller populations to the east were identified. The largest population extended onto BLM managed public land to the north of the Project site.

Birds

Greater Sage Grouse

Species Status

Sage grouse are sagebrush obligates which require large areas covered with sagebrush communities to meet life-history needs. The greater sage grouse is a popular upland game bird that was once abundant throughout sagebrush habitats in the west. Its original range encompassed the western to northwestern U.S. and three provinces of southwestern Canada. Currently, the greater sage grouse range has measurably decreased within eleven states and two Canadian provinces. Since the 1950s, the greater sage grouse population has declined by an estimated 45 to 80 percent (Connelly et al., 2004), with about 150,000 to 200,000 breeding greater sage grouse remaining throughout the range (as cited in BLM, 2004a). Greater sage grouse are no longer present in some western states. Sage grouse populations are continually declining throughout their range and individual populations have become increasingly separated. Core populations of greater sage grouse have survived in several states, including Oregon, Idaho, Montana, Wyoming, and Colorado, but even these populations have declined. The average number of chicks produced per hen has also declined by 40 to 50 percent during the same time in many areas (Connelly et al., 2004).

The decline of the sage grouse is thought to be a result of: habitat loss or fragmentation from invasive species, agriculture, degradation due to fire, overgrazing, urbanization, hunting and poaching, predation, disease, weather, accidents, herbicides, and physical disturbance (Connelly et al., 2004).

Sage grouse were added to the Oregon BLM sensitive species list in 1996. Between the years 1999 and 2003, the USFWS received eight petitions to list various populations, purported subspecies, or species of sage grouse as endangered or threatened. In April 2004, USFWS determined that three of the petitions provided substantial information that listing might be warranted, thus initiating a range-wide status review.

In May 2003, USFWS issued interim guidance on avoiding and minimizing wildlife impacts from wind turbines[2]. This guidance provides technical assistance to the wind energy industry to avoid or minimize impacts to wildlife and their habitats through 1) proper evaluation of potential wind energy development sites, 2) proper location and design of turbines, and 3) pre and post construction monitoring to assess impacts to wildlife. Site development recommendations are applicable to locating turbines within wind resource areas and specifically address avoidance of leks, roosts, features known to attract raptors, and maintaining contiguous habitat for area sensitive species (e.g., Greater sage grouse).

On January 7, 2005, the USFWS Director announced that the species did not warrant protection under the ESA at that time. In August 2005, ODFW released the Greater Sage-Grouse Conservation Assessment and Strategy for Oregon[3], which was supported by numerous agencies and universities using the best science available. This document highlighted to the BLM that "the loss of populations in the Prineville District would not only reduce the range of the birds but in effect create a new peripheral range and the population's susceptibility that often corresponds with populations at the fringe of the range.

Subsequent litigation led to another status review and the USFWS decision that showed the species warranted listing due to impacts on the species populations, but due to other species concerns of higher value the species was precluded from listing; placing the species on the Candidate list managed by USFWS (2010). In response to this USFWS decision, BLM implemented Instruction Memorandum No. 2010-071, supplementing previous BLM guidance for this species (BLM, 2010e). In March 2010, the ODFW together with NRCS released the Sage-Grouse Habitat Improvement Initiative[4], which designates private lands within 3 miles of a known lek as "high priority" sage grouse habitat.

In 2004, BLM released its National Sage-Grouse Habitat Conservation Strategy[5] to ensure immediate implementation of new actions to reduce the risk to sage grouse populations and to conserve sage grouse habitat in a consistent and effective manner. The strategy determined that all remaining habitat is important and must be protected, offering the guiding management principles to 1) protect what we have, 2) retain what we are losing and 3) restore what has been lost. As per the Oregon sage grouse strategy, Prineville District was tasked with restoration of sage grouse numbers and distribution near the 1980 spring breeding population level of approximately 3,000 birds. Despite efforts to improve sage grouse habitat on the Prineville District since 1996, the number of birds, chicks and viable leks have continued to decline. Spring breeding surveys conducted in 2009 estimated population levels between 1,200-1,500 birds. This is most likely attributable to habitat

[2] http://www.fws.gov/habitatconservation/Service%20Interim%20Guidelines.pdf

[3] http://www.dfw.state.or.us/wildlife/sagegrouse/pdf/sage_grouse_plan.pdf

[4] http://www.or.nrcs.usda.gov/programs/sage-grouse/index.html

[5]http://www.blm.gov/pgdata/etc/medialib/blm/wo/Planning_and_Renewable_Resources/fish__wildlife_and.Par.9151.File.dat/Sage-Grouse_Strategy.pdf

impacts from livestock grazing, juniper expansion into suitable habitat, and further fragmentation of habitat from human activities (urban expansion, transmission lines, etc).

Population Trends

The central Oregon population is a relatively large population that is separated from nearby populations by distance (approximately 30 km) and local topographic relief, with the Millican Valley being the western edge (USGS, 2007). It was determined the proportion of active leks declined over the assessment period with population trends indicating that average number of males per lek declined from a high of 21 males during 1965 to 1969 to nine during 2000 to 2007, a decrease of 48 percent. However, additional review of the data collected by the USGS (2007) showed the average number of males per lek since 1970 was between 9 and 13, showing a systematic decline after 1969 that leveled off and has remained steady from 1980-2007, with periods of cyclic highs and lows within this range. The USGS determined through modeling the minimum population estimate for central Oregon was 835 males in 2007 based on counts at 97 leks. It is estimated that roughly 80 percent or more of the leks that make up the central Oregon population are within the Prineville District. Since 2007, those leks have continued to decline; in 2008 another 38 percent, and in 2009 another 19 percent, further putting into question the actual size and viability of this Central Oregon population at this point in time and possibility of local extirpation.

Using various published sources and recognizing that untested assumptions were used in some estimates, the USFWS (2008) calculated a range-wide estimate of sage grouse population size between 447,000 and 496,000 individuals. The Oregon Sage Grouse Strategy estimated a population of 40,000 individuals in Oregon and a population for the Prineville District of between 1,840 and 2,290 individuals in 2003 (Hagen, 2005). The Oregon Sage Grouse Strategy (Hagen, 2005) states the sage grouse lek attendance in the Prineville District has steadily declined in the period from 1980 to 2003. Further recent declines reported in Prineville District (see above), puts into question the actual size and viability of this Central Oregon population at this point in time as well as the possibility of local extirpation. USFWS (2008) indicates a larger population trend estimate for Management Zone V (which includes the Project Area in Oregon as well as portions of California and Nevada) as showing a statistically undetectable change in long-term population numbers.

The greater sage grouse is a popular upland game bird that was once abundant throughout sagebrush habitats in the west. Greater sage grouse are no longer present in some western states. Sage grouse populations are continually declining throughout their range and individual populations have become increasingly separated. Core populations of greater sage grouse have survived in several states, including Oregon, Idaho, Montana, Wyoming, and Colorado, but even these populations have declined. The average number of chicks produced per hen has also declined by 40 to 50 percent during the same time in many areas (Connelly et alSage grouse are sagebrush obligates which require large areas covered with sagebrush communities to meet life-history needs. Sage grouse were encountered as individuals and small groups during winter and spring avian surveys, and during special status species wildlife surveys conducted in June 2008.*Project Area*

BLM and ODFW have documented greater sage-grouse use of the Project Area for many years and habitat includes breeding/nesting, summering (brood rearing), and wintering. Grouse can be found in the Project Area throughout all seasons of the year. The smaller buttes to the east and northeast appeared to be receiving only infrequent use.

Data collected previously by BLM (1988 to 1993) showed year-round use of West Butte by a population of nesting, summering, and wintering sage grouse (Hanf, 1994; Hanf, 2010). In part, the species' use of the Project Area is due to the ecological condition of the shrub-steppe habitat in the area, particularly relative to some of the surrounding lands (NWC, 2008). For the most part, this mountain big sagebrush habitat located high in the landscape, has persisted in a better condition class than that of the mountain big sagebrush lower on the slopes and valley floor, due to the higher precipitation level it has received. This community's resilience has allowed for a good composition of forbs which are extremely important in the life cycle of sage-grouse. This influence on habitat quality, as well as the larger and more contiguous sagebrush patches, is why this habitat has retained its suitability for sage-grouse. Also mountain big sagebrush is much more palatable to sage grouse (as well as to deer and elk) creating a habitat that provides year round use by sage grouse. Moreover, the mature condition of most of the sagebrush on West Butte provides good cover for nesting and winter foraging (Figures 3-3A and 3-3B, show habitats delineated by NWC (2008) and data provided by the GAP Analysis (1999)).

Based on radio telemetry studies and general observation records conducted by the BLM (Hanf, 1994; Hanf, 2010), sage grouse migratory movements to and from West Butte were determined to occur in all directions (except to the north), with most of the movements being to and away from areas to the southwest (Millican Valley), south (Moffitt), and the southeast (Ireland Flat) (see Figure 3-4B). This early/limited telemetry work did not show movements between West Butte and Bear Butte; this is likely due to the small number of birds captured (two) and the limited information they provided. Based on observed behavior elsewhere, movement is expected between these two areas. The Bear Butte lek was only found in 2001 after lek search by aircraft was performed. According to the ODFW, there is limited data on recent sage grouse use of the Bear Butte lek sites (Ferry, 2010). However, what was of particular note was how many birds went to West Butte from other areas to summer, nest, forage, and winter. It should be made clear that leks are not clearly or spatially defined, making it difficult to use a sample survey methodology to generate statistically defendable estimates of population size or trend, or to assess the uncertainty associated with such estimates (Johnson and Rowland, 2007).

The limited telemetry work provided more than a dozen brood observations on West Butte and found that of the 20 to 30 birds summering there each year, most were observed near the top of West Butte (Hanf, 1994). Although this work did not provide an estimate for the total number of individuals thought to reside on West Butte, it appears that an appreciable amount of summer use by sage-grouse on is occurring. This previous work of nearly twenty years coincides with more recent telemetry work (Freese et al., 2009) where preferred summer habitat was determined to be areas relatively high in elevation, close to leks, and within or

close proximity to habitats that harbor succulent vegetation through much of the summer. Results from this adjacent study are applicable to this Project Area because the landscape features of West Butte's resilient, high elevation, large and contiguous habitat patches, correlate to what would attract the disproportionate level of habitat use, which Freese et al. (2009) described as useful in predicting where sage-grouse are likely to occur across the landscape. Winter use on West Butte was documented as well, however, it is expected that use is dependent on the severity of the winter and if conditions are extreme, sage-grouse would be expected to utilize the wintering area documented by the BLM study (Hanf, 1994).

NWC recorded sightings of sage grouse presence or traces of their activity during overall avian field studies performed for the Project. Sage grouse were encountered as individuals and small groups during winter and spring avian surveys, and during special status species wildlife surveys conducted in June 2008. The largest groups encountered consisted of 11 birds (in-transit to a survey station on August 25, 2008) and 8 birds (in-transit to a survey station on July 8, 2008). One nest was documented based on behavior of the adult. Detections of fecal matter was also documented as a means of delineating areas of use. In addition, BLM staff observed small groups of approximately 10 sage grouse in transit across the top of West Butte (Hanf, 2010b) on several occasions in 2010. NWC reported that grouse use appeared to be the highest on West Butte itself. The smaller buttes to the east and northeast appeared to be receiving only infrequent use.

The sage grouse lek currently on West Butte is located approximately 0.25 mile from the nearest WTG location (Figure 3-4A). The lek where birds were first discovered was a moist area open area where a trough had been located. The second lek known now to this complex and that which birds currently have been observed strutting, lends itself as well to a moist meadow area near the top of the butte. This occupied lek within the Project Area is located in an open area which has resulted from heavy use by cattle in summer and early fall because of the placement of the water trough. However, in 1997 it returned to a count of 16 males and has continued to fluctuate ever since.

This lek has seen continuous fluctuation in bird numbers over time. Studies by Hanf (1994) found bird numbers dropped from a high of 18 males in 1988 when it was first discovered to a low of 2 males in 1991 and 1992. However, in 1997 it returned to a count of 16 males and has continued to fluctuate ever since. Surveys conducted in 2008 detected three males (Figure 3-4A) during two of three lek censuses (NWC, 2008). In 2009, three male and five female grouse were the largest gathering of birds observed at this lek during three separate survey days (NWC, 2010; Ferry 2010). However, again, just as the new lek was found at the new trough location these birds could be using adjacent areas that have not been surveyed. Birds moving from a previously established lek to another location have been documented on numerous occasions within Prineville District (Hanf, 2010b).

The ODFW continues to collect data on sage grouse population levels through lek attendance surveys. As reported in the ODFW's comment letter (May 17, 2010) on this EIS (see Appendix E), observations from the ODFW 2010 lek counts found a minimum of two males on one count, and a maximum of four males and one female observed on April 29, 2010.

Two helicopter surveys of the West Butte and Bear Butte leks were completed as well, resulting in three males at West Butte and no birds counted at Bear Butte. According to Brian Ferry (2010) from the ODFW Prineville Field Office, the estimated population of greater sage grouse within 11 miles of the Project Area in 2009 was 11 individuals (male and female). The 10-year (2000 to 2009) estimated population within this same area was calculated at 25 individuals; it is unknown how many of these birds use the Project Area, but it is assumed a number of these birds use the Project Area and adjacent lands. This information was developed using current and past population estimates based on locations of the leks and past BLM telemetry information documenting movement of birds between West Butte and other leks. During this same period, the number of active leks known within 13 miles of the Project Area was four, with only two (West Butte and Millican Borrow Pit) being active in the last 5 years. (2009) described as useful in predicting where sage-grouse are likely to occur across the landscape. However, additional review of the data collected by the USGS (2007) showed the average number of males per lek since 1970 was between 9 and 13, showing a systematic decline after 1969 that leveled off and has remained steady from 1980-2007, with periods of cyclic highs and lows within this range. The USGS determined through modeling the minimum population estimate for central Oregon was 835 males in 2007 based on counts at 97 leks. It is estimated that roughly 80 percent or more of the leks that make up the central Oregon population are within the Prineville District. USFWS (2008) indicates a larger population trend estimate for Management Zone V (which includes the Project Area in Oregon as well as portions of California and Nevada) as showing a statistically undetectable change in long-term population numbers.

Peregrine Falcon

The peregrine falcon occurs from the tundra to the Tropics, from wetlands to deserts, from maritime islands to continental forests, and from featureless plains to mountain crags. It nests primarily on sheer rock cliffs, but will also use human structures (bridges, transmission lines, and skyscrapers) for nesting habitat. Potential exists for species to rarely fly through the Project Area during migration or rarely to forage in breeding season. No peregrine falcons were observed during raptor nest, fixed-point, in-transit count surveys conducted by NWC in 2007 and 2008.

Bald Eagle

The bald eagle prefers deciduous forests located near bodies of water along rivers, lakes, or the sea coast and coastal marshes, reservoirs, and large lakes. This bird selects hardwood trees for roosting and nesting. Earlier this month (March) a follow-up survey was made on a reported bald eagle nest location. Indeed, a bald eagle nest was observed with two adults in an old-growth juniper tree, within 12 miles of the Project Area. To date, we have no additional information regarding previous use of the site, territory size, or foraging areas. We expected bald eagles to fly through the Project Area on occasion, especially in the winter, but it was also expected to be a rare event due to the lack of a water body and the nearest large water body being Prineville Reservoir and the Crooked River. However, this new nest

location is definitely of interest as it does not seem to follow what was previously known to be preferred bald eagle habitat.

Lewis's Woodpecker

Lewis's woodpecker prefers open forests of pine or cottonwood with ground cover, snags, and insects. Ponderosa pine forests are preferred at higher elevations, while riparian woodlands dominated by cottonwoods are preferred at lower elevations. Winter sites are usually oak woodlands or commercial orchards and are chosen for available food storage places. The Project occurs within the potential range of the Lewis' woodpecker. Suitable habitat exists for the species within patches of ponderosa and juniper woodland within the Project Area. However, no Lewis' woodpeckers were observed during surveys and they are expected only as transients on West Butte.

Loggerhead Shrike

Habitat associated to the loggerhead shrike in the Interior Columbia Basin includes open habitat with interspersion of tall woody shrubs (e.g., sagebrush, bitterbrush) or trees (e.g., juniper) for nesting and open ground for foraging (Altman and Holmes, 2000). Two nests of this species were located (during special status wildlife species surveys) along the project's access road (in the lower elevations well below the Project Area proper). Populations of loggerhead shrikes occurring below West Butte are undoubtedly contiguous with Northern Basin and Range populations and relatively disjunct from Blue Mountain or Columbia Plateau populations. Although loggerhead shrikes are experiencing declining population trends throughout much of their range, there is no evidence of this in central and southeast Oregon. Indeed, this species has benefitted greatly from juniper encroachment associated with fire suppression, and small-to-medium sized junipers (within otherwise shrub-steppe habitat) are selected for nesting and roosting and used as perches for foraging by shrikes. A single loggerhead shrike was observed in the Project Area proper, but two nests were also noted along the roadway indicating a bigger presence within the study area then noted during the surveys (NWC, 2008).

Mountain Quail

Mountain quail inhabits open montane forests with a well-developed brushy understory, steep slopes around edges of mountain meadows, and in logged or burned-over forests, from 1,500 to 10,000 feet. They are not uncommon on and around the Project Area, and their breeding here is established by the observation of adults accompanied by very young chicks. This species was encountered in a variety of locations in the mid- to higher elevations of the access road and the areas proposed for turbine placement.

Sage Sparrow

Habitats used by sage sparrow in the Interior Columbia Basin include two structural stages of low sagebrush, big sagebrush, and mountain big sagebrush; the open canopy, low-medium shrub stage, and the closed canopy, low-medium shrub stage; the closed herbaceous structural stage of big sagebrush; juniper sagebrush, and salt desert shrub (Altman and

Holmes, 2000). This species nest primarily in eastern Washington. Sage sparrows occurring at West Butte, as stated by NWC (2008), are more accurately understood as being contiguous with (non-status) populations in the Northern Basin and Range rather than with populations in the Blue Mountains or Columbia Plateau. This species was encountered on two occasions during the breeding season, once on the Project site proper and once along the access road at lower elevations. The limited detections of this species could be explained by their secretive nature or by their being transient individuals (rather than breeding residents). The local breeding status of sage sparrow remains unknown.

Ferruginous Hawk

Ferruginous hawks were observed at lower elevations within two miles of the access road in-transit to avian use surveys. This species prefers habitat that is ungrazed or lightly grazed prairie or sagebrush shrublands with nesting sites in juniper trees and or cliffs that command a view of adjacent lands for foraging (Altman and Holmes, 2000). This habitat is usually confined to draws in this region but fire suppression and cattle grazing have lead to juniper encroachment into sagebrush and shrub/steppe habitats located on West Butte. Overall population numbers in the Interior Columbia Basin are increasing at about 6 percent yearly (Altman et al., 2000); local populations in the area of the Project appear stable (Hanf, 2010). As with loggerhead shrike and sage sparrow, ferruginous hawks at West Butte are likely contiguous with Northern Basin and Range populations (which lack special state status) and disjunct from Blue Mountains or Columbia Plateau populations. A pair of ferruginous hawks was present along the access road in both 2008 and 2009. A cluster of inactive nests of this species was detected in 2008, and an active nest was discovered in 2009. Ferruginous hawks were not observed during avian use surveys over the Project proper.

Six inactive nests were identified (all in the same general area east of the access road). A pair of ferruginous hawks was observed near the cluster of six inactive nests, assumed to be built by this species in junipers. The pair of ferruginous hawks was frequently encountered in this area early in the breeding season, but eventually disappeared before successful fledging of young would have been expected to occur. An active ferruginous nest was identified in 2009. As with loggerhead shrike and sage sparrow, ferruginous hawks at West Butte are likely contiguous with Northern Basin and Range populations (which lack special state status) and disjunct from Blue Mountains or Columbia Plateau populations.

Northern Goshawk

Northern goshawks inhabit mixed hardwood and coniferous forests in temperate and boreal regions, from sea level to tree line. Prefers woodlands with intermediate canopy coverage interspersed with fields or wetlands, especially in remote areas. This species was observed only in-transit to avian use survey (recorded in winter) and were not recorded during the surveys. Overall use of the Project Area by breeding and transient northern goshawks appears to be relatively low.

Reptiles

Sagebrush Lizard occurs primarily in sagebrush plains, but also in stands of greased or other desert shrubs. This species was encountered in sandy areas of the Connected Action and along the access road of the Proposed Action during meandering special status species transect surveys. This reptile was generally associated with sandy areas containing sage, and was usually found on south-facing slopes. This species is probably common in the project area.

Mammals

Bats

As stated in the general discussion on bats, field investigations, using acoustical monitoring devices for detecting and recording bat echolocation, were conducted July 30, August 29, and September 11, 2008. This study was designed to gather information on the diversity of bat species that may use the Project Area. This study does not represent a comprehensive survey of bat species and populations that may use the Project Area. Although there are no known bat hibernacula in the Project Area, the NWC study did not specifically search for these sites in the surrounding area. Special status bat species that the survey positively or tentatively identified in the Project Area are discussed below.

- Small-footed myotis was positively identified as present at the survey points in the lower elevation corrals and the higher elevation meadow water tank.
- Long-eared myotis was positively detected at all of the survey stations.
- Yuma myotis was tentatively identified during bat inventories of the Project.
- Pallid bat was positively identified near the meadow cattle watering tank. This species generally forages near the ground, but may fly higher when dispersing and migrating.
- Townsend's big-eared bat was positively identified at two survey points, the meadow watering tank and at the stand of ponderosa trees.
- Silver-haired bat was tentatively identified as using the higher elevation meadow water tank and the lower elevation corral water tank. This is a high-flying, migratory species that is known to collide with turbine rotors.
- The spotted bat and fringed myotis are two other bats that are known to occur in Crook and Deschutes counties, but were not detected during the NWC inventory.

Pygmy Rabbit

The Oregon population of pygmy rabbit is currently listed as a USFWS Species of Concern; the Washington population is currently listed as threatened under the ESA. Historically, pygmy rabbits have been collected from Deschutes, Klamath, Crook, Lake, Grant, Harney, Baker, and Malheur counties in Oregon. However, the geographic range of pygmy rabbit in Oregon may have decreased in historic times (Verts and Carraway, 1998), and boundaries of the current distribution are not known (Hagar and Lienkaemper, 2007). This species typically prefers areas of tall, dense sagebrush cover with high percent woody cover, growing in soft,

deep soils (Gabler et al., 2001) with flat topography (Hagar and Lienkaemper, 2007). Specifically to Oregon burrow sites are located where soils are significantly deeper and looser than adjacent sites (as cited in Hagar and Lienkaemper, 2007).

In Oregon, habitat is comprised of areas where big sagebrush inclusions are mixed with low sagebrush, rabbit brush, or shorter stature big sagebrush. Another common habitat type in Oregon consists of small draw bottoms where deeper soils have collected. Most of these areas are vegetated with basin big sagebrush in the drainage bottom, surrounded by Wyoming big sagebrush, low sagebrush, or mountain big sagebrush in the surrounding uplands.

A USGS survey performed in 2004 and 2005 determined the presence of pygmy rabbits to the southeast of the Project along Highway 20 (Hagar Hagar and Lienkaemper, 2007). According to the NRCS Soil Survey (NRCS, 2009), the majority of surficial rock at the proposed wind farm site is covered by a relatively thin soil layer from 0 to 20 inches thick (0 to 50 centimeters). These conditions would be expected to limit pygmy rabbit presence within the area of the Proposed and Connected Actions. However, the BLM recorded presence, either by species sighting, presence of pellets, or active or inactive burrows, in July 2009 at two separate locations within or near the southern boundary of the proposed wind farm site (Figure 3-5; Hanf, 2010). No surveys of these locations were performed by NWC (2008). NWC performed special status species surveys throughout a majority of the area and did not note the presence of pygmy rabbits within the area of the Proposed and Connected Actions. However, survey methodology did not incorporate Prineville District BLM protocols for that of the pygmy rabbit.

Pygmy rabbits are dependent upon sagebrush, primarily big sagebrush, and are usually found in areas where big sagebrush grows in very dense stands with generally, soft, deep soils. Oregon burrow sites are located where soils are significantly deeper and looser than adjacent sites (Weiss and Verts, 1984). USFWS notes the major reason for decline in this species is loss of sagebrush, upon which pygmy rabbits are highly dependent for food and shelter.

The presence of pygmy rabbits noted by the BLM occurs on the southern side of West Butte. NRCS soil information in the area of the occurrence indicates the area is mainly Redcliff-Rock outcrop complex (30-60 percent slope), indicating these two sites are probably located in either seasonal or ephemeral draws or on flat benches within the terrain, allowing soils to build up and create the needed deep soils for burrow activities. Sagebrush cover is not limiting in the Project Area and overall habitat for this species is available within and adjacent to the Proposed and Connected Actions.

Plants

Target species for the purposes of this survey included all possible federal and Oregon Department of Agriculture candidate, threatened and endangered species considered likely to occur in the general region of the Project. In addition, rare species lacking federal and state status but which are actively tracked by the ORNHIC were included in the target list of species.

Surveys covered a buffer area extending 200 feet outwards from the proposed turbine string center line and proposed roads, for a total 400-foot-wide survey corridor. The entire large area in sections 31 and 32 was surveyed since specific turbine string placement had not yet been confirmed. Rare plant surveys covered 1,785 acres in the vicinity of proposed turbines and the roads between them as well as 451 acres representing the buffers around the road that would access the Project.

The survey time windows were designed to maximize the potential for accurate identification of as many taxa as possible in the field and hence to ensure adequate coverage with respect to potential occurrences of special status taxa. Surveys were conducted June 2 through 8, 2008. Follow-up surveys for green-tinged paintbrush (*Castilleja chlorotica)* were conducted July 7-9 and 13-15, 2008, with additional surveys to delineate the extent of the population occurring sporadically through early August.

Field surveys did not result in the finding of any USFWS endangered, threatened, proposed or candidate plant taxa. The only special status species found during botanical surveys was the green-tinged paintbrush (*Castilleja chlorotica*), a plant tracked by the Oregon Natural Heritage Program. A specimen was collected and sent to Mark Egger, a *Castilleja* expert at the University of Washington, who positively identified it.

Green-tinged paintbrush (BLM Sensitive, USFWS Species of Concern; OR Rank: G (global) 3/S (state) 3[Rare or uncommon but not imperiled (typically 21 to100 occurrences)]; ORNHIC: 1 [List 1 taxa are endangered or threatened throughout their range or are presumed extinct.]). The only special-status plant species encountered, *green-tinged paintbrush*, has always been considered rare. Endemic to Oregon, it is confined to high-elevation (above 4,700 ft) locations in four Oregon counties: Klamath, Lake, Deschutes, and Crook (Oregon Flora Project, 2009). The Project is very near the northeastern edge of the known range of this species, though it can be found farther north in western portions of Deschutes County.

This species blooms from late June to mid August, and was not identifiable during the early (June) surveys at West Butte. By early July, its presence was obvious; in some spots it was the dominant forb. This paintbrush was found only at elevations above 4,700 feet in deep soils; it did not occur in the lithosols. It was associated with mountain big sagebrush, a preferred host plant from which it obtains its nutrients (the paintbrushes are hemiparasitic). At this location, green-tinged paintbrush was found on level ground and on north- and east-facing slopes; it was largely absent from south-and west-facing slopes. On West Butte proper, an extensive population containing in excess of 50,000 plants was delineated, and the perimeters of four smaller populations to the east were identified. The largest population extended onto BLM managed public land to the south of the Project.

3.6.2 Impacts of Alternative 1 - Proposed and Connected Actions

Generally, potential impacts to species of concern and special status species during construction and operation of wind energy are summarized in the BLM Wind Energy Development Programmatic EIS (BLM, 2005b) and are expected to be similar to the impacts to other wildlife/birds/plants that are not afforded special protection. These include each of

the ecologic stressors listed in the BLM Wind Energy Development Programmatic EIS; habitat disturbance, invasive vegetation, direct injury or mortality, erosion and runoff, fugitive dist generation, noise, exposure to contaminants, and interference with behavioral activities (BLM, 2005b). See Section 3.5.2 for a complete list of these impacts.

Direct effects could include:

- direct habitat modification and reduction associated with construction clearing or grading;
- introduction of sediment and fugitive dust through erosion and runoff during construction and operation;
- exposure to contaminants that are used during construction and operation; and
- injury or mortality associated with collisions with construction equipment and/or turbines, meteorological towers, and overhead transmission lines.

Indirect effects could include:

- Human and habitat disturbances and/or loss that result in habitat fragmentation and/or species crowding in adjacent habitat, interfering with behavior and/or migration;
- introduction of invasive vegetation that could change on-site habitat conditions;
- interference with behavior or migration from noise created by Project facilities and human activity;

The importance of each of these impacts was assessed with respect to the special status species that potentially occur in the Project Area. As discussed in more detail below, permanent, adverse impacts on special status species are expected from the Proposed Action and Connected Action to certain special status species.

Birds

Impacts associated with special status bird species, including peregrine falcon, bald eagle, Lewis's woodpecker, loggerhead shrike, mountain quail, sage sparrow, ferruginous hawk, and northern goshawk, would be similar to those for other birds described in Section 3.6.2 of the BLM Wind Energy Development Programmatic EIS. Impacts associated with the Proposed Action and Connected Actions could have minor impacts on each of these species. Species that tend to fly at lower levels such as the loggerhead shrike, mountain quail, and sage sparrow are at minimal risk of impact from operating turbines. Raptors expected to only use the Project Area in transit, including peregrine falcon and bald eagle, are expected to incur few impacts as a result of collisions.

Greater Sage Grouse

Greater sage grouse are highly dependent, and are considered sagebrush obligate species, on sagebrush-dominated landscapes for all phases of their life history. They are habitual, using specific locales during all seasons, and are sensitive to habitat disturbance (Connelly et al., 2000; Connelly et al., 2003; Hanf, 1994; Becker et al., 2009). Due to the relatively new expansion of wind farm developments into sage grouse habitats, there is very little information regarding the affects of wind power on sage grouse. Currently, there are no

published studies on the impacts of wind power facilities on sage grouse leks. However, the loss and degradation of habitat from anthopogenic change are the most important historical and current factors leading to isolation, reduction, and extirpation of populations (Braun, 1998; Connelly et al., 2000; Aldridge and Brigham, 2002; Knick et al., 2003; Wisdom et al., 2005). It is known that sage grouse near natural gas fields have moved twice as far as birds from undeveloped leks in search of undisturbed nesting habitat (Lyon and Anderson, 2003), and that nest initiation rates were lower. Preliminary findings from a Wyoming study are indicating a direct link between truck traffic and landscape avoidance by sage grouse (Holloran, 2010). Effective management for this landscape species must include an accurate estimate of populations, sub-populations, seasonal use habitats, and ecological site potentials. Actual effects of the Proposed and Connected Action are uncertain, however given the fragmentation and loss of habitat described, along with the noise levels, truck traffic, and towering structures, an appreciable effect to year-round habitat and the population is expected.

Greater sage grouse are highly dependent, and are considered sagebrush obligate species, on sagebrush-dominated landscapes for all phases of their life history.The effects of wind energy on sage grouse populations have not been clearly identified and published in scientific literature, though potential direct and indirect impacts have been identified (Becker et al., 2009; Braun et al., 2002). The analysis of cause-effect relationships between land uses and population responses was the third highest among the eight key research needs identified for sage grouse in Oregon (Rowland and Wisdom, 2002). The BLM Wind Energy Development Programmatic EIS (BLM, 2005b) discusses a number of construction and operational activities that may adversely affect wildlife (sage grouse).

Activities and disturbance related to energy development scenarios has been shown to affect sage grouse populations. For example, sage grouse populations have been shown to decline following oil and gas development (Becker et al., 2009). A panel of experts ranked infrastructure related to energy development and urbanization as the second most important extinction risk factor for sage grouse after invasive species (70 FR 2244). Because of these factors, potential Project impacts to greater sage grouse were raised as a primary issue during the scoping process.

The primary reason for the nationwide decline in sage grouse is habitat related, including habitat loss, habitat fragmentation, and habitat degradation (Connelly et al., 2004). It is reasonable to assume any similar changes to sage grouse habitat on West Butte resulting from the development of the Project would, on a smaller scale, also affect sage grouse using the surrounding area such as Bear Butte, Millican Valley, and other areas. Whether such effects are measurable is unknown. Perhaps the single most unknown factor is how sage grouse, which are accustomed to a relatively low vegetation canopy, would respond to numerous wind turbines hundreds of meters taller than the surrounding landscape. Some scientists speculate such a skyline may displace sage grouse hundreds of meters or even miles from their normal range (NWCC, 2004b; USFWS, 2003). If birds are displaced, it is

unknown whether, in time, local populations may become acclimated to elevated structures and return to the area.

The impacts caused by the Proposed and Connected Actions that are most likely to threaten the persistence of the Project Area as suitable sage grouse habitat are:

- permanent removal and/or alternations of sage brush habitats;
- construction and operation noise and related human disturbances; and
- installation of tall structures (i.e., transmission poles, wind turbines, and meteorological towers) in currently occupied habitats.

Impacts associated with the construction of the Proposed and Connected Actions are similar to those discussed for other bird species in Section 3.5.2 and as such will not be discussed in this section. Impacts discussed below include those closely associated with sage grouse and consist of species specific impacts by habitat alteration (and resulting fragmentation and possible habitat abandonment) and operational noise (and the potential for lek abandonment).

A slight increase in sage grouse mortality could result from collisions with wind turbines, transmission interconnect lines, and vehicles. Sage grouse using the Proposed and Connected Action areas could collide with the transmission interconnect lines and with the lower reaches of the moving rotors. However, given the relative infrequency of sage grouse flights (e.g., usually limited to escape reactions, movements to foraging areas, short elevation migrations) and the close to the ground flying patterns, it is unlikely that these collisions would be numerous or result in an impact to the West Butte localized population and Central Oregon population. Collisions with vehicles are more likely; however, maintenance personnel would be trained to be sensitive to the presence of sage grouse and reduce driving speeds to prevent collisions.

To date, there are no known studies that address the question of whether wind energy projects will directly or indirectly impact sage grouse. Some studies have been conducted on greater prairie-chicken (*Tympanuchus cupido*) and lesser prairie-chicken (*T. pallidicinctus*) at wind-generation facilities, but with mixed results. In one such paper it was predicted that nesting and brood-rearing hens of both species may avoid large wind turbines (Robel et al., 2004), whereas another study documented persistence in both the number of occupied booming grounds and the number of cocks attending them near wind turbines in Minnesota and Nebraska (as cited in NWC, 2008). The conclusion of the latter study was that prairie grouse adjusted to the presence of wind generator complexes as long as suitable habitat remained. These effects are anticipated to be similar for Greater sage grouse due to similar behaviors and life history requirements.

Habitat Fragmentation

Habitat fragmentation is the separation or splitting apart of previously contiguous, functional habitat components of a species. Fragmentation can result from direct habitat losses that leave the remaining habitat in noncontiguous patches, or from alteration of habitat areas that render the altered patches unusable to a species (i.e., functional habitat loss). Functional

habitat losses include disturbances that change a habitat's successional state or remove one or more habitat functions; physical barriers that preclude use of otherwise suitable areas; and activities that prevent animals from using suitable habitat patches due to behavioral avoidance.

Fragmentation of sagebrush habitats has been cited as a primary cause of the decline of sage-grouse populations because the species requires large expanses of contiguous sagebrush. The negative effects of habitat fragmentation have been well documented in numerous bird species, including some shrub-steppe obligates (Knick and Rotenberry, 1995). Sagebrush habitats are becoming increasingly degraded and fragmented due to the impacts of multiple threats, including direct conversion, urbanization, infrastructure such as roads and powerlines built in support of several activities.

The loss of habitat from fragmentation and conversion decreases the connectivity between seasonal habitats potentially resulting in the loss of the population (Doherty et al., 2008). The decline in connectivity was due to the loss of leks and reduced population size (Knick and Hanser, in press). Historic leks with low connectivity also were lost (Knick and Hanser, in press), suggesting that current isolation of leks by distance (including habitat fragmentation) will likely result in their future loss (Knick and Hanser, in press). Small decreases in lek connectivity resulted in large increases in probability of lek abandonment (Knick and Hanser, in press). Therefore, maintaining habitat connectivity and sage-grouse population numbers are essential for sage-grouse persistence.

Sagebrush distribution was the most important factor in maintaining connectivity (Knick and Hanser, in press). This result suggests that any activities that remove or fragment sagebrush habitats will contribute to loss of connectivity and population isolation.

Recognizing this area is a "primary wildlife emphasis area", (see Upper Deschutes RMP), BLM has acknowledged the need to provide habitat that benefits wildlife and retains high wildlife use, maintaining large un-fragmented patches (1,000 to 2,000 acres) and are given high priority for restoration. Although the Project is on the fringe of greater sage grouse range, it has been recognized for habitat protection and enhancement. Oregon's 2010 initiative depicting "high priority" sage grouse habitat also supports this direction as a map depicting a 3-mile radius around the lek has been designated*Project Area*.

The construction of the 52 wind turbine locations, meteorological towers, and transmission line will further fragment the existing landscape within the Project Area and reduce connectivity to adjacent sage grouse habitat. Roads and turbines would not be sited within one-quarter mile of an active lek. Based on telemetry studies in Oregon which showed 80 percent of nesting females within a 3-mile radius of a lek (4-miles on Prineville District), this setback will not likely eliminate the negative effects on breeding, roosting and nesting habitat.

Transmission Lines/Turbines

Due to the potential spread of invasive species and predators as a result of powerline construction the impact from the powerline is greater than the actual footprint. Knick *et al*.

(in press, p. 111) estimated these impacts may influence up to 39 percent of all sagebrush in the SGCA. Powerlines can directly affect greater sage-grouse by posing a collision and electrocution hazard (Braun 1998, pp. 145-146; Connelly et al. 2000a, p. 974), and can have indirect effects by decreasing lek recruitment (Braun et al. 2002, p. 10), increasing predation (Connelly et al. 2004, p. 13-12), fragmenting habitat (Braun 1998, p. 146), and facilitating the invasion of exotic annual plants (Knick et al. 2003, p. 612; Connelly et al. 2004, p. 7-25). A study of prairie chickens (a bird similar to sage grouse) found that avoidance of tall structures did occur (Hagen et al., 2004, Pruett et al. 2009). Some scientists speculate that tall structures could displace sage grouse hundreds of meters or even miles from their normal range (ISAC, 2006). At the site of the Cotterel Wind Power Project in Idaho several males displaying directly beneath a meteorological tower and guy wires were observed within several hundred meters of an active lek (BLM, 2006). At the China Mountain MET Tower installation in Idaho (BLM, 2009a) sage grouse attendance of active leks following the first meteorological tower installation in 2002 and subsequent installations thereafter, was variable in nature. No consistent patterns were readily visible following tower installation and thus a conclusion could not be made from these data whether the meteorological tower installation displaced sage grouse. Many leks were not surveyed and data in that study are limited by small sample size and limited years of monitoring. In 2009, two sage-grouse died from electrocution after colliding with a powerline in the Mono Basin of California (Gardner 2009).

Transmission lines which create objects that grouse could picture as perch locations for predators could result in avoidance of areas around these locations limiting the use of available habitat directly adjacent to those areas (Connelly et al., 2003; Hagen, 2005). It has been shown both male and female sage grouse may abandon leks if repeatedly disturbed by raptors perching on nearby power lines (as cited in Becker et al., 2009; Connelly et al., 2004). The presence of a powerline may fragment sage-grouse habitats even if raptors are not present. Braun (1998) found that use of otherwise suitable habitat by sage-grouse near powerlines increased as distance from the powerline increased for up to 600 m (660 yd) and, based on that unpublished data, reported that the presence of powerlines may limit sage-grouse use within 1 km (0.6 mi) in otherwise suitable habitat. Braun et al. (2002) reported that sage grouse were particularly susceptible to the placement of overhead power lines within 0.5 miles of nesting grounds. Collisions with power lines and vehicles and increased predation by raptors may increase mortality of birds at leks (Connelly et al., 2000). Additional literature supports avoidance of transmission and fence lines by sage grouse because of the perception of them being perch locations for raptors (as cited in BLM, 2004a; Braun, 1998; Call and Maser, 1985). Sage grouse could also be impacted by flying into these structures (Braun, 1998). The powerlines installed as part of the project could serve as perches for raptors, and result in increased predation of sage grouse.

Roads

Impacts from roads may include direct habitat loss, direct mortality, barriers to migration corridors or seasonal habitats, facilitation of predators and spread of invasive vegetative

species, and other indirect influences such as noise (Forman and Alexander, 1998). Sage grouse mortality resulting from collisions with vehicles does occur (Patterson, 1952), but mortalities are typically not monitored or recorded.

Roads can provide corridors for predators to move into previously unoccupied areas. Corvids also use linear features such as primary and secondary roads as travel routes, expanding their movements into previously unused regions (Knight and Kawashima 1993; Connelly et al.2004).

The presence of roads increases human access and resulting disturbance effects in remote areas (Forman and Alexander, 1998; Forman, 2000; Connelly et al. 2004)

The expansion of road networks contributes to exotic plant invasions via introduced road fill, vehicle transport, and road maintenance activities (Forman and Alexander, 1998; Forman, 2000; Gelbard and Belnap, 2003; Knick et al., 2003; Connelly et al., 2004).

Male sage-grouse lek attendance was shown to decline within 3 km (1.9 mi) of a methane well or haul road with traffic volume exceeding one vehicle per day (Holloran, 2005). Male sage-grouse depend on acoustical signals to attract females to leks (Gibson and Bradbury 1985; Gratson, 1993). If noise interferes with mating displays, and thereby female attendance, younger males will not be drawn to the lek and eventually leks will become inactive (Amstrup and Phillips, 1977; Braun, 1986).

Nest initiation rates for hens bred on leks close to roads also were lower (65 versus 89 percent) affecting population recruitment (33 versus 44 percent) (Lyon, 2000; Lyon and Anderson, 2003; Lyon and Anderson, 2003) suggested that roads may be the primary impact of oil and gas development to sage-grouse, due to their persistence and continued use even after drilling and production have ceased.

Roads and power lines may therefore also alter the productivity or survival of sage grouse outside the reproductive season, indirectly reducing the number of birds that use leks, and increasing the potential for lek abandonment. Since the Project would result in the siting of roads and turbines within three miles of an active sage grouse lek, it is likely that their presence would result in some level of impact to sage grouse on West Butte. The extent of this impact cannot be quantified but it is expected based on previous research that habitat near these structures would likely be avoided.

Construction and Operational Noise and Human Related Disturbance

The direct loss and fragmentation of habitat associated with noise disturbances from vehicle traffic and construction have been shown to reduce attendance at sage grouse lek sites and lower female nest initiation in proximity to these sites. Young (2003) documented loud, unusual sounds and noise from construction and human activities disturb gallinaceous birds, cause birds to avoid traditional use areas, and reduce sage-grouse use of leks (as cited in BLM, 2005b). Disturbance at leks appears to limit reproductive opportunities and may result in regional population declines. Most observed nest abandonment is related to human activity (NatureServe, 2004 as cited in BLM, 2005b). Declines in lek attendance were positively

correlated with vehicle traffic levels, and vehicular activity during the daily strutting period on roads within 1.3 km of a lek intensified the negative influence of traffic (Beck et al., 2009).According to one study that specifically addressed noise impacts on sage grouse lekking sites, noise disturbances within 660 feet of a lek site generally resulted in a loss of attendance. As the distance increased from the source of noise, the number of leks with reduced attendance decreased (Braun et al., 2002). Similarly, female sage grouse were found to move greater distances from leks near noise disturbances, and had lower rates of nest initiation in areas disturbed by vehicle traffic (Lyon and Anderson, 2003). Lyon and Anderson (2003) suggested these greater travel distances were a result of medium traffic (<12 trips/day) during breeding and early nesting phases. The regular traffic patterns of roads (3 to 20 trips/day in the study) particularly during early construction phases may lead to grouse avoiding these areas altogether despite preferable habitat. This acts to further fragment existing sage grouse habitats and reduce the available habitat. Therefore, sage grouse leks located within 660 feet of wind turbines and Project roads could experience reduced attendance as a result of noise generated Proposed and Connected Action facilities.

Operational noise could impact greater sage grouse by causing lek abandonment and limiting breeding, rearing and foraging of the site by adult sage grouse. A lek complex occurs within the Project Area and wind turbines are sited within 0.5 miles of this location. A noise analysis of the Project's turbines during operation found that noise levels at the lek complex would be 51.7 decibels (dB) of A-weighted scale (see Figure 3-6). Crompton (2005) recommends noise at any lek should be less than 40 dB. Based on the assumptions used in the noise model, approximately 4,365 acres of Category 1 habitat located on or adjacent to West Butte would be in exceedance of this 40 dB threshold.

Other recommendations suggest limiting noise sources to 10 dBA above natural, ambient noise (approximately 39 dBA) measured at the perimeter of a lek from March 1 to May 15 (Inglefinger, 2001 and Nicholoff, 2003 as cited in WGFD, 2008). The Wyoming Bird Conservation Plan suggests the effects of continuous noise are strongest in areas where noise exceeds 50 dBA for bird communities (Nicholoff, 2003). However, even moderate noise levels (40 to 50 dBA) may have some effect on bird communities (Nicholoff, 2003).

A recent paper published on black grouse and wind development (Zeiler et al., 2009) showed that the booming of greater sage grouse and similar species are known to travel up to 2.5 miles from a lekking site. Wind volumes limits this distance but when combined with turbine noise black sage grouse booming distances were reduced to just over 165 feet (Zeiler et al., 2009). This could lead to lek abandonment and other detrimental affects to local greater sage grouse within the Project Area. Other research has shown that full development of the landscape within 3.2 km of leks reduced the average probability of lek persistence from 87 percent to 5 percent (as cited in Becker et al., 2009).

Other behaviors, including brood rearing and summer and winter foraging could also be disturbed due to temporary and permanent noise created by the Project. Localized and short duration noise caused by vehicle maintenance or maintenance activities could result in grouse displacement and avoidance of the area. Walker et al. (2007) found persistence of 110 leks

was positively influenced by the proportion of sagebrush habitat within 4 miles of the lek. Walker et al. (2007) also found that seasonal restrictions on drilling and construction do not address impacts caused by loss of sagebrush and incursion of infrastructure that can affect populations over long periods of time.

In summary, no single impact or combination of impacts have been proven to have caused the decline in greater sage grouse numbers over the past half-century, but the decline in greater sage grouse populations and habitat is thought to be due to a number of factors including drought, wildfire, infrastructure, powerlines, predators, livestock grazing, alteration of fire regime and climate change (Connelly et al., 2000; Connelly et al., 2004).

Habitat impacts are listed in Table 3.4-3. Approximately 16,335 acres of sagebrush habitat are located within a 3-mile buffer of known leks near or within the Project Area.

According to Hagen (2005), in 2002 there were approximately 1.8 million acres of sage grouse habitat remaining in the Prineville District and almost 14 million acres remaining state-wide. Based on the best available science for the protection of sage grouse and their habitat it has been recommended that energy facilities should not be developed within a 3-mile radius of sage grouse leks (Connelly et al., 2000). While potential habitat would remain mostly undisturbed, sage grouse may be displaced within a 3 mile radius of the lek due to disturbance from the construction and operation of the Proposed and Connected Action. Therefore, under this alternative, it would be prudent to expect that all acres of potential sage grouse habitat within 3.0 miles of the West Butte lek and two Bear Butte leks (16,335 acres, Figure 3-4A) could be affected by industrial scale wind development due to habitat alterations and behavioral avoidance. This does not take into consideration topographical or micro-habitat features of the area that may protect or reduce potential disturbance from the project; which could limit visual extent of the wind turbines.

Chapter 2 and Appendix B describe the specific design features that West Butte Wind would implement to avoid or minimize potential impacts to sage grouse. Even with these design features, there would likely be effects on greater sage grouse caused by the development of the West Butte Wind Power Project, in association with habitat loss, fragmentation and noise levels, as discussed in the BLM Wind Energy Development Programmatic EIS and the associated Record of Decision (BLM, 2005b). It is anticipated that the Connected Action would lead to the gradual displacement of sage grouse from portions of the Project Area and over time, result in reductions in lek attendance and nesting, brood-rearing and wintering on West Butte and the surrounding areas.

While the actual number of grouse that specifically use the Project Area remains unclear, given the year-round sage-grouse use on West Butte, it is prudent to expect that whatever the effects are locally, the central Oregon population of sage grouse and birds associated with the western fringe of the species range will also be affected by the Proposed and Connected Actions.

Federal Register Notice , FWS-R6-ES-2010-0018, Endangered and Threatened Wildlife and Plants; 12 Month Findings for Petitions to List the Greater Sage-Grouse (*Centrocercus*

urophasianus) as Threatened or Endangered, states "Continued habitat destruction and modification, compounded by fragmentation and diminished connectivity, will result in reduced abundance and further isolation of many populations over time, increasing their vulnerability to extinction. Overall, this increases the risk to the entire species across its range. Therefore, based on our review of the best scientific and commercial information available, we find that the present or threatened destruction, modification, or curtailment of the habitat or range of the greater sage grouse is a significant threat to the species now and in the foreseeable future."

USGS modeling (using 2007 lek data) shows, that across all 26 models of population growth, the central Oregon population has a 91 percent chance of declining below an effective population size of 500 within 100 years. For this reason, any additional loss or degradation of sage-grouse habitat such as those found within the Project Area (i.e., preferred high elevation habitats) which would result in the subsequent abandonment of those areas and a reduction in sage grouse numbers overall, would likely contribute to an overall potential decline is sage grouse numbers in the project area .

Sage Grouse Habitat Mitigation Policy and Enhancement

ODFW has developed recommendations for considering sage grouse under its Fish and Wildlife Habitat Mitigation Policy (OAR 635-415-0000) (Mitigation Policy). These recommendations utilize and are consistent with habitat categories directed under the Mitigation Policy.

The goal of these recommendations is to avoid, minimize, or mitigate for impacts on sage grouse habitats from energy development, its associated infrastructure, or other industrial/commercial developments. The objective of these recommendations is to protect essential habitats to meet habitat and population objectives in the cooperatively developed *Greater Sage Grouse Conservation Assessment and Strategy for Oregon: A Plan to Maintain and Enhance Populations and Habitat* (Sage Grouse Plan; OAR 635-140-0005 & -0010; Hagen, 2005).

The following recommendations were developed:

1. In an effort to protect breeding habitat, establish habitat protection areas of no development around (3-mile radius) occupied leks, and designate all sagebrush (*Artemisia spp*.) habitats, wet meadows, and native grassland areas within that radius as Category 1 habitat under the Mitigation Policy. The mitigation goal for Category 1 habitat is no loss of either habitat quantity or quality.
2. Any sagebrush habitat identified as winter habitat, designate as Category 2 habitat, and avoid development within a half mile of these areas. The mitigation goal for Category 2 habitat if impacts are unavoidable is no net loss of either habitat quantity or quality and to provide a net benefit of habitat quantity or quality.
3. Any sagebrush habitat identified as brood rearing habitat, designate as Category 2 habitat, and avoid development within a half mile of these areas.

4. Transmission lines should be placed in existing ROWs to aggregate this disturbance; if not possible, then transmission lines should be sited more than 2 miles from occupied leks, and more than a half mile from wintering areas and brood-rearing habitats.
5. Meteorological towers should be constructed more than 2 miles from occupied leks.
6. Improved (gravel) larger volume roads should be constructed more than 2 miles from occupied leks.
7. Ground level structures (e.g., transfer stations, pipelines, buried power lines) should not be sited within a half mile of the nearest occupied lek.
8. Timing restrictions: construction and maintenance activity associated with any development should be avoided from March 1 to June 30 in sage grouse habitat. If avoidance is not possible then activity should be restricted from 1 hour after sunset to 2 hours after sunrise.
9. If development is unavoidable in these habitats studies need to be conducted to quantify the level of impact on sage grouse.

The Oregon State Office of the BLM has also developed policy to maintain consistency with recommendations from ODFW to avoid and/or minimize impacts to sage grouse. BLM IM No. OR-2009-038 provides modifications to guidance found in the *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon: A Plan to Maintain and Enhance Populations and Habitat, Oregon State Strategy* (Hagen, 2005). The IM provides guidance regarding actions on BLM administered land (not private land) and states, "The recommendation to limit the construction of wind energy grids (wind farms) to no closer than 8 km (5 miles) of known/occupied sage grouse habitat (pg. 83, Oregon State Strategy) is reduced to a 4.8 km (3 miles) radius of sage grouse lek sites. However, additional buffers, stipulations, or mitigation outside the 4.8 km radius should be considered to minimize loss of winter and brood rearing habitat and to address ODFW's objective of "no net loss" of critical winter and brood rearing habitats. The IM also provides guidance for additional buffers for wind towers including:

- Winter Habitat: Winter habitat has not been adequately inventoried in Oregon, and field units should consult ODFW personnel and internal Bureau of Land Management data to identify winter habitat and the connectivity corridors between habitats for protection with a half-mile buffer. If telemetry or other data suggests habitat use patterns outside the 4.8-km (3-mile) radius, that information should be used in determining buffers and stipulations.
- Brood Rearing Habitats: Generally comprised of a mosaic of upland vegetation intermixed with wetland sites. These areas can be more than 10 miles from lek sites. They are essential for sage grouse survival and should be protected with a half-mile buffer. ODFW personnel and internal BLM data should be considered to identify these sites.
- Access Roads and Power Lines: Consult the Greater Sage grouse Conservation Assessment and Strategy for Oregon for guidelines (pgs. 83 & 84). In addition,

ODFW is now recommending that ground-level structures (e.g., roads, buried power lines) not be sited within 0.5 miles of the nearest lek site. Whenever possible, linear activities such as roads and power lines should be combined into a single right of way corridor to minimize habitat fragmentation and disturbance."

On March 5, 2010, the USFWS determined that greater sage-grouse warrants protection under the Endangered Species Act (ESA), but listing is precluded by the need to complete other listing actions of higher priority. As a result, greater sage-grouse will be considered a candidate species and will be proposed for protection when funding and workload priorities for other listing actions allow. As a candidate for listing, BLM Manual 6840 (2001) provides the direction for management of candidates through the BLM Special Status Species policy. The objectives of this policy are to:

- Conserve and/or recover ESA-listed species and the ecosystems on which they depend so that ESA protections are no longer needed for these species; and
- Initiate proactive conservation measures that reduce or eliminate threats to BLM sensitive species to minimize the likelihood of and need for listing of these species under the ESA.

In view of the USFWS finding, BLM issued an IM (2010-071) to identify management actions necessary at some sites to ensure environmentally responsible exploration, authorization, leasing, and development of renewable and non-renewable energy resources within the ranges of the greater sage-grouse. Actions available to BLM for protection of sage grouse populations as it relates to Wind and Solar Energy Development and Associated Site Testing include:

- Screen new right-of-way applications to identify whether the wind or solar energy development or site testing and project area includes priority habitat. If so, alert the applicant as early as possible that the application may be denied or that terms and conditions may be imposed on the right-of-way grant to protect priority habitat as supported by NEPA analysis. (Mapping of priority habitats, habitats defined as having the highest conservation value relative to maintaining sustainable sage grouse populations range-wide has not yet been completed).

In summary, the Proposed Action and Connected Action are not consistent with the guidelines in the Oregon State Strategy (and BLM IM No. OR-2009-038) which recommends that transmission lines not located within existing corridors should be placed greater than 3.2 km (1.9 miles) from known breeding, nesting, and brood-rearing habitats (Hagen, 2005). As illustrated in Figure 3- 4A, all of the WTGs proposed as part of the Connected Action fall within 3 miles of a sage grouse lek site and a portion of the transmission line associated with the Proposed Action (on BLM-administered lands) traverses sage brush habitats in areas that could be used for by sage grouse for nesting and brood-rearing. The Proposed and Connected Action is consistent with the recommendation to combine linear activities such s roads and power lines into a single right of way corridor to minimize habitat fragmentation and disturbance.

General guidelines for seasonal restriction and distance buffers for sage grouse leks are 0.6 mile March 1st – May 15 (BLM, 2005a). For nesting, brooding and rearing, seasonal restriction dates are April 1 – July 31 (BLM, 2005a). For winter habitat, season restriction dates are November 15 – March 15 (BLM, 2005a).

Other Special Status Bird Species

Peregrine falcon (State Sensitive-Vulnerable; BLM Sensitive). Potential exists for species to rarely fly through the Project Area during migration or rarely to forage in breeding season. No peregrine falcons were observed during raptor nest, fixed-point, in-transit count surveys conducted by NWC in 2007 and 2008. Peregrine falcons have not been recorded as a direct mortality at other wind farms in the region (as cited in NWC, 2008). No impacts on peregrine falcons are expected. General guidelines for seasonal restriction and distance buffers for peregrine falcon nests are 1 mile spatial buffer during January 1 – August 15 (BLM, 2005a).

Bald eagle. As noted above bald eagles may rarely fly through the Project Area. Due to the infrequency of their presence and because bald eagle mortality has not been documented at any wind farms previously, no impacts on bald eagles are anticipated from the Proposed or Connected Action area anticipated. General guidelines for seasonal restriction and distance buffers for bald eagle nests are ¼ mile spatial buffer for non-line of sight, ½ mile with line of sight, and 1 mile for blasting during January 1 – August 31 (BLM, 2005a). For winter roosts, the spatial buffer is ½ mile during December 1 – April 1 (BLM, 2005a).

Lewis's woodpecker. No Lewis's woodpeckers were observed during surveys, and no impacts on the species are anticipated due to expected presence and low likelihood of direct mortality by collisions since this species has had limited recorded impact at regional wind farms (as cited in NWC, 2008).

Loggerhead shrike. The construction and operation of the Project is expected to have little impact to this species due to the low flying nature of the species and its association to tall sagebrush and junipers for nesting interspersed with open patches for foraging. Direct mortality associated to collisions with wind turbines is not expected and has not been recorded at other wind farms in the region (NWC, 2008).

Mountain quail. Construction and operation of the Project is expected to have very little impact to this species; it generally remains in the draws rather than on the ridgetops. Mountain quail have not been observed as a direct mortality associated to collisions with wind turbines.

Sage sparrow. Project construction may result in some loss of suitable habitat, and there is a low likelihood of some direct fatality of this species due to its low flying and ground foraging behavior. Direct mortality of sage sparrow due to collisions with wind turbines is expected low since sage sparrows made up only 0.2 percent of the species composition of direct mortality as a result of collisions at other wind farms in the region (as cited in NWC, 2008).

Ferruginous hawk. Impacts to this species are likely to be those associated with disturbance from construction traffic and operation in proximity of nest sites, and it would be important

to determine the proximity to the access road of any active nest during the year of construction. Impacts are not expected from collisions with turbines based on data collected at other wind farms in the region that showed this species is only 0.6 percent of the species composition of direct mortalities associated to turbine collisions (as cited in NWC, 2008). General guidelines for seasonal restriction and distance buffers for ferruginous hawk nests are ½ mile spatial buffer for direct line of sight and ¼ mile with visual buffer during March 1 – August 31 (BLM, 2005a).

Northern goshawk. Overall use of the Project Area by breeding and transient northern goshawks appears to be relatively low, and no impacts on the species are anticipated. This species has not been recorded as a direct mortality at other regional wind farms (NWC, 2008); based on this plus limited use of the Project site limits Project related impacts. General guidelines for seasonal restriction and distance buffers for northern goshawk nests are ¼ mile spatial buffer during March 1 – August 1 (BLM, 2005a).

Reptiles

Northern sagebrush lizard. This species was encountered in sandy areas of the Project and along the access road. Impacts incurred by this species at the Project site are similar to those impacts associated to other reptiles within the Project Area analyzed in Section 3.6.2. The loss of habitat due to the main access road and turbine access roads, (74.1 acres of permanent impact to edge habitat along the current roadway and other areas with sandy soils) is relatively small in size comparative to habitat available in the adjacent landscape which provides quality dispersal habitat for this species. The powerlines could serve as perches for raptors, and result in increased predation of this species. Impacts to this species are expected to be localized in nature to individuals crushed by Project equipment, but no long-term population level effects are expected as a result of this Project.

Mammals

Bats

The Proposed Action is not expected to adversely impact sensitive bat species. The Connected Action is likely to adversely affect sensitive individual bats of sensitive species that fly at the height of the turbine rotors.

Small-footed myotis. Positively identified in NWC study. This species tends to fly lower than the rotor-swept are of modern wind turbines and is considered at low risk of collision (NWC, 2008). Wind facility studies, including the Pacific Northwest, have not reported a turbine caused fatality of this species (Arnett et al., 2008).

Long-eared myotis. Positively identified in NWC study. This is a low-foraging species that is considered at low risk of collision (NWC, 2008). Wind facility studies, including the Pacific Northwest, have not reported a turbine caused fatality of this species (Arnett et al., 2008).

Yuma myotis. Tentatively identified in NWC study. This is a low-foraging species that is generally considered at low risk of collision (NWC, 2008). While wind facility studies have not reported a turbine caused fatality of this species (Arnette et al., 2008), pre-construction

bat studies at Pacific Northwest wind facilities have not documented the presence of this species (NWC, 2008).

Pallid bat. Positively identified in NWC study. This species typically forages near the ground, but may fly higher when dispersing and migrating. Risk of turbine caused fatalities of this species remains unknown (NWC, 2008). While wind facility studies have not reported a turbine caused fatality of this species (Arnette et al., 2008), there is no data demonstrating the presence of this species at existing wind energy facilities (NWC, 2008).

Townsend's big-eared bat. Positively identified in the NWC study. This species is known to travel large distances while foraging, traveling as much as 90 miles in one evening. Seasonal movement is largely unknown, although there is thought to be local migration events (WBWG, 2005). Expected impacts to this species are unknown at this time. A turbine related fatality of this species has not been documented within the Pacific Northwest, but it is likely that suitable habitat was not present at wind facilities where post-construction surveys occurred (NWC, 2008).

Silver-haired bat. Tentatively identified in the NWC study. This is a high-flying migratory species that is known to collide with turbine rotors. As discussed in Section 3.6.2, silver-haired bat fatalities have represented up to 56 percent of turbine related bat fatalities (Arnette et al., 2008).

Pygmy rabbits

Impacts to this species are expected to occur mainly during construction of the Proposed and Connected Actions, with limited impacts occurring during operation of the facility. During construction, impacts relating to direct mortality, as a result of crushing an occupied burrow, could occur by vehicular traffic moving through the areas and/or by construction equipment used for clearing and grading.

Loss of sagebrush, upon which pygmy rabbits are highly dependent for food and shelter, is the main reason for the decline of pygmy rabbit populations. Substantial sagebrush has been burned or converted to agriculture in the region over time. Sagebrush is often cleared from large areas and replaced with exotic bunch grasses to improve livestock forage. The Proposed and Connected Actions would reduce the amount of sagebrush habitat in the area, but would not reduce this habitat substantially.

Green and Flinders (as cited in Hager et al., 2007) noted the importance of habitat connectivity and travel corridors. The ability of pygmy rabbits to rebound after periods of unfavorable conditions depends, in part, on landscape features that allow animals to disperse and recolonize suitable habitats. It is expected that the Proposed and Connected Actions would not reduce this ability to disperse and recolonize other areas due to the design outline of the wind turbines and relatively small area these rabbits use when dispersing. The powerlines installed as part of the project could serve as perches for raptors, and result in increased predation of pygmy rabbits.

Impacts to pygmy rabbits could occur as a result of the Proposed and/or Connected Actions due to the presence of this species in the area of construction and operation. Due to the limited number of rabbits that appear to inhabit the area and the general habitat condition of the butte (slopes and shallow soils), it is expected this Project's impact would be limited to no more than a few individuals – a level of impact that would not have a measurable impact on the locally breeding population.

Plants

The only special-status plant species encountered, *green-tinged paintbrush*, has always been considered rare. Endemic to Oregon, it is confined to high-elevation (above 5,000 ft) locations in four Oregon counties: Klamath, Lake, Deschutes, and Crook (Oregon Flora Project, 2009). The Project is very near the northeastern edge of the known range of this species, though it can be found farther north in western portions of Deschutes County.

Fire that kills mature sagebrush (upon which this paintbrush is hemiparasitic) can lead to at least short-term loss of green-tinged paintbrush (as cited in NWC, 2008). This effect was noted on the Project site, where the western extent of the green-tinged paintbrush population coincided with the eastern edge of a wildfire that occurred in 2006.

Some research has suggested that this species is avoided by cattle (as cited in NWC, 2008), but this is contrary to what was observed at West Butte. Though its viscous character is believed to be in part a defense mechanism against grazing (and though normal precipitation in winter and spring of 2008 led to high viscidity of this plant later that year), green-tinged paintbrush was extensively eaten as soon as cattle were introduced. Observations over a five-year period at Winter Rim on the Fremont National Forest in southern Oregon suggested that, at least under some circumstances, there can be large increases in green-tinged paintbrush distribution in areas of cattle grazing (Wooley, 2001).

The locally extensive distribution of green-tinged paintbrush on West Butte is such that micrositing of roads and turbines in order to completely avoid this plant is infeasible. Thus, for the main portion of the proposed Project, construction of roads and turbine platforms would result in the temporary disturbance of about 1percent percent and the permanent removal of about 1percent percent of the habitat occupied by this species on West Butte.

Because of its hemiparasitic nature, *Castilleja chlorotica* is considered difficult to transplant; success depends upon procuring large amounts of soil and of the plants upon which it is dependent. Therefore, post-construction re-vegetation (as along roads) should focus on maintaining native plants (especially mountain big sagebrush) and eliminating exotics. Whereas some attempts to seed *Castilleja chlorotica* in these areas is suggested, transplanting is not considered feasible.

Nonetheless, an extensive and dense population of green-tinged paintbrush is expected to remain inside and outside the project's footprint and is expected to recolonize areas temporarily impacted by Project construction. It does not appear likely that approving the Proposed Action and the Connected Action would lead to population level impacts of this

species in the area and would not cause the listing of the green-tinged paintbrush as a federal threatened or endangered species.

The ability of pygmy rabbits to rebound after periods of unfavorable conditions depends, in part, on landscape features that allow animals to disperse and recolonize suitable habitats. It is expected that the Proposed and Connected Actions would not reduce this ability to disperse and recolonize other areas due to the design outline of the wind turbines and relatively small area these rabbits use when dispersing.

3.6.3 Impacts of Alternative 2 - Northern Access Road Alternative and Connected Actions

Birds

Greater Sage Grouse

The effects of Alternative 2 on special status species are very similar to the effects of Alternative 1, with the exception of effects created by the northern access road and associated utility line. Of particular note are the potential effects on greater sage grouse by the presence of an overhead utility line in an area where none currently exists. Sage grouse are known to avoid transmission and fence lines because of the perception of them being perch locations for raptors (as cited in BLM, 2004a; Braun, 1998; Call and Maser, 1985). Sage grouse could also be impacted by direct mortality by flying to these structures (Braun, 1998). Roads and power lines may therefore also alter the productivity or survival of sage grouse outside the reproductive season, indirectly reducing the number of birds that use leks, and increasing the potential for lek abandonment. The northern access road and utility corridor crosses within 3 miles of two known leks and could result in some level of impact to sage grouse in the West Butte area. The extent of this impact cannot be quantified but it is expected based on previous research that habitat within a certain distance of these structures would be avoided. The northern access road adds 5.5 miles of overhead utility line to the proposed Project (i.e., in addition to the 5.0 miles of high voltage transmission line south of West Butte to interconnect the Project with the BPA transmission system). The powerlines could serve as perches for raptors, and result in increased predation of sage grouse.

The development of the northern access road would result in loss of habitat and may result in reduction of sage grouse use of leks within one kilometer (0.8 mile) of said roadway because of noise. Localized and short duration noise caused by construction and maintenance vehicles on the access road could result in grouse displacement and avoidance of the area. The existing environment of Juniper Acres includes vehicle trips and associated noise, as well as other human activity. Although declines in lek attendance were positively correlated with vehicle traffic levels, it is unlikely the additional truck traffic for maintenance of the Project would contribute substantially to the ambient noise condition in the area.

Other Special Status Bird Species

Potential impacts to ferruginous hawk could result from the northern access road construction and long-term use, particularly if these activities occur in proximity to a nest site.

Construction activities could be scheduled to avoid the nesting period if a hawk nest is found near the construction area. Field surveys have not been conducted in the area of the Northern Access road to confirm the presence of active hawk nests.

Reptiles

There would be no unique impacts on green tinged paintbrush under this alternative compared with those described for Alternative 1.

Mammals

Bats

There would be no unique impacts on green tinged paintbrush under this alternative compared with those described for Alternative 1.

Pygmy Rabbits

Impacts to this species would be similar to those from Alternative 1, except that there would be additional impacts from the northern access road and associated utility line. Impacts to ndividuals of this species could occur during construction of the northern access road. Further investigation would be needed to determine the prevalence of rabbits in the area. Project impacts could be limited to no more than a few individuals – a level of impact that would not have a measurable impact on the locally breeding population.

Plants

There would be no unique impacts on green tinged paintbrush under this alternative compared with those described for Alternative 1.

3.6.4 Impacts of the No Action Alternative

No facilities would be built under this scenario, and therefore there would be no effect on special status species.

Neighboring residential properties could experience temporary, construction-related noise (see Section 1.4.2); however, operation of the turbines and other Project facilities would not create noise that would be noticeable to neighboring private properties and therefore would not impact their development (see Section 1.4.2). Access to and from neighboring private properties from the Project access road on BLM-managed public lands would not be restricted, except for the existing cattle guards associated with existing fences (see Chapter 2). However, private landowners may use locked gates to limit access on private lands. In coordination with BLM and private landowners, West Butte Wind would post safety signs and require safe driving practices of Project employees and contractors to reduce driving speeds on Project access roads to avoid conflicts with residents in the area. During operation of the facilities located on private and BLM-managed public land, West Butte Wind would undertake ongoing coordination to minimize potential conflicts with current and future residential uses of these lands. Residents near the O&M facility could experience noise and visual impacts from construction and long-term use of that property. As noted in Section 1.4.2, noise from construction of the WTGs and related facilities on West Butte may be

perceptible to Juniper Acres residents, depending on proximity to the construction activity, but is expected to result in a temporary impact. Operation of the turbines and other Project facilities would not create noise that would be noticeable to neighboring private properties and therefore would not impact their development (see Section 1.4.2).In coordination with private landowners, West Butte Wind would post safety signs and require safe driving practices of Project employees and contractors to reduce driving speeds on the northern access road to avoid conflicts with residents in the area.

3.7 RECREATION

3.7.1 Affected Environment

The recreation analysis for the Project Area was compiled by reviewing USGS topographic quadrangle maps, selected aerial photography, and agency-specific jurisdiction maps/GIS data. The mapped information was verified by ground reconnaissance on August 3, 2009. In addition, federal land resource agencies were contacted to update official information. The study area for analysis of effects to recreation was the Project Area and its vicinity.

The Upper Deschutes ROD/RMP (BLM, 2005a) provides area-specific land use allocations and allowable uses as well as management objectives and guidelines for the conditions under which future uses might be authorized. The Upper Deschutes ROD/RMP identifies recreation areas within its boundary.

Existing Recreational Uses

Figure 3-6 shows existing recreational use areas in the Project Area and its vicinity. The Proposed Action is located in an area used for recreation, as defined by BLM's Upper Deschutes ROD/RMP. According to the Upper Deschutes ROD/RMP, this area is located within the Millican Valley Off Highway Vehicle Area, North Millican subunit, of the High Desert Special Recreation Management Area. The Proposed Action is within a designated Multiple Use Shared Facility recreational use area. The Connected Action would be located on private lands, where access is under the control of the private landowner.

According to BLM's Upper Deschutes ROD/RMP, public land surrounding the Project Area includes: a Non-Motorized Recreation Exclusive recreational area to the north; a Multiple Use Shared Facility recreational area to the west and south; a Non-Motorized Recreation Emphasis recreational area to the east; a General Wildlife Emphasis area to the northwest; and Primary Wildlife Emphasis areas to the north, west, south, and east.

Recreational uses in the Project and surrounding area include OHV use, hunting, and other recreational uses, which are discussed in the following sections.

Off-highway Vehicle Recreation

BLM-managed public land in the Project Area is used for recreation, with OHV use being the primary use (BLM, 2009b). The Millican Valley OHV Trail System is located to the north, west, and south of West Butte and includes the Millican Plateau OHV Area, North Millican

OHV Area, and South Millican OHV Area. The system is used by recreationists from central Oregon as well as riders from west of the Cascades.

The Millican Plateau OHV Trail System, located to the west and north of West Butte, provides 74 miles of Class I and III trails (i.e., all-terrain vehicle (ATV) and motorcycle trails) and 37 miles of Class I, II, and III trails (i.e., ATV, motorcycle, and vehicle routes). The North Millican Valley OHV Trail System, located to the south and southwest of West Butte, provides 78 miles of Class I and III trails and 24 miles for Class I, II, and III trails.

Other Recreation

Deer and elk hunting occur on some of the public and private lands located in the foothills of West Butte; however, the hunting is not widespread due to tag restrictions, rugged terrain, and limited road access (BLM, 2009b).

The North Millican OHV Area is also used by various recreationists year-round. Non-motorized users such as mountain bikers, hikers, target shooters, and hunters also use the area during the winter.

The Oregon Badlands Wilderness is located approximately 3 miles west of the Project Area. The Badlands includes 29,301 acres of designated wilderness area, which is primarily used by hikers and horseback riders year-round.

The Horse Ridge Natural Area, located approximately 7 miles southwest of the Project Area, is used for hiking, horseback riding, and mountain biking.

Pine Mountain, located approximately 6.5 miles southwest of the Project Area, is used for hiking, horseback riding, and mountain biking. There is also an observatory located on Pine Mountain, which is used for astronomy education and research, and is open to the public during scheduled times.

Sightseeing occurs in the area along Millican Road and Reservoir Road, north of West Butte (BLM, 2009b). Reservoir Road connects to Prineville Reservoir, northeast of West Butte, which offers boating, camping, and fishing activities.

3.7.2 Impacts of Alternative 1 - Proposed and Connected Actions

The Upper Deschutes ROD/RMP (BLM, 2005a) was reviewed to assess the potential impacts of granting of the ROW on recreational uses that have been identified in the area where the facilities associated with the Proposed Action would be constructed. These Project facilities are located in a small portion of the North Millican subunit.

Area recreationists may experience project-related access, noise, and visual impacts. Additionally, recreationists in the area may experience indirect impacts as a result of the landscape's changed appearance and the presence of a new land use (energy generation). Potential impacts on existing land use on BLM-managed public lands would occur for OHV recreation and other recreational uses (e.g., hunting) identified for the North Millican subunit management area. Recreational use (e.g., hunting) impacts on private lands associated with

the Connected Actions would be similar to those as the Proposed Action; however, access to private lands would continue to be under the control of the private land-owner.

Off-highway Vehicle Recreation

Traffic Usage

The access road proposed on BLM-managed public lands is located within the North Millican OHV Area. The Upper Deschutes ROD/RMP management direction for the North Millican Valley OHV Area is to manage for shared use on a designated trail system. This proposed access road is within an area designated Multiple Use Shared Facilities, which emphasizes shared road and trail systems for both motorized and non-motorized uses. The proposed access road is currently designated as a BLM Route Available for Motorized Travel as part of the much greater Millican Valley OHV trail network available for public use (see Figure 3-6). As noted above, OHV access and use is available in several of the sub-areas that make up the Millican Valley OHV Recreation Area.

Construction of the Project facilities associated with the Proposed Action would involve improvement of 3.65 miles of existing road, and construction of 0.25 miles of new road to connect access to the private lands where the Connected Action would be developed. Following road improvement, construction vehicles would travel on the improved access road to deliver work force, equipment, and materials needed for construction and operation of the proposed wind farm. During this construction period, access to the road would not be available for recreational users. Access to OHV trails that originate or intersect with this road (see Figure 3-6) would likely also be limited to protect public safety.

After construction of the wind farm is completed, Project traffic usage of the access road developed on BLM-lands would decrease substantially, and access to recreational users would be re-opened, with no permanent loss to miles of trail available for recreation. Access to other OHV trails that originate or intersect with this road would also be re-opened. However, the Upper Deschutes ROD/RMP limits the number of road miles allowed in the area. Therefore, improvements to the 3.65 miles of existing road would decrease the amount of rugged trail miles available for OHV use. Users may feel that this segment of road may have lost some of its rural quality by nature of the road surface having been improved. Rather than using the access road for a challenging riding experience, however, OHV users may travel the access road out of curiosity and create unauthorized trails off the road. Additionally, the 0.25 mile of new road would reduce the overall amount of trail miles available for OHV use.

Per direction in the Upper Deschutes ROD/RMP, the access road could be decommissioned in the absence of the Project, which would open 3.65 trail miles for use elsewhere in the area. Therefore, the Project access road could result in a total of 3.90 fewer trail miles available for OHV use elsewhere in the North Millican OHV Area during the operational life of the project. If West Butte Wind is required to decommission the main access road on BLM-managed public lands at the end of the RPOW lifetime, those 3.9 miles would become available for use in other areas within the North Millican OHV area.

Visual and Noise Impacts

Depending on location and distance, recreational users could experience project-related visual and noise impacts. As described in Section 3.8, the turbines would be visible either in the foreground, middle-ground or background of the visual landscape depending on how close the recreational use is located to the Connected Action, and if any natural or manmade features obstruct the recreationalist's view.

As discussed in Section 1.4.2, Project construction activities will result in temporary noise emissions. While recreational access to the construction areas on BLM-managed public land would be restricted during the facility construction, recreationists within three miles of active construction areas might experience temporary noise levels above ambient conditions.

- As discussed in Section 1.4.2, operation of the Proposed and Connected Actions would also emit noise. Recreationists located within a half mile of the turbines may perceive this operational noise. The intensity of the noise would vary from approximately 50 dBA within 750 to 1,000 feet of a turbine (equivalent to the noise of an operating refrigerator, to 36 to 40 dBA at distances of 0.4 mile and greater, typical of a rural environment background.

As noted in Section 1.4.2, noise from high voltage overhead transmission lines (i.e., corona noise) is generated by electrical discharge activity and has a characteristic crackling sound. This corona noise is sometimes accompanied by a low frequency (120 Hertz) hum. During dry weather conditions, noise from transmission lines is generally indistinguishable from background noise at locations beyond the edge of the transmission line ROW (BLM, 2005b). In wet conditions, the noise level at the edge of the ROW of 230 kV transmission line towers would be less than 39 dBA, which is typical of the noise level at a library. The noise level at a distance of 300 feet would be about 31 dBA, which is the typical background noise of a rural environment at night. Recreational users would perceive these noises if they are located within 500 feet of the ROW. Recreationists using areas within 0.5 mile of the substation may also hear substation noise.

Finally, motorized vehicles and hand and motorized equipment used to maintain the Proposed and Connected Actions will also be sources of temporary noise that may be perceived by recreational users, depending on the distance of their location with respect to the vehicles.

Other Recreation

For public safety reasons, access to the construction areas on BLM-managed public land would be restricted during the construction of the facilities associated with the Proposed Action. Access to private lands is already restricted by the private land-owner. Aside from these restricted access areas, the quality of hunting or other recreational use of BLM-managed public land would not be affected by construction of the Proposed and Connected Actions.

During operation of the facilities associated with the Proposed Action, access would be reestablished to BLM-managed public land. While current private landowners would continue to maintain access to their properties, existing or new gates would be used to prevent the general public from accessing facilities located on private lands. The quality of hunting or other recreational use of BLM-managed public land would not be affected as a result of operation of the Project. However, improved access to public lands along the access road may result in more hunters in the area thereby decreasing big game hunting opportunities.

In coordination private landowners, West Butte Wind would post safety signs and require safe driving practices of Project employees and contractors to reduce driving speeds on Project access roads to avoid conflicts with recreational users in the area. West Butte Wind would be required to seek review and approval of any road signs that may be deemed appropriate to control traffic on the access road on BLM administered lands.

During operation of the facilities located on private and BLM-managed public land, West Butte Wind would undertake ongoing coordination to minimize potential conflicts with current and future recreational uses of these lands.

Noise and visual impacts to non-OHV related recreational users would be similar to the impacts to OHV-recreational users described above.

3.7.3 Impacts of Alternative 2 – Northern Access Road Alternative and Connected Actions

With the Northern Access Road Alternative and Connected Actions, potential impacts on recreational use of BLM-managed public lands would be limited to impacts from construction and operation of the 115 kV transmission line and use of the existing BLM road. Access to private land south of BLM-managed lands to the proposed Switchyard would occur along the BLM road. However, it not expected that improvements of the road would be required. Construction would temporarily disrupt OHV and other recreational uses of the BLM road and immediate surroundings. During the construction period, access to the road would not be available for recreational users. Access to OHV trails that originate or intersect with this road (see Figure 3-6) would likely also be limited to protect public safety. Access would be re-opened following construction, with no permanent loss to miles of trail available for recreation on BLM-managed land.

Recreational uses (e.g., hunting, OHV use) on private lands associated with the northern access road would continue to be under the control of the individual private land-owners. Recreation activities on private lands may decline during the construction period because of noise, temporary physical disturbance of the areas, and increased traffic from construction vehicles. Long-term use of the road during operations by West Butte Wind and its agents would not affect recreational opportunities for the general public because of the low anticipated number of daily maintenance vehicle trips.

Depending on location and distance, recreational users could experience project-related visual and noise impacts described for Alternative 1 in Section 3.8, the turbines would be

visible either in the foreground, middle-ground or background of the visual landscape depending on how close the recreational use is located to the Connected Action, and if any natural or manmade features obstruct the recreationalist's view. Construction activities would also result in temporary noise emissions. Recreationists within three miles of active construction areas might experience temporary noise levels above ambient conditions.

- Project operations would also emit noise. Noise impacts from the turbines and transmission lines would be the same as that reported for the Alternative 1 (see Section 1.4.2) and is not likely to affect recreational activities on BLM or private lands.

While current private landowners would continue to maintain access to their properties, existing or new gates could be used to prevent the general public from accessing facilities located on private lands. The quality of hunting or other recreational use of BLM-managed public land would not be affected during operation of the wind energy Project.

Signage of roads and traffic coordination activities for Alternative 2 would be similar to those described for Alternative 1.

3.7.4 Impacts of the No Action Alternative

Under the No Action Alternative, the facility would not be constructed and there would be no change to existing recreational uses within the proposed Project Area or its vicinity.

3.8 VISUAL RESOURCES

BLM's Visual Resource Management (VRM) system (BLM Manual 8400 (2010b)) was used as an objective methodology to assess the aesthetic conditions of the landscape, characterize the current viewing environment, and evaluate potential impacts to the environment of the Proposed and Connected Actions. This visual resource assessment includes an evaluation of existing visual conditions as well as an impact analysis that considers viewer sensitivity and visual contrast.

There are no formal guidelines for managing visual resources on private land, therefore the BLM VRM system was also used to assess aesthetic conditions and impacts associated with the Connected Action that would take place on private lands. An inventory of aesthetic conditions was conducted on private land in the visual resource study area using BLM visual resource inventory guidelines (BLM Manual H-8410-1 Visual Resource Inventory (VRI) (2010c)). For lands managed by BLM, the Upper Deschutes ROD/RMP's VRI was used. The visual resource analysis consisted of an evaluation of public sensitivity toward certain areas, scenic quality evaluation, distance zone delineation, and the identification of affected land from major travel corridors. As described in more detail below, viewer sensitivity levels are established from High to Low, scenic quality considers landform, vegetation, color, water, adjacent scenery, scarcity, and cultural modification, and distance zones are evaluated based on the scale and nature of objects being viewed, ranging from the Foreground/Middleground (0 to 5 miles), to the Background (6 to 15 miles) and to areas Seldom Seen (Beyond 15 miles).

The BLM VRM guidelines were developed and implemented to be in keeping with NEPA, which requires Federal agencies to "assure for all Americans…aesthetically pleasing surroundings." Additionally, NEPA requires agencies to "utilize a systematic, interdisciplinary approach which would ensure the integrated use of … environmental design in the planning and decision-making process." In addition to NEPA, Section 102(8) of FLPMA states that public land will be managed to protect the quality of scenic values and, where appropriate, to preserve and protect certain public land in its natural condition.

The visual resource assessment described in this EIS was completed in the context of the Upper Deschutes ROD/RMP's goal:

Identify and protect visual values on public lands, assuring the integration of environmental design arts in planning and decision-making.

As such, relevant guidelines identified in the ROD/RMP to achieve this goal were considered and are described below.

3.8.1 Affected Environment

The study area for this visual resource assessment is defined as the area wherein potential undesirable visual effects from construction, operation, and decommissioning of the Proposed and Connected Actions may be discerned. The Proposed and Connected Actions are located within the Columbia Plateau Physiographic Province in Central Oregon. The region is characterized by gently sloping to flat lands covered in sagebrush-grassland and juniper. Portions of the existing affected environment are composed of rural ranch and farmland, and there are a relatively low number of residences within the area. The landscape is characterized by large swaths of open space with panoramic views where there is little or no "sense of boundary" restriction, and foreground and middleground objects do not substantially impede views of the background.

From public lands, the study area is most prominently viewed from the Millican Valley OHV area, located to the north, west, and south. This area is typically used by OHV users, hunters, equestrians, and other recreationists. Views are also predominant along roadways such as State Highway 20 and State Highway 27, which provide middleground and background views of West Butte. Travelers along these routes would have views of the proposed Project for limited durations of time with varying degrees of exposure to the wind turbines due to rolling hills, orientation of the roadway, and vegetative overgrowth. Views from public land areas such as the Oregon Badlands Wilderness, Horse Ridge, and Pine Mountain would allow views of the proposed wind turbines obstructed only by atmospheric conditions (e.g., wind turbines tend to blend in with overcast skies) and distance (e.g., at distances of more than 5 miles wind turbines become less evident and blend into the sky). Residents along Cascade Way in the Juniper Acres development have views of the proposed Project site; however, homes in this area are oriented toward the high relief, snow-capped Cascade Mountain Range which composes a major scenic feature in this region.

As part of the Upper Deschutes RMP, BLM previously conducted the VRI. The VRM Management Classes were finalized in the Upper Deschutes ROD. Results of the VRI show

that the BLM administered landscape that is crossed by the proposed ROW is considered predominantly VRM Class 4, and a small portion of VRM Class 3 (the slopes of West Butte). The Upper Deschutes ROD/RMP defines the objectives for these areas as:

- **VRM Class 4 areas:** Allow major modifications of existing character of landscapes. Manage VRM Class 4 lands for moderate levels of change to the characteristic landscape. Management activities may dominate the view and be the major focus of viewer attention. Every attempt will be made to reduce the effect of management actions through careful location, minimal disturbance, and repeating the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- **VRM Class 3 areas:** Partially retain the existing character of the landscape. Manage VRM Class 3 lands for moderate levels of change to the characteristic landscape. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.

Viewer Sensitivity

A sensitivity level analysis was completed for the Upper Deschutes ROD/RMP and was used as a baseline to evaluate sensitive viewing for the study area. Given the public concern for visual quality and maintaining a community identity in Central Oregon, views from highly visible and prominent locations are considered highly sensitive. The sensitivity levels established range from High to Low as follows:

High Sensitivity

- Landforms that form community backdrops or are prominent at a regional scale;
- Areas with congressional or state designations or areas that could be perceived by the public as having the same type of designations and protections (i.e., Wild and Scenic River corridors and the remaining public land river parcels that are outside these designated corridors). The Oregon Badlands Wilderness would also fall into this category;
- Areas that serve as recreation destinations for a variety of user groups and are used by out of area visitors on a regular basis. These would include river corridors, BLM lands adjacent to State Park units, dry canyons with defined and well-used trail systems, etc.

Moderate Sensitivity

- Areas that receive moderate to low levels of recreational use, or high levels of use that are primarily higher speed, motorized trail use, or are used nearly exclusively by local residents.

Low Sensitivity

- Areas that receive little if any recreational use, and are mostly used by adjacent residents;
- BLM lands that are isolated small parcels that have no legal public access, or are not recognizable by the majority of the public as being public land;
- Areas of BLM-managed land that are so fragmented by inholdings or convoluted ownership boundaries that the public land is not recognizable.

Aside from the Oregon Badlands Wilderness, which is designated as VRM Class 1, and State Highway 27, which is designated as a BLM Back Country Byway, the majority of the study area is characterized as moderate or low sensitivity, as the lands in lower elevations in the Millican Valley have many built structures including existing transmission lines.

Scenic Quality

A scenic quality evaluation was used to evaluate the natural landscape based on the degree of distinctiveness, which takes into consideration such factors as landform, vegetation, color, water, adjacent scenery, scarcity, and cultural modification. Scenic quality is determined by rating the distinctiveness and diversity of interest of a particular natural landscape in the context of form, line, color, and texture.

The study area is generally considered "common" in scenic quality because it is devoid of unique water features, has common vegetative growth (e.g., Juniper; sagebrush-grasses), has large swaths of open space with few unique topographic features, and has relatively homogenous color composition throughout the region. .

Distance Zones

To study the impacts of the Project on the visual environment, distance zones were delineated and factored into the visual analysis. Distance zones were developed by BLM based on perception thresholds, the scale and nature of objects being viewed, and the viewing environment. Both natural and human-made elements become less obvious and less detailed at greater distances and the perception of texture and color also becomes less noticeable with increased distance. BLM Manual 8410-1 Visual Resource Inventory (2010c) defines distance zones as:

- Foreground/Middleground – 0 to 5 miles
- Background – 6 to 15 miles
- Seldom Seen – Beyond 15 miles

3.8.2 Impacts of Alternative 1 - Proposed and Connected Actions

BLM's visual contrast rating system and the identification of key observation points (KOPs) and critical viewpoints within the study area was used to analyze the potential visual impacts of the Proposed and Connected Actions. KOPs were identified along commonly traveled

routes, likely observation points, and near residential and recreational areas. The BLM visual contrast rating system was applied to assess both public and privately owned land using BLM Manual H-8431 Visual Contrast Rating (2010d). KOPs 2, 4, 5, 8, 11 and 12 are located on BLM-administered lands.

The basic design elements of form, line, color, and texture were used to determine visual contrast created by the Project. Visual simulations were also rendered from selected KOPs determined to be critical views in areas of visual sensitivity on both BLM-managed and privately-owned lands.

BLM visual contrast rating worksheets were completed at each of the KOPs and are available for public review at the BLM Prineville District Office upon request. Table 3.8-1 summarizes the visual contrast ratings. The visual contrast rating worksheets were written during a site reconnaissance. The visual contrast ratings developed at each of the KOPs provided a measure of the degree of contrast that would potentially occur from the introduction of the proposed facilities into the existing landscape.

Visual contrast ranges from “none” to “strong” and is defined as:

- None: The element contrast is not visible or perceived.
- Weak: The element contrast can be seen but does not attract attention.
- Moderate: The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- Strong: The element contrast demands attention, will not be overlooked, and is dominant in the landscape.

Table 3.8-1. Key Observation Points

Key Observation Point	Location Description	Visual Contrast Rating
1 - Millican Road/Kitchen Hill	View point is on the eastern edge of Millican Road facing NW to NE approximately 6.5 miles north of intersection with Route 20. Four existing powerline corridors parallel each other oriented northeasterly/southwesterly. Power poles include one wooden "H" frame, two steel "A" frames, and one steel monopole. The powerline corridors have noticeable bare earth access roads and steel structures with reflective powerlines that create a noticeable sequential pattern in the landscape. The existing powerlines and road corridor are easily discernable in the landscape. Additionally, the landscape is relatively typical of the region and is panoramic with little sense of boundary or restriction. Depending on atmospheric conditions, views of the Cascade Mountain Range are apparent in the seldom-seen distance zone (beyond 15 miles).	Views were oriented away from proposed Project. This KOP was identified to characterize landscape and cultural modifications typical in the region.
2 - Millican Road/South of Reservoir Road	Approximately 2.5 miles south of intersection with Reservoir Road. Views oriented toward West Butte from Millican Road indicate a variation of vegetation from low-lying sagebrush-grasses to varying heights of juniper and sporadic coniferous trees. West Butte forms the horizon line and is characterized by patches of vegetation and exposed soil. Powerline and road corridors are present in this area. This KOP is located in the middleground distance zone; however wind turbines along the top of West Butte would likely only be evident for several seconds for drivers traveling southbound on Millican Road.	Moderate.
3 - Cascade Way	Located approximately 1 mile south of Reservoir Road. Cascade Way is an unpaved road that provides access to almost 70 residences, both seasonal and year-round. The Project Area is in view when topography and/or vegetation do not obstruct views. To the east, in the seldom seen distance zone are views of the Cascade Mountain range. Though residents (i.e., sensitive viewers) are located within the area of this KOP, distance from the Project site, topographic and vegetative obstruction and orientation of the viewer/residence reduce the overall impact of the proposed Project on present viewing conditions. Approximately six wind turbines would be evident to travelers and residents with views oriented southbound on Cascade Way.	Moderate.

Key Observation Point	Location Description	Visual Contrast Rating
4 - Cascade Way and Reservoir Road	Located at the intersection of Cascade Way and Reservoir Road. Cascade Way provides access to residents of Juniper Acres and is an unpaved road. The landscape in this area is characterized by large coniferous trees, sagebrush-grass, and juniper. The topography is hilly, preventing long-term views of West Butte, which is the most dominant feature in the area. When topography and vegetation allows, views of the Cascade Mountain range are evident in the seldom-seen distance zone to the west. Views of the proposed Project would be intermittently available to travelers on Reservoir Road and southbound on Cascade Way.	Weak.
5 - Highway 27	Approximately 5.5 miles north of the intersection of Highway 27 and Highway 20. The landscape in this area is characterized by extreme sloping hills, dense vegetation, and meandering seasonal waterways. West Butte is very dominant in the middleground and the Project Area is evident for short durations when traveling on this serpentine route. Highway 27 has a low volume of traffic and is largely unused during winter months because of the terrain and condition of the road (e.g., winding and unpaved, with steep drops). Four WTGs are discernable from this vantage. Rotation of blades will likely be noticeable. Duration of viewing would be short due to the descending grade of the roadway limiting views of the turbines. The BLM powerline and maintenance road, which is the only potential location where views of these features may be seen from, would not be seen from this vantage.	Weak.
6 - Intersection of Highway 27 and Highway 20	Approximately .75 mile north of the intersection of Highway 27 and Highway 20. Landscape in this area is characterized as panoramic with powerline and roadway corridors. West Butte is evident in the background, but is largely obstructed by existing topography (e.g., rolling hills). The landscape is typical of the region and color variation may be more evident during the spring and summer months. Views to the west reveal the Cascade Mountain range in the seldom seen distance zone. Approximately 14 wind turbines would be evident from this KOP. Drivers on Highway 20 would have views for less than 20 seconds.	Weak.
7 - Highway 20	View is oriented westbound on Route 20 approximately 3 miles west of intersection with Highway 27. Both West Butte and a portion of the Cascade Range are evident when viewed from this location. Both mountain features appear within the normal cone of vision oriented N/NE along the roadway. However, the Cascade Mountain range is located in the seldom seen distance zone and may not be discernable when atmospheric conditions are overcast. Views of the wind turbines would be evident from this area.	Weak.

Key Observation Point	Location Description	Visual Contrast Rating
8 - Access to Ranch from Highway 20	Approximately ¼ mile north of Highway 20 near Millican Road. This location has agricultural/ranching modifications and is characterized by large swaths grassy, pastoral land in the foreground and Juniper covered rolling hills in the middleground. Views of the wind turbines would largely be obstructed from this vantage as the Basalt Plateau extending in an east to west direction also provides topographic screening of West Butte.	Weak.
9 - Reynolds Pond	Reynolds Pond is a recreational area located approximately 11 miles from the study area. The landscape is characterized by a relatively small human-made pond and robust vegetation and wildlife. Views of the proposed wind turbines are not likely from this area.	Weak.
10 - Alfalfa Community Center	The Alfalfa Community Center is located approximately 11 miles west of the proposed Project site. Views from the back of the Community Center building are oriented east toward West Butte. The landscape in this area is characterized by agricultural lands with ranch and farming activities. Eleven WTGs are discernable from this vantage point though distinct views of WTGs deteriorate given distance and atmospheric conditions. Rotation of blades is likely not discernable from this distance.	Weak.
11 – Oregon Badlands Wilderness Trailhead	The Oregon Badlands Wilderness is the only designated BLM VRM Class I landscape in the study area. The Oregon Badlands Wilderness is composed of rolling hills and sagebrush-grasslands and juniper vegetation that characterizes the region. The Oregon Badlands Wilderness has a loop-type hiking trail and supports other types of recreation. Recreationists within this area are typically oriented to the north and northeast (away from the proposed Project facilities. Results of the visual simulations reveal that nine WTGs are discernable from the Oregon Badlands Wilderness; however, they are not a dominant feature in the landscape and views from hiking trails within the Oregon Badlands are not oriented toward West Butte and the WTGs. Rotation of blades may be slightly discernable given clear atmospheric conditions.	Moderate.

Key Observation Point	Location Description	Visual Contrast Rating
12 – Highway 20 and Millican Road (south)	Located .75 mile north of the junction of Highway 20 and Millican Road, views of the southern flanks of West Butte are approximately 5 miles away. There is a dominant line and form created by the top of West Butte, creating an aesthetically pleasing contrast with the skyline. Approximately eight wind turbines would be apparent from this view and would create a strong visual contrast in the landscape, due to the upper elevations of West Butte being sky-lined. Vegetative and topographic screening would be minimal in this area. Approximately eight of the proposed wind turbines would be visible by drivers traveling northbound for several seconds (i.e., 10 to 20 seconds); drivers traveling southbound would generally not be exposed to views unless stopped. The proposed wind turbines would not be apparent from this KOP in the evening.	Strong.

Note: Visual contrast rating worksheets were completed during the development of the report

Visual simulations were rendered from the locations listed in Table 3.8-2 and shown in Figure 3-8. The visual simulations are shown in Figure 3-9.

Table 3.8-2. Visual Simulation Locations

Location of Visual Simulation	Approximate Distance from WTGs (in miles)
Alfalfa Community Center	11
Cascade Way and Reservoir Road	6
Millican Road and Alfalfa Road	7
Brothers	14
Highway 27	4
Pine Mountain[1]	13
Millican Road	5
Oregon Badlands Wilderness	9
Millican Road and Highway 20	8
North Highway 27	7

[1] *WTGs are discernable from this vantage; however, this location is typically visited during dark sky conditions when WTGs are not discernable. Rotation of blades is likely not discernable from this distance.*

Construction of the Project, including equipment movement and activities associated with road improvements, installation of new overhead power lines, and WTG installation, could temporarily impact visual quality of the landscape. Construction equipment installing the wind turbines including cranes would be a short-term visual impact (i.e., lasting only until the wind turbines are constructed and operational). Likewise, travelers using vicinity roads and highways would experience temporary visual impacts of construction and materials delivery vehicles and trucks travelling using these roads as haul routes. West Butte Wind

would reduce visual impacts during construction of the Project by minimizing areas of surface disturbance, controlling erosion, using dust suppression techniques, and restoring exposed soils as closely as possible to their original contour and vegetation. However, much of the visual impacts resulting from the Proposed Action would be most noticeable after construction is completed and the Project begins operation.

The Proposed Action, including improving an existing access road and constructing a 115kV/14.4 kV transmission line across approximately 3.9 miles of BLM lands, would result in no or weak visual contrast in the landscape as determined through site reconnaissance and visual simulations. Per the Upper Deschutes ROD/RMP's Visual Resource objective VR-1, all transmission line towers and conductors associated with the Proposed Action would utilize non-reflective surfaces or be painted to minimize visual impacts and blend in with the adjacent landscape. Typical viewing areas of these facilities would be from Highway 20, where viewing conditions would be either not visible to travelers along Highway 20 or would not attract attention to recreators within the area.

The WTGs would be the most visible feature of the Connected Action facilities given the structure height and rotation of moving blades. The proposed WTGs would stand between 400 and 574 feet in height and would be located entirely on private land adjacent to VRM Class 3 and 4 VRM-designated BLM-managed public lands. Though the WTG height is substantial and the WTGs would be located on a prominent landscape feature (West Butte), views from sensitive viewpoints such as residences and recreational areas (e.g., KOP 2, 3, 11, and 12) are limited in the study area. Contrasts between the vertical lines of the wind turbines and the horizontal undulating topography would be less apparent when viewed from a distance. Therefore, while the WTGs would be visible from multiple observation points, these views would most typically be limited to middleground and background distance zones. At these distances, atmospheric conditions would often allow the WTGs to blend into the skyline due to their white, non-reflective color. Because of the structural nature of the WTGs and WTG arrays, the design of the proposed facilities associated with the Connected Action would be integrated with the surrounding landscape. Visual uniformity has been taken into consideration as a design element, and the structures would be constructed as tubular towers, painted with non-reflective white paint. FAA requires that the WTGs be lit to provide for aviation safety; however, the Project WTGs would be lit at the minimum level required by the FAA. The FAA currently recommends red strobe lights with a pulse rate of 24 per minute on wind turbines; when turbines are painted a neutral color (as proposed here), the FAA does not require any daytime lighting.

Generally, the visual contrast rating for the proposed WTGs would vary from weak to moderate, where they might begin to attract attention but would not dominate the landscape from key observation points, the exception being at south Millican Road where visual contrast would be strong due to the proposed wind turbines being sky-lined on the top and upper elevations of West Butte on private land. WTG tower lights may be seen at night by residents of Juniper Acres. Other Project facilities (e.g., substation, O&M building) on private lands would result in "none" or "weak" contrast to the visual landscape given their

location, low profile, and accessibility. The substation and O&M facility would be painted a neutral color to reduce contrast with the surrounding landscape. Additional lighting at the substation and O&M building would be limited to reduce nighttime light pollution through the use of directed lighting, timers, and motion sensors. Although the turbine lights will be visible at a distance, an adverse impact would not occur to residents, as the closest residents live 1.8 miles from the turbine location.

Project facilities associated with the Proposed Action would be consistent with the VRM Class 3 and 4 objectives described in the Upper Deschutes ROD/RMP (BLM, 2005a). Construction and operation of the Connected Action, especially the WTGs, would result in visual contrasts that are potentially noticeable when viewed from sensitive viewing points. Visual contrast created by the wind turbines would reduce the overall scenic quality of the landscape as long as they exist due to the visual contrast created by vertical lines (e.g., towers) and vertical forms in the horizontal undulating topography. Visual contrast would be more apparent when viewed in the foreground and middleground when turbine rotors are seen and/or heard.

3.8.3 Impacts of Alternative 2 - Northern Access Road Alternative and Connected Actions

The Northern Access Alternative and Connected Actions would have a similar impact on the visual environment as Alternative 1. Major features of the Project, the WTGs and the 115 kV transmission line, would be the same and have the same visual impact on KOPs. Similar to the road improvements of the Proposed Action, the northern access road would create an improved and maintained road surface over approximately 6 miles of an existing corridor and new road over approximately 1.8 miles of jeep trails. A 14.4 kV utility line would be adjacent to the access road from the O&M building to the substation. These features north of the wind farm would be largely screened from view by Bear Creek Butte and West Butte. In addition, design features discussed in Chapter 2 would be incorporated to reduce visual impacts.

The road and utility line could create a weak to moderate visual contrast in the landscape. Because 6 miles of the access road is along an existing corridor in proximity to residences, the improvements to the road bed would create a weak to moderate visual contrast rating. At the southern end of the road corridor, presence of a new road in an undeveloped area would create a moderate visual contrast for back country recreationists in that immediate area (e.g., on BLM land). At lower elevations, the new road would not be visible from most other surrounding areas because of the topographic screening and because the road would not be a prominent element of the landscape. As it climbs the slope to West Butte, the new road may be more visible from a distance; however, the visual contrast in the landscape would be weak to moderate.

The overhead utility line would be visible from residences at the southern end of Juniper Acres. The views toward West Butte from these residences would be interrupted by the utility line and poles along the northern access route, creating a weak to moderate visual

contrast rating, depending on proximity and the visibility of other man-made features in the landscape (e.g., houses, fences, antennae). The presence of a utility line on poles in the undeveloped area leading from the O&M building up to the wind farm and substation would create a moderate visual contrast for back country recreationists in that immediate area (e.g., on BLM land).

3.8.4 No Action Alternative

No impacts to current visual conditions would occur without the influence of the Proposed Action.

3.9 CULTURAL RESOURCES

Projects requiring federal funds and permits require compliance with the National Historic Preservation Act (NHPA) of 1966, as amended (16 USC 470) and its implementing regulations, Protection of Historic Properties (36 CFR 800; Section 106). Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties (i.e., those properties deemed eligible for listing or formally listed on the National Register of Historic Places) and affords the Advisory Council on Historic Preservation (ACHP), the State Historic Preservation Office (SHPO), and interested Tribal governments an opportunity to comment on the findings of these federal agencies, as appropriate. Regulations in 36 CFR 800 provide a process for satisfying the requirement of Section 106, namely, resource identification (inventory or survey), significance evaluation, assessment of adverse effects on the significant historic properties, and the resolution of adverse effects through consultation to avoid, minimize, or provide mitigation. Adverse effects include, but are not limited to, destruction or alteration of all or part of a property, removal from or alteration of its surrounding environment; introduction of visual, audible, or atmospheric elements that are out of character with the property or that alter its setting; transfer, sale or lease of property out of federal ownership without adequate conditions or restrictions regarding preservation, maintenance, or use; and neglect of a property resulting in its deterioration or destruction (36 CFR 800.5).

Historic properties (i.e., sites, districts, buildings, structures, and objects) deemed eligible for listing in the National Register of Historic Places (NRHP) must be significant in American history, architecture, archaeology, engineering, or culture. In addition, properties must possess integrity of location, design, settings, materials, workmanship, feeling, and association, and meet one or more of four criteria:

- Criterion A: Be associated with events that have made a significant contribution to the broad patterns of our history;
- Criterion B: Be associated with the lives of persons significant in our past;
- Criterion C: 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

- Criterion D: Have yielded, or may be likely to yield, information important in prehistory or history.

Properties at least 50 years of age are considered historic, but younger properties may be considered for listing if they are of exceptional importance.

ORS Chapter 358 provides for the protection of cultural resources in the state of Oregon. ORS 358.920(1)(a) makes it unlawful to "excavate, injure, destroy or alter an archaeological site or object or remove an archaeological object located on public or private lands in Oregon unless that activity is authorized by a permit issued under ORS 358.235." OAR 736-051-0090(1) also states, "A person may not knowingly and intentionally, excavate, injure, destroy or alter an archaeological site or object or remove an archaeological object from private lands in Oregon unless that activity is authorized by a permit issued pursuant to this rule."

3.9.1 Affected Environment

Proposed Action on BLM-Administered Land

West Butte Wind completed an archaeological survey of 3.6 miles of existing access road crossing BLM-administered land. An historic structures survey has not been completed for this segment. Archaeological sites and historic structures surveys of the private properties within the Proposed and Connected Actions would be completed after the EIS is issued but before the Record of Decision is made.

Records Search Results

West Butte Wind completed a records search at the Oregon SHPO for previously recorded archaeological sites of the area of the Proposed and Connected Actions on August 12, 2008. No recorded archaeological resources were found in areas that would be affected by construction or operation of the West Butte Wind Power Project. Several previous archaeological surveys have been completed within one or more miles of the Proposed and Connected Actions (see Table 3.9-1).

Table 3.9-1. Archaeological Surveys within one or More Miles of the Proposed and Connected Actions

Project Name	Date of Survey	Acreage Surveyed	Archaeological Sites Recorded
Millican Valley OHV Recreation Area, Phase I	1995	602.5	None
Butte Pasture Prescribed Burn	1984	200.0	2 isolates; historic log corral
Sage Hollow Pipeline	1988	14.5	None
Tub Spring Juniper Control	1989	130.0	2 isolates; 4 sites

The records search by West Butte Wind did not indicate if Government Land Office (GLO) maps or any other documents were consulted indicating whether historic trails, roads, railroads, canals, or ditches are located within the proposed Project boundaries.

There is a historic Prineville to Lakeview Wagon Road within the vicinity of the Project Area and that remnant road beds exist in portions of BLM administered property. The route continues along the upper reaches of Williamson Creek on private land. Segments of the historic wagon road may overlap with the Project footprint.

Archaeological Survey Results

West Butte Wind completed an archaeological survey of the Proposed Action, namely the 3.6 mile (approximately 43.6 acres) existing access road crossing BLM managed property on August 13-15, 2008. The area examined for the archaeological survey covered the existing road and extended 50 feet on either side of the road centerline because the precise location of the transmission line has not been determined, resulting in a 100-foot-wide survey corridor.

Archaeological survey results by West Butte Wind located 10 isolates within the 3.6 mile survey. Oregon SHPO defines an isolate as, "nine or less artifacts" but also says that "most seemingly 'single' precontact artifacts – such as a flake or scraping tool – found in a shovel test pit or on the ground surface are not isolated finds. Rather, they provide a clue that a site may exist in the area around that artifact" (SHPO, 2007). Soils in the area are generally shallow volcanic ash over bedrock and surface visibility overall, ranged from 80 to 100 percent. An intensive reconnaissance by West Butte Wind's archaeological consultant in the immediate area of the isolates resulted in negative outcomes. BLM will make treatment recommendations for the isolates.

Connected Action on Private Land

In late 2009, West Butte Wind completed an archeological survey of the area of potential effect (APE) for the Connected Action. The systematic pedestrian survey included the proposed access road alignments and WTG locations as presently defined for the project, as well as the associated temporary storage yards, O&M building, and substation. A total of 1,478 acres were surveyed. Field crews surveyed a 60-meter (200-foot) wide corridor for the proposed access road alignments. The survey area around proposed turbine locations was 400 meters (1,320 feet). The pedestrian survey was undertaken using 20-meter (66-foot) transects except for the primary access road survey, which consisted of a single transect on each side of the existing road. When cultural materials were identified, an intensified search pattern was implemented in order to further locate artifacts and to establish resource boundaries. In some cases, the resource boundaries were extended to include related cultural materials located outside the APE. Pedestrian survey of the storage yard, O&M building, and substation locations was limited to their proposed footprints. These locations were surveyed using 20-meter transect intervals.

The pedestrian survey identified a number of archaeological isolates and archaeological sites. The prehistoric site types were all lithic scatters representing, for the most part, tool manufacturing and food-processing localities. No prehistoric features were identified. A preliminary analysis of the artifacts recorded at these resources suggests occupation of West Butte ranging from about 8,000 to 150 years ago. Historic artifacts recorded during the survey included cans, bottle glass fragments, and other historic artifacts. A total of 13 historic

features were recorded, including corrals, trash scatters, stacked rock survey markers, historic graves, and a historic road alignment. The historic road alignment represents a segment of the historic Prineville to Silver Lake Road. It is located on private land along the main access road in the southern portion of the Project Area.

A systematic pedestrian survey of selected locations was performed on May 20-21, 2010. This survey supplemented the fall 2009 survey and addressed changes in turbine placement and access road alignment being considered to avoid archaeological resources identified in the 2009 field investigations (Ellis 2010). The access road under consideration for realignment at the time of the May 2010 survey is located in Section 27 of T18S R16E. The previously proposed access road would have impacted two archaeological sites (field numbers 09-13/21 and 09/13/22). The May 2010 survey included an alternative access road alignment across Section 27, which would avoid potential effects to these two sites. The May 2010 survey did not identify any evidence of archaeological or historical resources. Thirty-four lithic scatter sites were found on private property. The majority of these sites would be avoided by minor relocation of turbines and roads. The Applicant is working with BLM and Oregon SHPO to develop a comprehensive cultural resources mitigation plan.

3.9.2 Impacts of Alternative 1 - Proposed and Connected Actions

As described above, both archaeological isolates and archaeological sites were discovered during the field surveys. The archaeological resources identified in the Project surveys would be avoided when West Butte Wind develops its final Project layout. Such avoidance would include a buffer around each resource to minimize inadvertent disturbance of the resource. The width of the buffer would be defined in consultation with BLM, SHPO, and the appropriate Tribes. Where avoidance is not practicable, additional field investigations and research would be undertaken to assess the significance of the resource(s) that would be affected. Archaeological sites that cannot be avoided would be evaluated to determine if sites would be eligible for listing in the National Register of Historic Places. Based on federal access for the West Butte Wind project, the connected actions on private land would be considered a federal action and West Butte Wind, Oregon SHPO, and Prineville BLM would cooperate and meet the requirements of Section 106 of the NHPA. Test excavations at sites on private lands would require obtaining a State of Oregon Archaeological Permit from the Oregon SHPO. Text excavations at sites on BLM lands would require obtaining an Archaeological Resources Protection Act (ARPA) permit from the BLM. Consultation and coordination with the BLM, Oregon SHPO, and appropriate Tribes would be necessary in these additional steps.

3.9.3 Ground disturbances in all areas containing archaeological materials would be monitored by an archaeologist and Native American monitor to ensure that any outstanding resources previously unidentified are recorded. In the event these types of resources are encountered, construction would be temporarily redirected until the find can be evaluated and recorded pursuant to SHPO requirements. With respect to the isolates discovered during surveys on BLM managed public land, West Butte Wind would comply with BLM's recommendations for their treatment.

3.9.4 Impacts of Alternative 2 – Northern Access Road Alternative and Connected Actions

No field surveys or database searches have been conducted to identify the existence of archeological sites, historic structures, or other cultural resources in the Area of Potential Effect associated with Alternative 2. It is assumed that if Alternative 2 were developed, the design features relative to the protection of cultural resources described for Alternative 1 would also be implemented.

3.9.5 Impacts of the No Action Alternative

Under this alternative, the Proposed Action would not be built. Future actions on BLM-managed lands that are approved or currently under review include grazing, recreational use in accordance with general management plans, right-of-way easements for utility and transportation corridors, and prescribed burns to reduce fuels and wildfire intensity. These actions would continue regardless of the Alternative 1, Alternative 2 and No Action Alternatives.

The amount of land in the Project vicinity currently used for grazing and the longevity of the grazing leases on BLM-managed land indicates that grazing is envisioned to continue as the primary land use. These actions may result in impacts to cultural resources under the No Action Alternative. Future residential development on private land may also impact cultural resources.

3.10 SOCIOECONOMICS/ENVIRONMENTAL JUSTICE

3.10.1 Affected Environment

This section describes and evaluates effects to socioeconomic factors including, employment, income, housing availability, community facilities, residential areas, property values, and environmental justice populations. The study area for evaluating potential effects to socioeconomic factors includes multiple spatial scales: Project Area, cities, counties, and census block groups. The study area allows a relevant context for examination of effects at the county level while providing information for smaller scales where appropriate.

The cities nearest to the Project Area, which could be a potential source of employees, housing, and community facilities, include Bend, Redmond, and Prineville. The Project Area lies within portions of two Census block groups[7]. Census Tract 9504-Block Group 2 in Crook County extends north beyond the Project Area boundary, while Census Tract 9902-Block Group 1 in Deschutes County extends south beyond the Project Area boundary (U.S. Census Bureau, 2000).

Employment, Income, and Industry

In 2002, within the City of Bend there were an estimated 2,162 business establishments, 23,039 employees, and an annual payroll of over $628,724,000 (U.S. Census Bureau, 2002).

[7] A subdivision of a census tract. The block group is the lowest-level geographic entity for which the Census Bureau tabulates sample data from the decennial census (U.S. Census Bureau 2000).

In 2000, the primary industry was educational, health and social services (19 percent of the workforce); followed by retail trade (16 percent); and arts, entertainment, recreation, accommodation and food services (11 percent) (U.S. Census Bureau, 2000).

In 2002, within the City of Redmond there were an estimated 464 establishments, 4,357 employees, and an annual payroll of over $97,938,000 (U.S. Census Bureau, 2002). In 2000, the primary industry was retail trade (16 percent of the workforce), followed by educational, health and social services (15 percent), and manufacturing (14 percent) (U.S. Census Bureau, 2000).

In 2002, within the City of Prineville there were an estimated 219 business establishments, 2,755 employees, and an annual payroll of over $57,642,000 (U.S. Census Bureau, 2002). In 2000, the primary industry was manufacturing (24 percent of the workforce); followed by educational, health and social services (20 percent); and retail trade (15 percent) (U.S. Census Bureau, 2000).

In 1999, the income per capita in Census Tract 9504-Block Group 2 in Crook County was $15,093. In 2002, the primary industry was "agriculture, forestry, fishing and hunting, and mining" (50 percent of the workforce); followed by manufacturing (12 percent); and "educational, health and social services" (10 percent) (U.S. Census Bureau, 2000).

In 1999, the income per capita in Census Tract 9902-Block Group 1 in Deschutes County was $31,664. In 2002, the primary industry was "educational, health and social services" (29 percent of the workforce); followed by construction (11 percent); and "finance, insurance, real estate and rental and leasing" (11 percent) (U.S. Census Bureau 2000).

The main land uses within the Project Area are livestock grazing and recreation. Livestock grazing supports the agriculture, forestry, fishing and hunting, and mining industry. Recreation supports the agriculture, forestry, fishing and hunting, and mining and arts, entertainment, recreation, accommodation and food services industries. The Connected Action would be located on approximately 4,929 acres within a 10,000-acre ranch. Additionally, the ranch is within the West Butte Ranch BLM grazing allotment, which includes 25,160 acres. Recreational activities occur on BLM-managed lands within the Proposed Action area, and on surrounding private lands with the landowner's permission.

Housing and Community Facilities

Bend has 18,303 owner-occupied, 11,847 renter-occupied, and 3,393 vacant housing units. The median home value is $358,300 (U.S. Census Bureau, 2008). The Bend-La Pine School District serves the community with 16 elementary schools, six middle schools, and six high schools. The city has its own police and fire departments. The closest hospital is St. Charles Bend Medical Center.

Redmond has 5,513 owner-occupied, 3,720 renter-occupied, and 676 vacant housing units. The median home value is $239,400 (U.S. Census Bureau, 2008). The Redmond School District serves the community with five elementary schools, two middle schools, one

elementary/middle school, and two high schools. The city has its own police and fire departments and the closest hospital is St. Charles Redmond Medical Center.

Prineville has 1,786 owner-occupied, 1,031 renter-occupied, and 205 vacant housing units. The median home value is $88,600 (U.S. Census Bureau, 2000). While more recent information is unavailable for Prineville, based on housing availability in Bend and Redmond, housing is still likely available in Prineville as well. The Crook County School District serves the community with five elementary schools, one middle school, and one high school. The city has its own police and fire departments. The closest hospital is Pioneer Memorial Hospital.

Residential Properties near the Project Area

The site of the Connected Actions is within three, privately owned 40-acre undeveloped parcels, with no legal access through West Butte Ranch. A West Butte Ranch farm worker residence is located within the Connected Action area. Additionally, there are almost 70 residences, both seasonal and year-round, within the Juniper Acres rural subdivision in the northern portion of the Project Area. The closest residence within Juniper Acres would be approximately 1.8 miles from the nearest proposed WTG. Figure 2-2 shows the Juniper Acres subdivision. According to Deschutes and Crook County planning staff, there are no residential developments currently planned or under review in the vicinity of the Proposed and Connected Actions. Juniper Acres is platted but not fully built out; therefore, future residential construction in that area could occur (Rankin, 2009).

Environmental Justice

Executive Order 12898 requires federal agencies to identify and address disproportionately high and adverse human health and environmental effects of their actions, programs, and policies on minority and low-income populations. The three primary steps in assessing environmental justice issues are to determine: 1) the geographic distribution of low-income and minority populations; 2) whether any impacts would be high and adverse; and 3) whether these impacts would disproportionately affect the low-income and minority populations.

To assess the Project Area's low-income and minority composition relative to that of its surroundings, census block group demographic data were compared with county and state data (U.S. Census Bureau, 2000). Relevant demographic characteristics for Oregon, Crook County, Census Tract 9504-Block Group 2, Deschutes County, and Census Tract 9902-Block Group 1 are shown in Table 3.10-1. As shown in Table 3.10-1, environmental justice populations may exist within the area.

Table 3.10-1. Summary of Environmental Justice Populations

Area	Population	Total Minority (percent)	Hispanic or Latin (percent)	African American (percent)	Asian (%)	American Indian (percent)	Pacific Islander (percent)	Other (%)	Two or More Races (percent)	Households Below Median Poverty Level in 1999 (percent)
Oregon	3,421,399	21.5	8.0	1.6	3.0	1.3	0.2	4.2	3.1	11.6
Crook County	19,182	12.7	5.6	0.0	0.4	1.3	0.0	3.8	1.4	11.3
Census Tract 9504 – Block Group 2	653	15.9	7.0	0.0	0.3	1.5	0.0	3.4	3.7	23.3
Deschutes County	115,367	8.9	3.7	0.2	0.7	0.8	0.1	1.4	2.0	9.3
Census Tract 9902 – Block Group 1	1,754	4.9	1.2	0.1	1.6	0.3	0.1	0.2	1.5	4.1

Note: Shaded cells denote characteristics where the block group percentage is more than a 50 percent greater than that of the corresponding county, which is meaningfully greater and could trigger environmental justice concerns (CEQ, 1997).

Source: U.S. Census Bureau, 2000

3.10.2 Impacts of Alternative 1 - Proposed and Connected Actions

Impacts to area employment, income, tax base, housing, community facilities, residential areas, property values, and environmental justice populations are discussed in the following sections.

Employment, Income, and Industry

Construction and operation of the Project is anticipated to bring employment opportunities to the State. The Jobs and Economic Development Impact (JEDI) Model, developed to assess the economic development effects of constructing and operating wind plants (National Renewable Energy Lab (NREL), 2002), was used to estimate the number of employment opportunities that would be created by the Project. During the construction period, the Project would generate approximately 70 direct, fulltime equivalent (FTE) positions, 345 indirect FTE positions through the purchase of materials and offsite services, and 143 induced FTE positions through direct and indirect employee purchases of goods and services. During operation, the Project would annually generate approximately 6 FTE permanent positions for operation and maintenance of the facility, 9 indirect FTE positions, and 8 induced FTE positions.

The following Project cost information is also based on the JEDI Model (NREL, 2002). For construction of the Project, facility equipment would cost approximately $159.2 million, materials would cost approximately $33.3 million, construction-related labor would cost approximately $14.1 million, and an additional $5.9 million would be paid out for other development costs. Direct construction employee income would be approximately $4.3 million, indirect employee income would be approximately $13.2 million, and induced employee income would be approximately $4.7 million.

During operation of the Project, operation-related labor would cost approximately $500,000 annually and an additional $1.6 million would be paid out for materials and services annually. Debt and equity costs would be approximately $31.9 million annually. Property taxes[8] would equate to approximately $600,000 annually and the property lease would equate to approximately $300,000 annually. Direct operation employee income would be approximately $400,000 annually, indirect employee income would be approximately $300,000, and induced employee income would be approximately $300,000.

Of the Project costs, spending in Oregon would reach approximately $38 million during construction and $1.6 million annually during operation. Construction-related spending in Oregon would affect the following industry sectors: approximately $28.1 million would be spent in the construction sector, $4.2 million in manufacturing, $2.0 million in retail trade, $2.0 million in miscellaneous services, $1.2 million in professional services, and $500,000 in government services. Annual operation-related spending in Oregon would affect the

[8] The annual property tax amount is calculated from the taxable Project value and the local property tax rate (1 percent). The taxable Project value is approximately 33 percent of the assessed Project value, which is 85 percent of Project construction cost (NREL, 2002).

following industry sectors: approximately $140,000 would be spent in the manufacturing sector, $2,000 in electrical equipment services, $70,000 in transportation, communication, and public utility, $150,000 in wholesale trade, $130,000 in retail trade, $320,000 in fire services, $200,000 in miscellaneous services, $6,000 in professional services and $590,000 in government services.

Increased employment and subsequent consumer spending would result in direct and indirect tax impact, including state and federal income taxes, property taxes paid by West Butte Wind, and both federal and state corporate income taxes paid on taxable revenues of the Project. Taxes paid by the landowner on royalty income from the property lease would also contribute to local, state, and federal tax revenues.

Although the Proposed and Connected Actions would result in minor grazing land use impacts, West Butte Ranch has additional acreage available for grazing on the remaining private land within the Project Area (approximately 4,718 acres) and the greater remaining West Butte BLM grazing allotment area (24,950 acres). While the amount of land available for grazing would be slightly reduced (approximately 0.8 percent), the remaining available land would still accommodate historic and current levels of grazing. Therefore, no change in economic conditions associated with grazing is anticipated.

As discussed in Section 3.7, the Proposed and Connected Actions would result in minor recreational land use impacts by access restrictions to Project facility areas located on private lands. Additionally, although the 3.65-mile access road on BLM-managed public land would still be available for OHV use, improvements to the access road would decrease the amount of rugged trail miles available for OHV use and users may feel that this segment of road may have lost some of its rural quality. However, considering the number of Class I and III trails miles in the Millican Plateau OHV Area and North Millican OHV Area (152 miles of ATV and motorcycle trails), changes to the 3.65 miles of BLM road would represent a 2.4 percent reduction of the miles of rugged trails in the area. The remaining available rugged trail miles would still accommodate historic and current levels of OHV use of these trails and therefore, no change in economic conditions associated with OHV recreation is anticipated. The quality of other recreational activities on BLM-managed public land would not be affected and therefore, no change in economic conditions associated with other recreational activities is anticipated.

Housing and Community Facilities

An estimated 415 direct and indirect positions would be employed by the Project facility during construction. Given the project's location, some people directly or indirectly employed by the facility may live in Bend, Redmond, or Prineville. However, positions requiring skilled workers may need to be filled by people not living in the area, which would result in a minor increase in the need for short-term housing, goods, services, and community facilities in Bend, Redmond, and Prineville. Given the availability of vacant housing (4,274 units total) and community facilities in place, the three cities could accommodate housing, goods, services, and community facilities needed during Project construction.

The relatively few direct and indirect skilled worker positions employed by the Project facility during operation (15 positions total) would have an impact on available housing and community facilities in Bend, Redmond, and Prineville.

Residential Properties near the Project Area

There are a relatively low number of existing residences in the vicinity of the Project Area; however, individuals who reside in or near the Project Area are likely to experience noise and visual impacts and access restrictions. Neighboring residential properties could experience temporary, construction-related noise (see Section 1.4.2); however, operation of the turbines and other Project facilities would not create noise that would be noticeable to neighboring private properties and therefore would not impact their development (see Section 1.4.2). The turbines would be visible to neighboring private properties (see Section 3.8); however design features discussed in Chapter 2 would be incorporated to reduce visual impacts. Access to and from neighboring private properties from the Project access road on BLM-managed public lands would not be restricted, except for the existing cattle guards associated with existing fences (see Chapter 2). However, private landowners may use locked gates to limit access on private lands. In coordination with BLM and private landowners, West Butte Wind would post safety signs and require safe driving practices of Project employees and contractors to reduce driving speeds on Project access roads to avoid conflicts with residents in the area. During operation of the facilities located on private and BLM-managed public land, West Butte Wind would undertake ongoing coordination to minimize potential conflicts with current and future residential uses of these lands. The potential for indirect impacts on people residing in the area would likely be a result of the landscape's changed appearance and the presence of a new land use (energy generation).

Property Values

A 2003 study of post-1998 wind farms in the United States examined data on property sales in the vicinity of wind projects and determined whether and the extent to which the presence of a wind Project had an influence on property values for properties that were sold. The results of the study indicated that there is no empirical support for the claim that wind development harms property values (REPP, 2003). In fact, the study indicated that for the great majority of wind projects, the property values actually rose more quickly in the view shed than they did in the comparable community. Moreover, values increased faster in the view shed after the projects came on-line than they did before. Similarly, a nation-wide survey of tax assessors in areas with wind power projects found no evidence supporting the claim that views of wind farms decrease property values (ECONorthwest, 2006). One of the likely reasons that wind turbines do not diminish property values is that not all people agree that views of wind turbine are undesirable. As reported in interviews of tax assessors, some residents find views of wind turbines attractive. A 2009 study collected data on almost 7,500 sales of single-family homes within 10 miles of 24 existing wind facilities in nine different states within the United States. The study used a variety of analysis techniques which consistency produced results indicating that neither the view of wind facilities nor the distance of the home to those facilities has any consistent, measurable, and statistically

significant effect on home sales prices (Hoen et al., 2009). Given the results of these studies, the Proposed Action and Connected Actions would not be expected to adversely affect property values.

Environmental Justice

Environmental justice populations in Oregon, Crook County, Census Tract 9504-Block Group 2, Deschutes County, and Census Tract 9902-Block Group 1 are shown in Table 3.10-1.

According to the 2000 Census, Census Tract 9505-Block Group 2 had a population of 653. Census Tract 9504-Block Group 2 has a higher total minority population than that of Crook County (approximately 16 and 13 percent, respectively); however the minority population in this block group is not meaningfully greater than that of the county. The population in this block group that is of "Two or More Races" is, however, meaningfully greater than that of the county (approximately 4 and 1 percent, respectively). Approximately 23 percent of the households in Census Tract 9504-Block Group 2 are low-income, which is meaningfully greater than that of Crook County (approximately 11 percent).

According to the 2000 Census, Census Tract 9902-Block Group 1 had a population of 1,754. Census Tract 9902-Block Group 1 has a lower total minority population (approximately 5 percent) than that of Deschutes County (approximately 9 percent); however, the Asian population in this block group (approximately 2 percent) is meaningfully greater than that of the county (approximately 1 percent). Approximately 4 percent of the households in Census Tract 9902-Block Group 1 are low-income, compared with 9 percent for Deschutes County.

Based on the data in Table 3.10-1, there may be environmental justice populations residing in or recreating within the Project Area.

Some residents and recreationists in or near the Project Area would experience noise, project-related access, and visual impacts (see Sections 1.4.2 for noise impacts, 3.7 and 3.8 for access impacts, and 3.9 for visual impacts). However, impacts would be distributed equally amongst all segments of the population. It is not anticipated that the development of this wind power generation facility would result in a disproportionate impact on any population, including low-income or minority populations. Therefore, there are no environmental justice concerns for the Proposed Action or Connected Actions.

3.10.3 Impacts of Alternative 2 – Northern Access Road Alternative and Connected Actions

The overall effects of the Northern Access Road Alternative and Connected Actions on socioeconomic conditions would be the same as that reported for Alternative 1, with very minor differences specific to construction, operation, and maintenance of the northern access road and O&M facilities.

Local taxation of certain Project improvements (primarily the O&M Facility) would shift from Deschutes County to Crook County, however since the wind generation facilities will

remain unchanged, the overall tax revenue resulting from the Project would be the same for both Alternatives.

Employment, income, and industry impacts would also be the same under Alternatives 1 and 2, as would impacts to housing and community facilities. Local taxation of certain Project improvements (primarily the O&M Facility) would shift from Deschutes County to Crook County, however since the wind generation facilities will remain unchanged, the overall tax revenue resulting from the Project would be the same for both Alternatives.

Employment, income, and industry impacts would also be the same under Alternatives 1 and 2, as would impacts to housing and community facilities. Construction of the northern access road and O&M facility could temporarily disrupt the Juniper Acres community, but would not have a long-term effect on community activities. As a result of easements acquired or obtained for the northern access road and O&M facilities (see Section 2.5), a portion of 64 parcels would be converted from the existing use to Project-related use. These easements would not affect existing land use on the majority of the affected parcels and future land use development patterns in the area would remain unchanged. Affected landowners would be provided with financial compensation; however, the acquisitions and conversion to Project-related use would result in a reduction of the land available for the existing use.

Property values in Juniper Acres could improve as a result of the upgrades to Cascade Way, but this change may be tempered as a result of the presence of the O&M facility at the southern end of the residential area. The presence of the utility line and the O&M facility at the southern end of the residential area could detract from the rural setting, which is a feature of the Juniper Acres community. Other factors affecting property values in the area would likely mask any effects of the road improvement and O&M facility.

Daily activities of residents in the Juniper Acres development could be affected by project-related noise from the northern access road and the O&M facility. Residential properties near the access road would experience temporary construction-related noise (see Section 1.4.2) from the road construction. Residents near the O&M facility could experience noise and visual impacts from construction and long-term use of that property. As noted in Section 1.4.2, noise from construction of the WTGs and related facilities on West Butte may be perceptible to Juniper Acres residents, depending on proximity to the construction activity, but is expected to result in a temporary impact. Operation of the turbines and other Project facilities would not create noise that would be noticeable to neighboring private properties and therefore would not impact their development (see Section 1.4.2).

In coordination with private landowners, West Butte Wind would post safety signs and require safe driving practices of Project employees and contractors to reduce driving speeds on the northern access road to avoid conflicts with residents in the area. During operation of the facilities located on private and BLM-managed public land, West Butte Wind would undertake ongoing coordination to minimize potential conflicts with current and future uses of these lands.

The northern access road would have no additional impacts on environmental justice communities, as the basis for analysis of these impacts does not change for Alternative 2.

3.10.4 Impacts of the No Action Alternative

Under the No Action Alternative, the facility would not be constructed and there would be no impacts or changes to regional or local socioeconomic conditions. Economic benefits associated with increased employment, multiplier effects from employment spending, and taxes for local, state, and federal governments would not be realized. Existing land uses in the Project Area would continue without the influence of the Proposed and Connected Actions. There would be no change to existing residential uses within the Project Area or its vicinity; however, future residential developments could occur on neighboring private properties, such as Juniper Acres, which may occur regardless of Alternatives 1 or 2 and the No Action Alternative. The No Action Alternative would not preclude future developments where development could occur in accordance with local zoning (private lands) and federal policy (BLM-administered lands).

3.11 GREENHOUSE GAS EMISSIONS

3.11.1 Affected Environment

Climate change is becoming increasingly evident across the United States. As included in the *Global Climate Change Impacts in the United States* (U.S. Global Change Research Program, 2009), in the Pacific Northwest, annual average temperatures over the region as a whole rose about 1.5°F over the past century, with some areas experiencing increases up to 4°F. The region's average temperature is projected to rise another 3 to 10°F in this century, with higher emissions scenarios resulting in warming in the upper end of this range. Increases in winter precipitation and decreases in summer precipitation are projected by many climate models, though these projections are less certain than those for temperature. Impacts related to changes in snowpack, streamflows, sea level, forests, and other important aspects of life in the Northwest are already underway, with more severe impacts expected over the coming decades in response to continued and more rapid warming. Increases in global temperatures appear to be primarily driven by human-induced emissions of heat-trapping gases (referred to as greenhouse gases) (U.S. Global Change Research Program, 2009).

According to the EPA (2009b), greenhouse gases (GHGs) are defined as any gas that absorbs infrared radiation in the atmosphere. GHGs include water vapor, carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). GHGs lead to the trapping and buildup of heat in the atmosphere near the earth's surface. The primary source of GHGs in the U.S. is activities related to use of energy derived from fossil-fuel related sources, which include fuel combustion, as well as production, transmission, storage, and distribution of energy (EPA, 2009c).

According to the Governor's Advisory Group on Global Warming (2004), Oregon total greenhouse gas emissions in 2000 were about 68 million metric tons of carbon dioxide equivalents. Of the GHG emissions from Oregon in 2000, 84 percent came from CO_2. The

primary source of CO_2 pollution came from burning fossil fuels, such as coal at power plants serving the state, gasoline, diesel, and natural gas. The largest source of CO_2 emissions is from the production of electricity (42 percent). Gasoline and diesel fuel use in transportation accounted for the second largest source of CO_2 emissions at 38 percent. While about 43 percent of Oregon's electricity comes from carbon-free hydroelectricity, about 42 percent comes from the burning of coal. In 2002, Oregon utilities emitted 0.5 metric tons of CO_2 per megawatt-hour (MWh).

3.11.2 Impacts of Alternative 1 - Proposed and Connected Actions

Table 3.11-1 provides a summary of potential CO_2 emissions from Project construction and operation.

Table 3.11-1. Summary of Potential CO_2 Emissions

Activity	Estimated Annual CO_2 Emissions (metric tons)	Estimated Facility Lifetime (30 years) CO_2 Emissions (metric tons)
Construction		
WTG part deliveries	377.4	377.4
WTG foundation construction deliveries	114.7	114.7
Road construction water deliveries	327.2	327.2
Employee commuting	407.7	407.7
Construction Total	**1227.0**	**1227.0**
Operation		
Employee commuting	94.7	2839.7
Operation Total	94.7	2839.7
Project Total	**1321.7**	**4066.7**

Sources: EPA, 2005 and 2009d
National Commission on Energy Policy, 2004

Project construction would produce minor GHG emissions as a result of the operation of construction equipment, worker vehicles, and trucks transporting equipment, parts, and materials. These emissions would be temporary and short-term. It has been estimated that a wind energy facility produces approximately 0.01 metric tons of CO_2 per MWh for materials and construction (White and Kulcinski, 1998). As shown in Table 3.11-1, approximately 1227.0 metric tons of CO_2 would be produced during Project construction.

The specific process of generating electricity with wind turbines does not produce air emissions because no fuel is burned to produce energy. Therefore, Project operation would not produce direct CO_2 or other GHG emissions during electricity generation (BLM, 2005b).

Without burning fuel, the proposed Project would have an average annual electricity generation capacity of approximately 273,312 MWh[9],

Indirect GHG emissions during Project O&M activities would be minor, consisting of exhaust from maintenance vehicles and equipment and commuting of up to 10 employees. As shown in Table 3.11-1, O&M employee commuting would produce approximately 94.7 metric tons of CO_2 annually.

The total wind energy facility process including construction, operation, and decommissioning produces approximately 0.015 metric tons of CO_2 per MWh whereas the total coal facility process produces 0.974 metric tons of CO_2 per MWh (White and Kulcinski, 1998). Therefore, a wind energy facility produces approximately 1.5 percent of the CO_2 that a coal facility produces. Based on the data from the White and Kulcinski study (1998), emissions from the Proposed and Connected Actions would be approximately 3.0 percent of Oregon utilities' estimated 2002 emissions of 0.5 metric tons of CO_2 per MWh.

3.11.3 Impacts of Alternative 2 – Northern Access Road Alternative and Connected Actions

Since GHG emissions are primarily related to the construction and operation of the Connected Action, and since the Connected Action will not be significantly modified by Alternative 2, the Northern Access Alternative would have the same effects on GHG emissions as Alternative 1.

3.11.4 Impacts of the No Action Alternative

Under the No Action Alternative there would be no project-related construction or operation and therefore, no impacts or changes to GHG emissions as a result of the Proposed and Connected Actions. Additionally, there would be no permanent removal of vegetation for carbon storage as a result of the Proposed and Connected Actions. The proposed wind farm's average annual electricity generation capacity of approximately 273,312 MWh would not occur and the potential offset of 196,283 metric tons of CO_2 per year would not be realized. Energy demands would either not be filled or would be filled through the development and operation of additional renewable and nonrenewable energy facilities.

3.12 Cumulative Effects

Cumulative effects are defined as effects to the environment resulting from the incremental effect of a proposed action when added to other past, present, and reasonably foreseeable future action regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

[9] The value is based on a project generating capacity of 104 MW, an average WTG efficiency of 30 percent, and 8,760 hours per year. MW is the electricity generating capacity. MWh is the amount of electricity generated per hour.

A cumulative effects analysis broadens the scope of analysis to include effects beyond those attributable solely to the implementation of the alternatives. The purpose of the cumulative effects analysis, as stated by the Council on Environmental Quality (CEQ, 1997), "is to ensure that federal decisions consider the full range of consequences."

The cumulative effects analysis in this EIS considers the geographic and temporal boundaries relevant to each resource under investigation. The effects of the Proposed Action and Connected Actions are then evaluated in the context of all other actions, projects, and trends within those specific boundaries that are affecting that resource.

As recommended by CEQ's *Considering Cumulative Effects*, not all potential cumulative effects issues have been included in this EIS; only those considered to be relevant or consequential (CEQ, 1997). The resources identified as requiring specific attention for the cumulative effects analysis within this EIS are: vegetation and wildlife, including species of concern and special status species; recreation; visual resources; and socioeconomics. Past, present, and reasonably foreseeable future actions likely to have an effect on these resources include:

- existing infrastructure and utility corridors (e.g., communication towers, transmission lines and roads);
- proposed infrastructure and development projects (e.g., wind power, roads, and housing development);
- livestock grazing;
- prescribed fire and wildfire.

3.12.1 Affected Environment

Past and Present Actions

The current conditions on lands potentially affected by the proposed Project result from natural and human events that have taken place over many decades. A complete, detailed description and analysis of all events and their effects is not possible to compile, would be unduly costly to explore in detail, and would not provide any clearer picture of the existing environment. Past and present actions are reflected in the Affected Environment. With best available information, effects specific to past and present actions are identified as follows.

The West Butte area is located in a relatively undeveloped region of central Oregon. While buildings and infrastructure occupy a very small portion of the landscape, human influence through land management practices has affected the natural environment since the 1860s. This threshold serves as the earliest temporal boundary for assessing cumulative effects of the natural and human resources in the Project Area.

The region is characterized by gently sloping to flat lands covered in sagebrush-grassland and juniper. Old-growth juniper (i.e., juniper that was present before the migration of white European settlers into the region beginning in the mid- to late-1800s) occurs in large contiguous stands in the Millican/West Butte areas. Big sagebrush steppe and dwarf shrub-

steppe have likely persisted on this landscape for centuries, with soil type and depth determining their locations. Native vegetation remains in good ecological condition although, due to fire suppression, juniper woodlands are expanding (NWC, 2008).

Little to no vegetation exists in areas developed with buildings, roads, and trails that were introduced in the mid to late 1900s. Non-native plant species occupy relatively small areas primarily adjacent to existing roads. These were likely introduced with the development of the roads.

Rural ranches and farmland occupy some areas; although, the number of residences is relatively low. Highways, gravel roads, and transmission lines traverse the area, creating an obvious human presence. These developments have resulted in some habitat fragmentation and disturbance to natural communities. Because the area is relatively remote, these developments do not diminish the attraction of the area for recreation use and sight-seeing.

Land development and increased human activity in the West Butte area and surrounding region in the late 1900s introduced non-native and invasive species, physically disturbed natural habitat, created noise sources that disturb some species, and created barriers to animal migration and daily movement. In addition, recreational use, fire suppression, prescriptive burning, and grazing have affected the natural environment. Fire suppression practices expanded juniper woodlands which led to a decline in sagebrush-grassland. These practices also led to the increased risk for intense wildfire. Prescribed burning treatments have reduced the larger fuels that result in high intensity fires and reestablished lighter fuels that could lower fire intensity in the region in the future. Livestock grazing practices can reduce wildlife populations by competing for food, water, and space, and degrading habitat. Habitat degradation caused by grazing also exposes prey species to increased predation (due to lost vegetative cover for concealment and escape), resulting in further declines in those populations.

Reasonably Foreseeable Future Actions

According to Deschutes and Crook County planning staff, there are no residential developments or other developments currently planned within the geographic boundaries of the cumulative effects study areas for vegetation and wildlife, including species of concern and special status species; recreation; visual resources; and socioeconomics (Rankin, 2009).

Future actions on BLM-managed lands that are approved or currently under review include grazing, recreational use in accordance with general management plans, right-of-way easements for utility and transportation corridors, and prescribed burns to reduce fuels and wildfire intensity. These actions would continue regardless of the Alternative 1, Alternative 2 and No Action Alternatives.

The amount of land in the Project area and vicinity currently used for grazing and the longevity of the grazing leases on BLM-managed land indicates that grazing is envisioned to continue as the primary land use.

3.12.2 Cumulative Impacts of Alternatives 1 and 2 - Proposed and Connected Actions

Based on the analysis of direct and indirect effects, this cumulative impacts analysis considers the cumulative effects of Alternatives 1 and 2 to be the same, unless noted otherwise, and refers to them collectively as the proposed Project. The analysis of direct and indirect effects of Alternatives 1 and 2 reveals that these actions could affect vegetation and wildlife, recreation, visual resources, and socioeconomics. These effects, combined with the past and present actions (represented by the affected environment) and reasonably foreseeable future actions (grazing, recreational use, rights-of-way easements for utility and transportations corridors, and prescribed burns), could create a cumulative effect on these resources. The potential cumulative effects of the proposed Project are described for these resources in the following sections.

Vegetation and Wildlife

The geographic and temporal boundaries used for the cumulative effects analysis for vegetation and wildlife are based on the range of individual species and factors influencing their life cycle.

The recovery rate for vegetation following actions that cause removal or degradation depends on the individual plant species and their abilities to regenerate. A reasonable time span for considering cumulative effects on vegetation is 20 years prior to and following the proposed Project. The geographic area for considering cumulative effects on vegetation is the Project Area and its immediate surroundings because vegetation impacts generally occur within the immediate action area.

Continued grazing and fire management practices contribute to modification of vegetation in the Project Area and, when considered with the effects of the proposed Project, can create a cumulative impact. Grazing and fire management activities can result in vegetation loss or damage, but these activities can be altered to promote vegetation recovery in specific areas. Vegetation loss associated with the proposed Project includes permanent removal of vegetation for access roads and turbines. When considering the cumulative impacts, grazing and fire management practices would add a proportionately small, and potentially temporary, amount of vegetation loss in the Project Area.

The cumulative effects of the Project on wildlife must consider the area in which the individual species travel during their lifetime and overall trends in species' populations. As noted in Sections 3.5.2 and 3.5.3, Project impacts are primarily expected to be associated with birds and bats, primarily due to the reduction, modification, and fragmentation of habitat.

Local and migrating bird species that use the Project Area for portions and/or all their life history would experience direct and indirect impacts from the proposed Project, although the Project is not expected to have a population level impact on any of the bird species using the site. The Project would only directly affect approximately 4 percent of the available habitat within the immediate Project Area. Reasonably foreseeable future actions in the Project area (grazing, recreational use, rights-of-way easements for utility and transportations corridors,

and prescribed burns) would contribute negligibly to a cumulative effect on birds because they are ongoing actions; i.e., they occur as part of the affected environment and there is no indication that the magnitude of these actions or their impacts would change in the reasonably foreseeable future. In the case of utility and transportation corridor development and prescribed burns, once the initial disturbance is complete, birds would return and resume normal activities in these areas, exhibiting no cumulative impact with respect to the Proposed and Connected Actions.

BLM has studied the effects of WTGs extensively in the BLM Wind Energy Development Programmatic EIS (BLM, 2005b). Generally, species in the Project Area have not been documented as being highly affected by wind development (NWC, 2008; Altman and Holmes, 2000); however, it is likely that wind-power development would contribute to cumulative collision mortality of birds in the United States (Johnson 2002 Wildlife Society Bulletin). The effects of wind energy projects on collision deaths of birds is a very small percentage of collision deaths related to human structures. It is possible that species affected by the Project would also be affected by reasonably foreseeable future actions in the extensive area of their range that reduce, modify, or fragment habitat, or cause collision deaths. It is not possibly to identify all of the reasonably foreseeable future actions within the large geographic area over which birds and other migratory species range.

Numerous relatively minor disruptions to eagle behaviors from multiple activities, even if spatially or temporally distributed, may lead to disturbance that would not have resulted from fewer or more carefully sited activities. The accumulation of multiple land development projects or siting of multiple infrastructures that may be hazardous to eagles can cumulatively reduce the availability of alternative sites suitable for breeding, feeding, or sheltering, resulting in a greater than additive risk of take to eagles.

To ensure that impacts are not concentrated in particular localities to the detriment of locally important eagle populations, cumulative effects need to be considered at the population management level (*Service Regions* for bald eagles and *Bird Conservation Regions* for golden eagles), and especially for project-specific analyses at local area population levels (the population within the average natal dispersal distance of the nest or nests under consideration). Eagle take that is concentrated in particular areas can lead to effects on the larger management population because 1) disproportionate take in local populations where breeding pairs are high producers may reduce the overall productivity of the larger population; and 2) when portions of the management population become isolated from each other the productivity of the overall management population may decrease.

The potential cumulative effects on greater sage grouse were considered in greater detail because of the special status of that species (see Section 3.6.2). Continued and concerted efforts to protect sage grouse habitat in accordance with Oregon's Greater Sage grouse Conservation Strategy (OAR 635-140-0005 & -0010; Hagen, 2005), ODFW's mitigation policy (OAR 635-415-0000), and BLM's Instruction Memorandum (No. OR-2009-038) could result in improved population numbers in central Oregon.

There are no reasonably foreseeable future actions that would affect the sage grouse populations using the West Butte and Bear Butte leks beyond the effects from ongoing actions (grazing and recreational use). Therefore, the proposed Project would not contribute to a cumulative effect on sage grouse populations. The construction and operation of WTGs and transmission lines, could potentially contribute cumulatively to adverse effects on individual sage grouse that use the West Butte and Bear Butte leks and the surrounding sage brush habitats.

Bat populations would not be affected by the access roads and transmission lines; however, the wind farm development would likely result in collision deaths, as described in Section 3.5.2. Bat mortality and injury due to collision with WTGs would increase with the proposed Project, contributing to the total number of mortalities from wind energy. As stated in Section 3.5.2, potential population effects of wind-turbine-related bat fatality remain unknown from available studies and no quantitative information regarding long-term population trends can be drawn from existing data.

As noted in Sections 3.5.2 and 3.5.3, loss of winter range habitats for pronghorn, mule deer, and elk, and habitat associated with the Project would be 0.4 percent of the total winter range habitats for these species within 3 miles of the Project boundary. Reasonably foreseeable future actions in the Project area such as grazing, recreational use, and prescribed burns would contribute negligibly to a cumulative effect on these mammals because they are ongoing actions; i.e., they occur as part of the affected environment and there is no indication that the magnitude of these actions or their impacts would change in the reasonably foreseeable future. Reasonably foreseeable utility and transportation corridor development may affect the same big game species affected by the West Butte Wind Project; however, once the initial disturbance is complete, these species would generally return and resume normal activities in these areas, exhibiting limited cumulative impacts with respect to the Proposed and Connected Actions. The level of cumulative impact would largely depend on the location and level of ongoing human activities associated with the utility and transportation corridor developments.

Recreation

Recreation considers public and private lands adjacent to the Project site and the planning horizon for reasonably foreseeable future actions as the geographic and temporal boundaries, respectively. Recreation activities in the Project Area would remain relatively unchanged under the proposed Project. Activities that have been ongoing for decades would continue into the reasonably foreseeable future, keeping in compliance with applicable management plans, policies, and regulations. The proposed Project would not contribute to a cumulative effect on recreation resources.

Visual Resources

The cumulative effects analysis for visual resource considers the same study area as was used for the direct and indirect effects analysis presented in Section 3.8. The last half of the 20th Century and the planning horizon for reasonably foreseeable future actions set the temporal

boundaries of the analysis. Considering the past present and reasonably foreseeable future actions on public and private lands adjacent to the Project site, and the viewshed affected by the proposed Project, the proposed Project would not contribute to cumulative effect on visual resources.

Socioeconomics

The socioeconomic resources potentially affected by the proposed Project have a wide geographic range in which other factors contribute to the conditions of those resources. The timeframe of influence extends several decades, 10 to 20 years prior to and after the present conditions. The proposed Project, while having some short-term effect on employment and the economy as well as housing due to construction (see Section 3.10), would have no long-term effects on socioeconomic conditions that would contribute to an adverse cumulative impacts on the economy, employment, housing, community facilities, or environmental justice populations.

3.12.3 Cumulative Impacts of Alternative 3 – the No Action Alternative

The near-term effects of Alternative 3 – the No Action Alternative are described in Sections 3.1 through 3.11. The reasonably foreseeable future actions in the Project Area and vicinity (grazing, recreational use, rights-of-way easements for utility and transportations corridors, and prescribed burns) would continue to affect vegetation and wildlife, recreation, visual resources, and socioeconomics to the same extent these resources are being affected now. No additional adverse impact would occur for any of these resources to create a cumulative effect. Land management practices by BLM and the U.S. Forest Service continue to be reviewed by federal staff to determine best practices for sustainability of environmental resources on federal lands in the Project Area; however, no change to current practices is reasonably foreseeable.

3.13 MITIGATION

Table 3.13-1 summarizes potential mitigation measures that may be applied to Alternative 1, the Proposed Action, or Alternative 2, the Northern Access Route Alternative. Table 3.13-1 also summarizes the concern to be addressed and the expected effects of implementing the measures. The Applicant already agreed to numerous design features to limit negative effects of the Project (e.g., implement a noxious weed control program within the Project Area). Design features were incorporated directly into the design of the Alternatives, and do not show up in the discussion or in Table 3.13-1.

3.13.1 Jurisdiction

While BLM's decision could include any of the listed mitigation measures (by making their completion a condition of the right of way grant), the implementation and monitoring of most of them are beyond BLM's jurisdiction. Most of the onsite measures (e.g., turbine modifications) would fall under the authority of Crook County, where most of the Project would be constructed. Most of the offsite mitigation (e.g., conservation easements) would occur in and be overseen by Crook or Deschutes Counties. A few of the measures would

involve federal, state, or county land or a combination (e.g., noxious weed control and juniper cuts).

Table 3.13-1. Mitigation

Concern, assumptions	Proposed mitigation	Expected effects[1]
Effects of turbine noise **sage grouse**. Sound 10 or more decibels above ambient level disrupts sage grouse. ODFW considers Category 1 habitat (within 3 miles of a lek) to be the most important.	**Modify turbine layout:** Place turbines 1 mile or more from leks (vs ¼ mile away in Alts 1 + 2)	4,365 acres of Category 1 habitat exceeding 40 dB are within 3 miles of the leks.
Effects of turbine noise on **sage grouse leks.** Sound over 40 decibels causes lek abandonment.	**Modify turbine layout:** Place turbines 1 mile or more from leks (vs ¼ mile away in Alts 1 + 2)	4,365 acres of Category 1 habitat exceeding 40 dB are within 3 miles of the leks.
	Monitor sage grouse breeding within Project Area.	None (monitoring itself does not produce effects).
Effects of temporary and permanent disturbance to Category 1 **sage grouse habitat** from roads, powerlines, turbines, and other Project actions. This includes habitat loss as well as fragmentation.	**Purchase conservation easements** to protect 6,700 acres of comparable habitat.[2]	Acres affected by loss or fragmentation in Alternative 1 = 6,700 private + 18,542 public. Offsite acres protected from development if mitigation is applied = 6,700 private
	Purchase conservation easements to protect 25,242 acres comparable habitat.[2]	Acres affected by loss or fragmentation in Alternative 1 = 6,700 private + 18,542 public. (25,242 total). Offsite acres protected from development if mitigation is applied = 25,242 private
Effects of aboveground electrical lines on **raptors** (collision, electrocution) and **sage grouse** (serve as perches for predators)	**Modify electric line design:** bury all 5 miles of transmission lines that cross public and private land.	Remaining aboveground transmission line if this mitigation were applied = None.
	Modify electric line design: bury all transmission lines that cross public land (3.9 miles).	Remaining aboveground transmission line if this mitigation were applied = 1.1 on private land
	Modify electric line design: bury all collector lines. Alt 1 and 2 already call for burying 90% of collector lines. This mitigation would bury the remaining 10% (1.25 miles).	Remaining aboveground collector lines if this mitigation were applied = None.
Effects of turbines on **bats**. Bats are killed by direct collision with turbine towers, turbine blades, and transmission lines, and by damage to lungs from low pressure created by rotating turbine blades. Higher	**Limit turbine cut in speeds** on all turbines to 6.5 mph anytime bats are expected to be active in the area.	Number of bat deaths annually under Alternative 1 = 36 to 177; versus estimated deaths if this mitigation were applied = 25 to 124.

Concern, assumptions	Proposed mitigation	Expected effects[1]
	Limit turbine operations to decrease fatalities to </=52 annually, based on results of fatality monitoring plan.[3]	Number of bat deaths annually under Alternative 1 = 36 to 177; versus number estimated if this mitigation were applied = </=52.
Effects of turbine noise and/or habitat fragmentation (from roads, powerlines, turbines) on **shrub steppe habitat** (important to a number of wildlife species).	**Cut juniper** onsite and/or offsite in areas where juniper cover is >15% (reduce to <1%).	Acres of shrub steppe habitat improved onsite = 100 / 100 and offsite = 500 / 500
	Control noxious weeds on 6,700 acres of at risk land offsite.[5]	Acres offsite where native vegetation would not be outcompeted by noxious weeds = 6,700 / 0
	Decommission project.	This would return the Project Area to a state and condition as found prior to project development.

1 Effects displayed here for Alternative 1 would be similar for Alternative 2, except that the miles of overhead collector lines buried in Alternative 2 with the addition of mitigation would include 9.4 miles on private land.

2 Easements would be on land of comparable condition and value to wildlife, in an area where the land is under some risk of development (proposed for residential development or in area of same or higher wind power potential). Much of the habitat within the Project Area is high quality nesting/summer habitat critical for sage grouse survival and production and is key in providing connectivity for the central Oregon sage-grouse population. The affected habitat in the Project Area is resilient; above 5,000' elevation; in good or better ecological condition (as defined by NRCS site guides); and is used year round by sage grouse. ODFW defines the area within 3 miles of a lek as Category 1 Habitat, and encourages no development in these areas.

3 This plan would be designed by ODFW, USFWS and BLM. The plan would include but not be limited to acoustical surveys at a minimum of 10 sites within Project Area to determine bat migration pattern and local movement, and surveys at 30 meters above ground level for 14 consecutive nights during migration period.

4 Water is not limiting onsite, therefore this action is not proposed onsite.

5 Weeds would be controlled onsite as part of the project design features. Offsite contributions could improve other areas.

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Chapter 4 CONSULTATION AND COORDINATION

4.1 INTRODUCTION

In developing this EIS, BLM consulted and coordinated with a variety of Project stakeholders. A scoping process was developed to ensure that interested parties, including federal, state, and local agencies; organizations; interested persons; landowners; and the general public were contacted, consulted, and given an adequate opportunity to be involved in the process.

4.2 NATIONAL ENVIRONMENTAL POLICY ACT AND AGENCY CONSULTATION AND COORDINATION

As described in Section 1.4.1, BLM has prepared this EIS to comply with its responsibility for review of the Proposed Action under the National Environmental Policy Act. The EIS is an informational document, for both lead agency decision-makers and the public, regarding the environmental effects of the proposed West Butte Wind Project. BLM will use the EIS to determine if the proposed Project is consistent with existing land use plans and management objectives. BLM prepared this EIS in compliance with the National Environmental Policy Act (NEPA) [42 United States Code (USC) 4332] and the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (Title 40, Code of Federal Regulations (CFR) 1500-1508). BLM also performed specific stakeholder consultations and coordination consistent with NHPA, American Indian Religious Freedom Act, Endangered Species Act, and other applicable regulatory requirements that would comply with BLM and Oregon SHPO.

4.2.1 History of Public Involvement

Consistent with NEPA, BLM completed a public scoping process to solicit input to identify issues, impacts, and potential alternatives to be addressed in the EIS. The public scoping process began on September 18, 2009, when BLM issued 577 letters to stakeholders requesting comments on the West Butte Wind Project. Section 1.4 of this Draft EIS describes the issues identified during the scoping process.HDR Engineering, Inc. (HDR), West Butte Wind, and Northwest Wildlife Consultants (NWC) were also consulted in the preparation of this Draft EIS. HDR and NWC conducted analyses and surveys while West Butte Wind provided information on the design of their Project.

Additional opportunities to provide scoping comments on the Project were provided by BLM when they issued a Notice of Intent to prepare an EIS on January 19, 2010. Eleven letters and 11 e-mails were sent on January 19, 2010.

BLM reviewed all stakeholder letters received during the scoping process and considered them in developing the EIS. Additionally, BLM reviewed and considered letters and public hearing transcripts available through Crook and Deschutes counties' local permitting process for the West Butte Wind Project. By issuing this Draft EIS, BLM is inviting comment from the public and agencies on the environmental analysis completed herein. Based on the environmental review and public comments on the Draft EIS, BLM will issue a Final EIS.

Through these efforts, a wide variety of stakeholders have had an opportunity to comment on the Project, including federal, state, and local agencies; elected officials; Native American tribes; non-governmental organizations; and property owners in the vicinity of the Project.

The scoping comments collected on the Project include general support and opposition to the Project, suggested alternatives, and environmental concerns and potential mitigation. BLM used scoping comments to identify issues to be addressed in the EIS (see Table 1.4-1).

BLM is inviting comment from the public and agencies on the environmental analysis completed herein. Public review of the Draft EIS will occur during a 45-day comment period. BLM will consider comments received on the Draft EIS in its preparation of the Final EIS. BLM will prepare and issue a Final EIS on this Project prior to issuing a Record of Decision.

4.2.2 Consultation and Coordination with Agencies and Organizations

Consultation and coordination occurred with the following agencies and organizations in preparation of this Draft EIS:

- Applied Earthworks
- Archaeological Society of Central Oregon
- Burns Paiute Tribe
- Confederated Tribes of the Warm Springs Reservation
- Crook County Historical Society
- Deschutes County Historical Society
- HDR Engineering, Inc.
- Klamath Tribe
- Northwest Wildlife Consultants
- Oregon Department of Fish and Wildlife
- Oregon Natural Desert Association
- Oregon Wild
- Pine Mountain Observatory
- State Historic Preservation Office
- Technical Advisory Committee (ODFW, USFWS, Oregon Natural Desert Association, Crook County, Oregon State Extension Office, and Project property owners)
- U.S. Fish and Wildlife Service
- West Butte Wind Power, LLC
- Willamette Cultural Resources Associates

The HDR staff involved in preparing this EIS include those listed in Table 4.2-1.

Table 4.2-1. List of HDR Preparers

Name	Title	Role
Ahrens, Tim	Technical Editor	Document Editing/Formatting
Atkinson, Corrinne	Environmental Business Class Leader	Quality Control
Brewster, Erik	GIS Services Specialist	GIS, Maps, Graphics
Cecere, Pamela	Environmental Planner	Visual Resources
Cleveland, Leandra	Environmental Scientist	Wetlands and Riparian Zones, Vegetation
Diehl, Aaron	Environmental Scientist	Wildlife
Hutchinson, Matthew	Environmental Scientist	Geology, Soils, Paleontology
Mattson, Todd	Senior Environmental Program Manager	Project Manager
Miranda, Donette	Environmental Scientist/Planner	Land Use, Recreation, Wastes, Socioeconomics, Greenhouse Gas Emissions
Rolfes, Christina	Environmental Scientist	Alternatives Analysis
Schwingler, Ingrid	Environmental Scientist	Natural Resources
Snead, Carol	Senior Environmental Project Manager	Cumulative Impacts, Alternatives Analysis
Spellecacy, Ronalee	Environmental Planner	Water Quality and Quantity, Floodplains, Human Health and Safety, Air Quality
Tisdale, Lucie	Cultural Resource Coordinator	Cultural Resources
Wallace, Michael	Environmental Scientist	Wildlife, Special Status Species

4.3 NATIONAL HISTORIC PRESERVATION ACT CONSULTATIONS

To comply with Section 106 of the NHPA, BLM has initiated consultations with SHPO. As the lead federal agency responsible for compliance with NHPA, BLM anticipates a "no effect" on historic properties eligible for listing on the NRHP. This conclusion is based on West Butte Wind's commitment to complete necessary cultural resource surveys prior to construction, and, if necessary, to reconfigure Project facilities to avoid historic properties eligible for listing on the NRHP. At the end of September 2009, BLM submitted a letter to SHPO agreeing to, and expressing acceptance of, the results of the intensive survey of the right-of-way portion of the proposed Project completed in 2008 by Applied Earthworks. SHPO concurred with BLM and accepted the 2008 survey results (personal communication with BLM and SHPO specialist Matt Diederich, 10/29/2009).

BLM will submit to SHPO a combined finding of effect for the undertaking, including the results of the 2008 Applied Earthworks Class I survey and 2009 cultural resources survey of the private properties portion of the Project. It is anticipated that SHPO will concur with the results to avoid all NRHP-eligible sites through Project design.

In compliance with NEPA, NHPA, and American Indian Religious Freedom Act, BLM consulted three tribes regarding the Project:

- Confederated Tribes of the Warm Springs Reservation
- Klamath Tribe
- Burns Paiute Tribe

In formal consultation letters mailed on August 13, 2009, the tribes were asked to identify any properties of traditional, religious, or cultural importance which may be affected by the proposed Project, and to identify any traditional or religious leaders who may have information about places of cultural significance. Furthermore, tribes were invited to comment on any environmental, cultural, or other issues relating to the Project, which may be of concern to their communities. A second letter updating the status of the Project was mailed to the tribes on January 15, 2010. Neither correspondence elicited a response from the tribes.

On August 13, 2009, BLM sent letters to the Deschutes County Historical Society, the Crook County Historical Society, and the Archaeological Society of Central Oregon asking for any comments on the Project.

As of early October 2009, BLM has not heard from the Klamath or Burns Paiute tribes or the historical societies. BLM, Willamette Cultural Resources Associates, and the Applicant are working with the Warm Springs Tribe on oral history traditions for the West Butte cultural landscape. The Warm Springs Tribe will collect the oral histories and provide a summary report to Willamette Cultural Resource Associates and the Prineville BLM. Based on the information, recommendations would be developed to address resource concerns.BLM anticipates that the proposed Project will have “no effect” on Native American Religious Concerns.

4.4 ENDANGERED SPECIES ACT CONSULTATIONS

As the lead federal agency responsible for compliance with the Endangered Species Act, BLM has concluded that the Project would have “no effect” on federally endangered or threatened species or their designated critical habitats. Therefore, BLM is not required to initiate formal Endangered Species Act consultation with USFWS.

4.5 OTHER BIOLOGICAL RESOURCE COORDINATION

Coordination has occurred among BLM, USFWS, and ODFW staff regarding biological resources in the Project Area. BLM coordinated with USFWS and ODFW on the survey protocols used to assess the presence of habitat, birds, bats, and special status wildlife and plants in the Project Area, and on the design of the biological study. Additionally, on May 15, 2008, ODFW, BLM, and Crook County toured the Project site. The USFWS was invited, but was unavailable to attend. During the tour, the biological study was discussed and comments on the study were invited. These agencies were also contacted to discuss other biological issues of concern.

West Butte Wind is currently coordinating with a TAC to involve and solicit input from public and agency stakeholders regarding the preparation of a Wildlife Mitigation and Monitoring Plan. The TAC consists of representatives from ODFW, USFWS, BLM, Oregon

Natural Desert Association, Crook County, Oregon State Extension Office, and Project property owners.

4.6 LIST OF PREPARERS

BLM staff involved in preparing this EIS include those listed in Table 4.6-1.

Table 4.6-1. List of BLM Preparers

Name	Title	Role
Armson, JoAnne	Natural Resource Technician	Special Status Plants
Brown, Molly	Field Manager	Deschutes Resource Area Manager
Cork, Dana	Engineer	Engineering
Eichman, Henry	Economist	Socioeconomics
Gregory, Ron	Archeologist	Archeology, Cultural Resources
Hanf, Jan	Wildlife Biologist	Wildlife Biologist
Henderson-Norton, Deborah	District Manager	District Manager
Holtzapple, Terry	Archaeologist	Cultural Resources
Horn, Ed	Soil Scientist	Soils
Lilienthal, Christina	Public Affairs Specialist	Public Contact, Communications
Moffitt, Jennifer	Natural Resource Specialist	Soils, Vegetation, Noxious Weeds
Phelps, Berry	Recreation Planner	Visual Resource Management/ Recreation, Wilderness Characteristics
Purrington, Teal	Planning and Environmental Coordinator	NEPA Planner
Robertson, Steve	Associate District Manager	Associate District Manager
Smith, Anna	Hydrologist	Hydrologist, Water Resources
Storo, Steve	Geologist	Interdisciplinary Team Lead
Vandergon, Doug	Realty Specialist	Realty, Rights-of-way
Zalunardo, Don	Range Management Specialist	Livestock Grazing

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CHAPTER 5 REFERENCES

Aldridge, C. L., and R. M. Brigham
2002 Sage-grouse nesting and brood habitat use in southern Canada. Journal of Wildlife Management. 66:433-444.

Altman, B. and Aaron Holmes
2000 Conservation Strategy for Landbirds in the Columbia Plateau of Eastern Oregon and Washington. Version 1.0 Prepared for Oregon/Washington Partners in Flight.

American Bird Conservancy
2010 Wind Energy Policy. Available online at http://www.abcbirds.org/abcprograms/policy/wind/wind_policy.html. Accessed march 2010.

Andersen, D.E.
1990 "Nest-Defense Behavior of Red-Tailed Hawks." The Condor 92:991-997.

Arnett, E. B., K. Brown, W. P. Erickson, J. Fiedler, T. H. Henry, G. D. Johnson, J. Kerns, R. R. Kolford, C. P. Nicholson, T. O'Connell, M. Piorkowski, and R. Tankersley, Jr.
2008 Patterns of bat fatalities at wind energy facilities in North America. Journal of Wildlife Management 72: 61-78.

Avian Power Line Interaction Committee (APLIC)
2006 Suggested Practices for Avian Protection on Power Lines: The State of the art 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington D.C. and Sacramento, CA. Available online at http://www.aplic.org/SuggestedPractices2006(LR-2watermark).pdf

Baerwald, E.F., J. Edworthy, M. Holder, R.M.R. Barclay
2009 A Large-Scale Mitigation Experiment to Reduce Bat Fatalities at Wind Energy Facilities. Journal of Wildlife Management: Vol. 73, No. 7, pp. 1077-1081.

Barrios, L. & A. Rodríguez
2004 Behavioral and environmental correlates of soaring bird mortality at on-shore wind turbines. Journal of Applied Ecology 41, 72-81. Available online at http://www.outlierproductions.com/Resources/Barrios%20bird%20wind.pdf.

Becker J.M., C.A. Duberstein, J.D. Tagestad, and J.L. Downs
2009 Sage-grouse and Wind Energy: Biology, Habits, and Potential Effects from Development. Prepared for the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy Wind & Hydropower Technologies

Program under Contract DE-AC05-76RL01830. Pacific Northwest National Laboratory, Richland, Washington

Bird, B. and M. Schenk
2005 Sage Grouse (Centrocercus spp). Fish and Wildlife Technical Report Number 26, May 2005. Natural Resources Conservation Service and Wildlife Habitat Council.

Black, B.B., M.W. Collopy, H.F. Percival, A.A. Tiller, and P.G. Bohall
1984 Effects of Low-level Military Training Flights on Wading Bird Colonies in Florida. U.S. Air Force Technical Report Number 7. Florida Cooperative Fisheries and Wildlife Resources Unit, Gainesville, Florida.

Bolster, Betsy C.
2005 Lasiurus cinereus Hoary Bat. Western Bat Working Group. Species Accounts.

Borg, E.
1981 "Physiological and Pathogenic Effects of Sound." Acta Oto-Laryngologica (Supplement) 381:7-68.

Bothun, G.
2010 E-mail correspondence between Prof. G. Bothun, Professor of Physics, University of Oregon, and Teal Purrington, BLM, dated January 19, 2010. Subject Re: Proposed wind turbines near Pine Mtn Observatory

Bowles, A.E.
1995 "Responses of Wildlife to Noise." Wildlife and Recreationists: Coexistence through Management and Research. R.L. Knight and K.J. Gutzwiller, eds. Island Press, Covelo, California. pp. 109–156. Available online at: http://books.google.com/books?hl=en&lr=&id=Hg3kLAc1lCkC&oi=fnd&pg=PA109&dq=%22Bowles%22+%22Responses+of+wildlife+to+noise%22+&ots=_S-JObzmLU&sig=s8vrxpPUi78yj8Ac_JZy8Oaiuio#v=onepage&q=%22Bowles%22%20%22Responses%20of%20wildlife%20to%20noise%22&f=false.

Braun, C.E.
1998 "Sage Grouse declines in western North America: What are the problems?" Proceedings of the Western Association of State Fish and Wildlife Agencies. 78:139-156. Available online at http://www.rangenet.org/projects/grouse/grouse01.html.

Braun O., O. Oedekoven, and C. L. Aldridge
2002 Oil and gas development in western North America: effects on sagebrush steppe avifauna with particular emphasis on sage-grouse. Transactions of the North American Wildlife and Natural Resources Conference 67:337-349.

Bureau of Land Management (BLM)

1985 BLM 9113 Manual. Available online at http://www.blm.gov/pgdata/etc/medialib/blm/mt/blm_programs/energy/oil_and_gas/operations/gold_book.Par.10040.File.dat/9113.pdf.

1989 Surface Operating Standards for Oil and Gas Exploration and Development (Rocky Mountain Regional Coordinating Committee (RMRCC) (i.e., the Gold Book). Available online at http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/gold_book.html.

1998a Paleontological Resource Management (8720). July 1998. Available online at http://www.blm.gov/pgdata/etc/medialib/blm/wo/Planning_and_Renewable_Resources/coop_agencies/paleontology_library.Par.75198.File.dat/ms8270.pdf.

1998b General Procedural Guidance for Paleontological Resource Management (H-8720-1). July 1998. Available online at http://www.blm.gov/pgdata/etc/medialib/blm/wo/Planning_and_Renewable_Resources/coop_agencies/paleontology_library.Par.78212.File.dat/h8270-1.pdf.

2001 Manual 6840 – Special Status Species Management. Available online at http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/pdfs/pa_pdfs/biology_pdfs.Par.9d22a8ee.File.dat/6840_ManualFinal.pdf.

2004a National Sage-Grouse Habitat Conservation Strategy. U.S. Department of Interior, BLM. November 2004.

2004b National Sage-Grouse Habitat Conservation Strategy – 1.4.1 Guidance for the Management of Sagebrush Plant Communities for Sage-Grouse Conservation. U.S. Department of Interior, BLM. November 2004.

2005a Upper Deschutes Record of Decision and Resource Management Plan. U.S. Department of Interior, BLM, Prineville District Office. October 2005.Available online at http://www.blm.gov/or/districts/prineville/plans/deschutesrmp/index.php.

2005b Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States. FES 05-11. U.S. Department of Interior, BLM. June 2005. Available online at http://windeis.anl.gov/.

2006 Final Environmental Impact Statement for the Proposed Cotterel Wind Power Project and Proposed RMP Amendment. Twin Falls District, Burley Field Office. FES 06-07. Available online at http://www.blm.gov/id/st/en/fo/burley/Planning/cotterel_wind_power.html.

2007 Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands. October 2007. Available online at http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/20080/im_2008-009.print.html.

2009a Environmental Assessment (ID-210-2008-284) China Mountain Meteorological Tower Amendment. Jarbidge Field Office, Twin Falls County, Idaho

2009b Personal communication with BLM staff. September 17, 2009.

2010a Wilderness Characteristics Inventory, Unit Number/Name: OR-056-004/, Millican Unit; 2008-10, March 2010.

2010b Manual 8400 – Visual Resource Management. Available online at http://www.blm.gov/nstc/VRM/8400.html.
2010c Manual H-8410-1-Visual Resource Inventory. Available online at http://www.blm.gov/nstc/VRM/8410.html#Anchor-49575.
2010d Manual 8431 – Visual Resource Contrast Rating. Available online at http://www.blm.gov/nstc/VRM/8431.html.
2010e Instruction Memorandum No. 2010-071. Gunnison and Greater Sage-grouse Management Considerations for Energy Development (Supplement to *National Sage Grouse Habitat Conservation Strategy*). March 5, 2010.

Call, M. W. and C. Maser.
1985 Wildlife habitats in managed rangelands-the Great Basin of southeastern Oregon: Sage Grouse (Centrocercus urophasianus). General Technical Report PNW-187. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon, p. 30.

CalPIF (California Partners in Flight)
2005 Version 1.0. The sagebrush bird conservation plan: a strategy for protecting and managing sagebrush habitats and associated birds in California. PRBO Conservation Science, Stinson Beach, CA. http://www.prbo.org/calpif/plans/.

Cade, T. and C. Wood
1997 Changes in Distribution and Abundance of the Loggerhead Shrike. Conservation Biology; Volumn 11, No. 1 pages 21-31.

Carter, T. C., M. A. Menzel, and D. A. Saugey
2003 Population trends of solitary foliage-roosting bats. Pages 41–47 in T. J. O'Shea and M. A. Bogan, editors. Monitoring trends in bat populations of the United States and Territories: problems and prospects. U.S. Geological Survey, Biological Resources Discipline, Information and Technology Report USGS/BRD/ITR-2003-0003, Washington, D.C., USA.

Christy, Steve and Kelly Von Bronkhorst
2009 West Butte Prescribed Burn 2009, BLM Prineville District, Prineville.

Clark, Linda
1989 Tub Spring Juniper Control, BLM Prineville District, Prineville.

Connelly, J.W., M.A. Schroeder, A. R. Sands, and C. E. Braun
2000 Guidelines to manage sage grouse populations and their habitats. Wildlife Society Bulletin 2000, 28 (4): 967-985.

Connelly, J. W., K. P. Reese, and M. A. Schroeder
2003 Monitoring of Greater Sage-grouse Habitats and Populations. College of Natural Resources Experiment Station, Station Bulletin 80, University of Idaho, Moscow, Idaho, USA.

Connelly, J. W., S. T. Knick, M. A. Schroeder, and S. J. Stiver.
2004 Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats. Western Association of Fish and Wildlife Agencies. Unpublished Report. Cheyenne, Wyoming.

Cornell Lab of Ornithology
2003 Birds in Forested Landscapes: What is Forest Fragmentation and Why is it Important? Available online at http://www.birds.cornell.edu/bfl/gen_instructions/fragmentation.html. Accessed February 2008.

Council on Environmental Quality (CEQ)
1997 Considering Cumulative Effects Under the National Environmental Policy Act. Council on Environmental Quality. Executive Office of the President, Washington, D.C. January 1997.

Crompton B.
2005 The Sage-Grouse of Emma Park – Survival, Production, and Habitat Use in Relation to Coalbed Methane Development. Utah Division of Wildlife Resource (draft).

Crook County
2007 Crook County Weed Control. Noxious Weed List. Available online at http://co.crook.or.us/LinkClick.aspx?fileticket=46fzAOQKel0%3d&tabid=110&mid=1583.
2008 Invasive Weeds. A Crook County GIS & WWETAC project. GIS maps updated on April 29, 2008. Available online at http://gis.co.crook.or.us/Default.aspx?alias=gis.co.crook.or.us/wwetac.

de Lucas, M., G.F.E. Janss, D.P. Whitfield, and M. Ferrer
2008 Collision Fatality of Raptors in Wind Farms Does Not Depend on Raptor Abundance. Journal of Applied Ecology. Vol. 45, No. 6 (Dec., 2008), pp. 1695-1704.

Deschutes County
2010 Deschutes County Noxious Weed List. Available online at http://avenue.deschutes.org/weeds/weedlist/NWeedList/webform1.aspx.

Deschutes River Conservancy (DRC)
2010a Deschutes Groundwater Mitigation Program. Available online at http://www.deschutesriver.org/CEDocuments/175181.aspx.
2010b Groundwater Mitigation Bank. Available online at http://www.deschutesriver.org/What_We_Do/Water_Banking/Mitigation_Bank/default.aspx.

Drewitt, A.L. and R.H. Langston
2008 Collision Effects of Wind-power Generators and Other Obstacles on Birds. New York Academy of Sciences 10.1196/annals. © 2008. 1134: 233-266.

ECONorthwest
2006 Economic Impacts of the Kittitas Valley Wind Project. August 2006.

Ellis, D. V.
2010 Willamette Cultural Resources Associates, Ltd. Technical Memorandum Re: West Butte Wind Project Cultural resources survey. June 23, 2010.

Ellis, K. L.
1987 "Effects of new transmission line on breeding male sage grouse at a lek in northwestern Utah." J. Chairman Roberson (ed). 15th Sage Grouse Workshop Transactions of the Western States Sage Grouse Committee; Western Association of Fish and Game Agencies, Midway, UT, 28-30 July, 1987.

Enneberg, Marci
1988 Sage Hollow Pipeline, BLM Prineville District, Prineville.

Erickson, W.P., G.D. Johnson, M.D. Strickland, and K. Kronner
2000 Avian and Bat Mortality Associated with the Vansycle Wind Project, Umatilla County, Oregon. Technical Report prepared by WEST, Inc. for Umatilla County Department of Resource Services and Development, Pendleton, Oregon. 21pp.

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

Erickson, W.P., J. Jeffrey, K. Kronner, and K. Bay
2004 Stateline Wind Project Wildlife Monitoring Final Report, July 2001 – December 2003. Technical report submitted to FPL Energy, the Oregon Energy Facility Siting Council, and the Washington Stateline Technical Advisory Committee.

Erickson, W.P., J.D. Jeffrey, and V.K. Poulton
2008 Puget Sound Energy Wild Horse Wind Facility Post-Construction Avian and Bat Monitoring: First Annual Report, January – December 2007. Prepared by WEST, Inc. for Puget Sound Energy, Ellensburg, Washington.

Estep, J.E.

1989 Avian mortality at large wind energy facilities in California: identification of a problem. California Energy Commission staff report P700-89-001.

Federal Emergency Management Agency (FEMA)
1989 National Flood Insurance Rate Maps for Crook County, Oregon. Available online at http://msc.fema.gov/webapp/wcs/stores/servlet/CategoryDisplay. Accessed September 3, 2009.
2009 FIRM Maps 41017C12575E, 41017C0975E, 41017C1000E, 41013C0550B, 41013C05250B. Available online at www.msc.fema.com. Accessed October 6, 2009..

Ferry, Brian. District Wildlife Biologist – Oregon Department of Fish and Wildlife
2010 Personal Communication. Sage grouse. March 23, 2010.

Freese, M. T., R. F. Miller, S. L. Peterson, W. D Robinson, and A. C. Yost
2009 Linking Greater Sage-Grouse Habitat Use and Suitability across Spatiotemporal Scales in Central Oregon. A report submitted to the Bureau of Land Management and Oregon Department of Fish and Wildlife April 2009.

Gabler, K. I., L. T. Heady, and J. W. Laundré
2001 A Habitat Suitability Model for Pygmy Rabbits (Brachylagus Idahoensis) in Southeastern Idaho. Western North American Naturalist 61(4), © 2001, pp. 480–489.

Gannett, M.W., Lite, Jr., K.E., Morgan, D.S., and Collins, C.A.
2001 Ground-water hydrology of the upper Deschutes Basin, Oregon: U.S. Geological Survey Water-Resources Investigations Report 00-4162, 74 p. Available online at http://pubs.usgs.gov/wri/wri004162/pdf/WRIR004162.pdf.

Good, R. E., R. M. Nielson, H. H. Sawyer, and L. L. McDonald
2004 Population level survey of Golden Eagles (Aquila chrysaetos) in the western United States. Final report prepared by Western EcoSystems Technology, Inc.. U. S. Fish and Wildlife Service, Arlington, VA.

Goodman, Scott H.
1995 Millican Valley OHV Recreation Area, Phase I, BLM Prineville District, Prineville.

Goodrich, L.J. and J.P. Smith
2008 Raptor Migration in North America. Pp. 37-150 in K.L. Bildstein, J.P. Smith, E. Ruelas I., and R.R. Veit (eds). State of North America.s Birds of Prey. Nuttall Ornithological Club and American Ornithologists. Union Series in Ornithology No. 3. Cambridge, Massachusetts, and Washington, D.C. [TP-09].

Gorman, Kyle. Region Manager - South Central Region. Oregon Water Resources Department
2009 Personal Communication. Water Resources for the West Butte Wind Power project Memo. December 21, 2009.

Governor's Advisory Group on Global Warming
2004 Oregon Strategy for Greenhouse Gas Reductions. December 2004. Available at http://www.oregon.gov/ENERGY/GBLWRM/docs/GWReport-FInal.pdf.

Hagar, J., and G. Lienkaemper
2007 Pygmy rabbit surveys on state lands in Oregon, U.S. Geological Survey Open-File Report 2007-1015, 23p.

Hagen,C. A., B. E. Jamison, K. M. Giesen, et al.
2004 Guidelines for managing lesser prairie-chicken populations and their habitats. Wildlife Society Bulletin: 69-82.

Hagen, Christian
2005 Greater Sage Grouse Conservation Assessment and Strategy for Oregon: A Plan to Maintain and Enhance Populations and Habitat. Oregon Department of Fish and Wildlife, Bend, Oregon. August 2005.

Hanf, Jan
2010a Personal Communication. BLM District Wildlife Biologist Comments on Draft EIS. February 27, 2010.
2010b West Butte Wind Project Analysis Data Sources. May 7, 2010.

Hanf, J. M., P.A. Schmidt, and E.B. Groshens
1994 Sage Grouse in the high Desert of Central Oregon, Results of a Study, 1988-1993. Department of the interior, Bureau of Land Management. Prineville District Office, Prineville, Oregon. BLM/OR/WA/PT-95/002-4120.7.

Harris, L.D.
1984 The Fragmented Forest, Island Biogeographic Theory and the Preservation of Biotic Diversity. University of Chicago Press, Chicago and London.

HDR Engineering, Inc. (HDR)
2010 Draft A-Weighted Noise Contour. West Butte Wind. June 8, 2010.

Hoen, B., R. Wiser, P. Cappers, M. Thayer, and G. Sethi
2009 The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis. Prepared for U.S. Department of Energy Lawrence Berkeley National Laboratory (LBNL). LBNL-2829E. December 2009. Available online at http://eetd.lbl.gov/ea/EMS/reports/lbnl-2829e.pdf.

Holloran, M.J.
2005 Greater sage-grouse (*Centrocercus urophasianus*) population response to natural gas field development in western Wyoming. PhD Dissertation. Univ.

WY, Laramie. 223pp. Available online at http://www.cfc.umt.edu/cesu/NEWCESU/Assets/Individual%20Project%20Reports/BLM%20Projects/Wyoming/05Hubert_sage-grouse_Holloran%20thesis.pdf.

Holloran, M.J.
2010 Wildlife Protection Recommendations for Wind Energy Development in Wyoming. April 2010. Available online at http://gf.state.wy.us/downloads/pdf/AprilWindDraft%204.5.pdf.

Hoover, S. L. and M. L. Morrison.
2005 Behavior of Red-Tailed Hawks in a Wind Turbine Development. Journal of Wildlife Management 69(1):150-159.

Houston, C., Stuart and Daniel E. Bowen, Jr.
2001 Upland Sandpiper (Bartramia longicauda), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/580.

Howe, R.W., T.C. Erdman, and K.D. Kruse
1995 Potential avian mortality at wind generation towers in southeastern Brown County. Wisconsin Public Service Commission, Green Bay, WI. 24 pp + appendices.

Hunt, G.
2002 Golden Eagles in a Perilous Landscape: Predicting the Effects of Mitigation for Wind Turbine Blade-Strike Mortality. Cal. Energy Commiss. Consultant Report. Available online at http://www.energy.ca.gov/reports/2002-11-04_500-02-043F.PDF.

ISAC (Idaho Sage-grouse Advisory Committee)
2006 Conservation Plan for the Greater Sage-grouse in Idaho. Idaho Fish and Game. Boise, ID.

Johnson, G.D., D.P. Young, Jr., W.P. Erickson, M.D. Strickland, R.E. Good and P. Becker
2000a Avian and bat mortality associated with the initial phase of the Foote Creek Rim Wind power Project, Carbon County, Wyoming: November 3, 1998 - October 31, 1999. Tech. Rept. prepared for SeaWestEnergy Corporation and Bureau of Land Management. 32pp.

Johnson, G.D., D.P. Young, Jr., C.E. Derby, W.P. Erickson, M.D. Strickland, and J.W. Kern
2000b Wildlife monitoring studies, SeaWest Windpower Plant, Carbon County, Wyoming, 1995-1999. Technical Report prepared by WEST, Inc. for SeaWest Energy Corporation and Bureau of Land Management. 195pp.
Johnson, G.D., W.P. Erickson, K. Bay, and K. Kronner

2002 Baseline ecological studies for the Klondike Wind Project, Sherman County, Oregon. Prepared for Northwestern Wind Power by WEST, Inc., Cheyenne, Wyoming and Northwest Wildlife Consultants, Inc., Pendleton, Oregon.

Johnson, D. H. and M. M. Rowland
2007 The utility of lek counts for monitoring greater sage-grouse. 15–23. in Reese, K. P. and R. T. Bowyer. Monitoring populations of sage-grouse. Proceedings of a Symposium at Idaho State University. University of Idaho College of Natural Resources Experiment Station Bulletin 88. Moscow, USA.

Kerns, J. and P. Kerlinger
2003 A Study of Bird and Bat Collision Fatalities at the Mountaineer Wind Energy Center, Tucker County, West Virginia: Annual Report for 2003. Technical Report prepared by Curry & Kerlinger, LLC for FPL Energy and Mountaineer Wind Energy Center Technical Review Committee. 39pp.

Knick, Steven T., David S. Dobkin, John T. Rotenberry, Michael A. Shcroeder, W. Matthew Vander Haegens and Charles Van Riper III.
2003 Teetering on th Edge or Too Late? Conservation and Research Issues for Avifauna of Sagebrush Habitats. The Cooper Ornithology Society. The Condor 105:611-634.

Knight, R.L. and S.A. Temple
1995 "Origin of Wildlife Responses to Recreationists." Wildlife and Recreationists Coexistence through Management and Research. R.L. Knight and K.J. Gutzwiller, eds. Island Press, Inc., Washington, DC. pp. 81–91.

Kochert, M.N. and K. Steenhof
2002 Golden Eagles in the U.S. and Canada: status, trends and conservation challenges. Journal of Raptor Research 36 (S1): 32-40.

Kronner, K., B. Gritski, M. Darrach, B. Anderson, Z. Ruhlen, and T, Ruhlen
2007 Ecological Baseline Study for the Proposed Rattlesnake Road Wind Power Facility, Arlington, Oregon. Prepared for Arlington Wind Power LLC and Horizon Wind Energy LLC. Prepared by Northwest Wildlife Consultants, Inc.

Kronner, K., B. Gritski, and S. Downes
2008 Big Horn Wind Power Project Wildlife Fatality Monitoring Study, 2006-2007. Report prepared for PPM Energy, Portland, Oregon and the Big Horn Project Technical Advisory Committee. Prepared by Northwest Wildlife Consultants, Inc. Goldendale, Washington.

Kunz T. H., E. B. Arnett, B. M. Cooper, W. P. Erickson, R. P. Larkin, T. Mabee, M. L. Morrison, M. D. Strickland, and J. M. Szewczak
2007a Assessing Impacts of Wind-Energy Development on Nocturnally Active Birds and Bats: A Guidance Document. Journal of Wildlife Management 71(8): 2449–2486. http://www.wind-watch.org/documents/wp-content/uploads/wild-71-08-45.pdf.

Kunz, T. H., E. B. Arnett, W. P. Erickson, A. R. Hoar, G. D. Johnson, R. P. Larkin, M. D. Strickland, R. W. Thresher, and M. D. Tuttle
2007b Ecological impacts of wind energy development on bats: questions, research needs and hypotheses. Front Ecol. Environ. 5(6): 315-324.

LaGory, Kirk E. Young-Soo Chang, K.C. Chun, Timothy Reeves, Richard Liebich, and Karen Smith
2001 A Study of the Effects of Gas Well Compressor Noise on Breeding Bird Populations of the Rattlesnake Canyon Habitat Management Area, San Juan County, New Mexico. U.S. Department of Energy, Office of Fossil Energy and National Petroleum Technology Office, under Contract No. W-31-109-Eng-38.

Lebow, Clayton G and Ricky G. Atwell
2008 "Archaeological Records Search for the West Butte Wind Project in Crook and Deschutes Counties, Oregon and Archaeological Survey of the Project's Access Road and Transmission Line across BLM land in Deschutes County, Oregon". Applied Earthworks, Inc., Albany, Oregon for Pacific Wind Power, LLC Los Olivos, CA.

Leddy, K. L.
1996 Effects of wind turbines on nongame birds in Conservation Reserve Program grasslands in southwestern Minnesota. M.S. thesis, South Dakota State Univ., Brookings.

Leddy, K.L., K.F. Higgins, and D.E. Naugle
1999 Effects of wind turbines on upland nesting birds in conservation reserve program grasslands. Wilson Bulletin 111(1): 100-104.

Lowther, Peter E. and Charles T. Collins
2002 Black Swift (Cypseloides niger), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/676.

Lyon, A. G. and S. H. Anderson.
2003 "Potential gas development impacts on Sage Grouse nest initiation and movement." Wildlife Society Bulletin 31:486-491.

Malmberg, Torsten
1954 Topographical concentrations of Flight-Lines. Zoological Institute, Lund, Sweden.

McLeod, D. R. A., D. P. Whitfield, A. H. Fielding, P. F. Haworth, and M. J. McGrady.
2002 Predicting home range use by Golden Eagles (*Aquila chrysaetos*) in western Scotland. *Avian Sci* 2:183–198.

Moyle, R.G. and F.H. Heppner
1998 Flight without horizon references in European starlings. Auk 115, 771-774. Available online at http://elibrary.unm.edu/sora/Auk/v115n03/p0771-p0774.pdf .

Myhrum, Ron and William Ferry
1999 Soils Survey of Upper Deschutes River Area, Oregon, including parts of Deschutes, Jefferson, and Klamath Counties. USDA Natural Resource Conservation Service. Oregon.

National Energy Policy Development Group
2001 National Energy Policy, Reliable, Affordable, and Environmentally Sound Energy for America's Future. Washington, DC, May.

National Commission on Energy Policy
2004 Policy Discussion – Heavy-Duty Truck Fuel Economy. 10th Diesel Engine Emissions Reduction (DEER) Conference August 29 - September 2, 2004 Coronado, California. Available online at http://www1.eere.energy.gov/vehiclesandfuels/pdfs/deer_2004/session6/2004_deer_kodjak.pdf.

National Research Council
2007 Environmental Impacts of Wind-Energy Projects. National Academies Press. 2007 (prepublication copy), pp. 39-47.

National Renewable Energy Lab (NREL)
2002a Jobs and Economic Development Impact (JEDI) Model. Available online at http://www.nrel.gov/analysis/jedi/. Accessed August 2009.
2002b Wind Turbine Lightning Protection Project Subcontractor Report. NREL/SR-500-31115. May 2002. Available online at http://www.nrel.gov/docs/fy02osti/31115.pdf.

National Wetlands Inventory (NWI)
2009 Available at http://wetlandsfws.er.usgs.gov/imf/imf.jsp?site=NWI_CONUS. Accessed October 6, 2009.

National Wind Collaborative Committee (NWCC)
2010 Wind Turbine Interactions with Birds, Bats, and their Habitats: A Summary of Research Results and Priority Questions. United States Department of Energy, Contract No. DE-AT01-07EE11218. Available online at http://www.nationalwind.org/assets/publications/Birds_and_Bats_Fact_Sheet.pdf.

Natural Resources Conservation Service (NRCS)
2009 Available at http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm. Accessed October 2009.
2010a Soil Data Mart. Available online at http://soildatamart.nrcs.usda.gov/. Accessed March 2010.

2010b Official Soil Series Description. Available online at http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdlist.cgi. Accessed March 2010.
2010c Major Land Resource Areas. Available online at http://soils.usda.gov/survey/geography/mlra/. Accessed March 2010.

Nelson, H. K. and R. C. Curry.
1995 Assessing avian interactions with windplant development and operation. *Trans. North Am. Wildl. Conf* 60:266–287.

Nicholoff, S.H.
2003 Wyoming Partners in Flight. Wyoming Bird Conservation Plan. Version 2.0. May 1, 2003. Available online at http://www.blm.gov/wildlife/plan/WY/menu.htm.

Northwest Wildlife Consultants, Inc. (NWC)
2008 Biological Study Results, West Butte Wind Power Project. November 20, 2008. Pendleton, OR and Goldendale, WA.

National Wind Coordinating Collaborative (NWCC)
2004a Wind Turbine Interactions with Birds and Bats: A Summary of Research Results and Remaining Questions. Available at www.nationalwind.org.
2004b Proceedings of Onshore Wildlife Interactions with Wind Developments: Research Meeting V. Lansdown, VA. November 3-4, 2004.

Omernik, J.M.
1987 Ecoregions of the conterminous United States. Map (scale 1:7,500,000). Annals of the Association of American Geographers 77(1): 118-125. Available online at http://www.epa.gov/wed/pages/ecoregions/level_iii.htm.

Oregon Department of Environmental Quality (DEQ)
2009 2008 Oregon Air Quality Data Summaries. Publication Number DEQ 09-AQ-015. June 2009. Available online at http://www.deq.state.or.us/aq/forms/2008AQreport.pdf. Accessed September 1, 2009.
2010 Accessing Data from DEQ's Environmental Cleanup Site Information (ECSI) Database. Available online at http://www.deq.state.or.us/lq/ecsi/ecsi.htm.

Oregon Department of Fish and Wildlife (ODFW)
2009 Oregon Mule Deer Initiative: November 17, 2009. Available online at: http://www.dfw.state.or.us/resources/hunting/big_game/mule_deer/docs/Mule_Deer_Mgmt_Plan_Final.pdf. Accessed February 11, 2010.
2010 ODFW Comments on the Draft Elkhorn Big Game Monitoring Study Report. May 31, 2010.

Oregon Department of Forestry (ODF)

2001 Northwest Oregon State Forests Management Plan. Available online at http://oregon.gov/ODF/STATE_FORESTS/nwfmp.shtml . Salem, Oregon. Accessed August 2006.

2003a Astoria District Implementation Plan. Oregon Department of Forestry, Salem, Oregon.

2003b Tillamook District Implementation Plan. Oregon Department of Forestry, Salem, Oregon.

2003c Salmon Anchor Habitats Strategy for Northwest Oregon State Forests. Oregon Department of Forestry, Salem, Oregon.

Oregon Flora Project

2009 Department of Botany and Plan Pathology. Oregon State University. http://www.oregonflora.org/.

Oregon State Historic Preservation Office (SHPO)

2007 Guidelines for Conducting Field Archaeology in Oregon. April 2007. Available online at http://www.oregon.gov/OPRD/HCD/ARCH/docs/draft_field_guidelines.pdf.

Orloff, S. and A. Flannery

1992 Wind turbine effects on avian activity, habitat use, and mortality in Altamont Pass and Solano County Wind Resource Areas. Rep. from BioSystems Analysis Inc., Tiburon, CA, for Calif. Energy Commis. [Sacramento, CA], and Planning Depts, Alameda, Contra Costa and Solano Counties, CA. Var. pag.

Pacific Wind Power

2009 Draft West Butte Wind Power Project Wildlife Mitigation Plan. August 2009.

Pagel, J.E., D.M. Whittington, and G.T. Allen

2010 Interim Golden Eagle inventory and monitoring protocols; and other recommendations. Division of Migratory Bird Management, U.S. Fish and Wildlife Service.

Paige, C., and S.A. Ritter

1999 Birds in a sagebrush sea: managing sagebrush habitats for bird communities. Partners in Flight Western Working Group, Boise, ID.

Peeke, H.V.S. and M.J. Herz, eds.

1973 Habituation, Vol. 1., Behavioral Studies. Academic Press, Inc., New York, New York.

Perkins, Mark

2005 Lasionycteris noctivagans Silver-Haired Bat. Western Bat Working Group. Species Accounts.

Phelps, Berry
2010 Personal Communication. BLM Outdoor Recreation Planner Comments on Draft EIS. March 2010.

Piatt, J.F., K.J. Kuletz, A.E. Burger, S.A. Hatch, V.L. Friesen, T.P. Birt, M.L. Arimitsu, G.S. Drew, A.M.A. Harding, and K.S. Bixler
2006 Status Review of the Marbled Murrelet (Brachyramphus Marmoratus) in Alaska and British Columbia, Open-File Report 2006-1387.

Piersma, T., B. Spaans, and A. Dekinga
2002 Are shorebirds sometimes forced to roost on water in thick fog? *Wader Study Group Bulletin* 97, 42-44.

Pruett, C.L., Patten, M.A., and Wolfe, D.H.
2009 It's Not Easy Being Green: Wind Energy and a Declining Grassland Bird. BioScience: March 2009 Vol. 59 No. 3.

Ralph, C. J., G. R. Geupel, P. Pyle, T. E. Martin, and D. F. DeSante
1993 Handbook of field methods for monitoring landbirds. USDA Forest Service, General Technical Report PSW-GTR-144. 41p.

Rankin, Sarah
2009 West Butte Wind Energy, LLC, personal communication. September 2009.

Renewable Energy Policy Project (REPP)
2003 The Effect of Wind Development on Local Property Values. Available online at www.repp.org/articles/static/1/binaries/wind_online_final.pdf.

Reynolds, R. T., J. M. Scott, and R. A. Nussbaum
1980 A variable circular-plot method for estimating bird numbers. Condor 82:309–313.

Rich, Terrell D., Michael J. Wisdom, and Victoria A. Saab
2005 Conservation of Priority Birds in Sagebrush Ecosystems. USDA Forest Service Gen. Tech. Rep. PSW-GTR-191.

Richardson, W.J.
2000 Bird migration and wind turbines: migration timing, flight behavior, and collision risk. In: *Proceedings of National Avian – Wind Power Planning Meeting III, San Diego, California, May 1998*, pp. 132-140. Prepared for the Avian Subcommittee of the National Wind Coordinating Committee by LGL Ltd., King City, Ontario.

Robel, R. J., J. A. Harrington, Jr., C. A. Hagen, J. C. Pitman, and R. R. Reker.
2004 Effect of energy development and human activity of the use of sand sagebrush habitat by Lesser Prairie-chickens in southwest Kansas. Transactions of the North American Wildlife and Natural Resources Conference 68: in press.

Rowland, M. M. and M. J. Wisdom.
2002 Research problem analysis for Greater Sage-grouse in Oregon. Final report. Oregon Department of Fish and Wildlife; U.S. Department of the Interior, Bureau of Land Management, Oregon/Washington State Office; and U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, p. 75.

Rowland, M. M., M. J. Wisdom, B. K. Johnson, and M. A. Penninger
2005 Effects of Roads on Elk: Implications for Management in Forested Ecosystems. Pages 42-52 in Wisdom, M. J., technical editor, The Starkey Project: A Synthesis of Long-term Studies of Elk and Mule Deer. Reprinted from the 2004 Transactions of the North American Wildlife and Natural Resources Conference. Lawrence, Kansas: Alliance Communications Group.

The Seattle Times Company
2009 Golden eagle killed by Wash. wind turbines. Originally published May 19, 2009 at 12:18 PM. Page modified May 21, 2009 at 7:19 PM. http://seattletimes.nwsource.com/html/localnews/2009237912_apwawindturbineeagle1stldwritethru.html.

Skagen, S.K., C.P. Melcher, and R. Hazlewood
2004 Migration stopover ecology of western avian populations: A southwestern migration workshop. U. S. Geological Survey, Biological Resources Discipline, Open-File Report 2004-1452, 28 p.

Smallwood, K.S. and C.G. Thelander
2004 Developing Methods to Reduce Bird Mortality in the Altamont Pass Wind Resource Area. PIER Final Project Report 500-04-052 prepared for California Energy Commission.
2008 Bird mortality at the Altamont Pass Wind Resource Area, California. *Journal of Wildlife Management* 72:215-223.

Steidl, R.J. and R.G. Anthony
1996 "Responses of Bald Eagles to Human Activity during the Summer in Interior Alaska." Ecological Applications 6(2):482-491.

Taulman, J.F.
1998 "Modification of a Hierarchical Model of Forest Disturbance." Environmental Conservation 25(1):3-7.

Temple, S.A. and J.R. Cary
1988 "Modeling Dynamics of Habitat-Interior Bird Populations in Fragmented Landscapes." Conservation Biology 2(4):340-347.

Thorson, T.D., Bryce, S.A., Lammers, D.A., Woods, A.J., Omernik, J.M., Kagan, J., Pater, D.E., and Comstock, J.A.

2003 Ecoregions of Oregon (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000).

Ticer, C.L., S.R. Boe, R.A. Ockenfels, and J.C. deVos, Jr.
1999 Factors affecting home ranges and movements of pronghorn on a shortgrass prairie of northern Arizona. Pronghorn Antelope Workshop Proceedings 18:84-90.

Toepfer, J. and W. Vodehnal.
2008 Prairie grouse display ground and nest distribution and population trends relative to wind generator complexes in northwestern Minnesota and the sandhills of Nebraska. Oral presentation at NWCC meetings, Milwaukee, Wisconsin, Oct. 27-28, 2008. (Proceedings to be published).

Tri State Generation and Transmission Association
2009 San Juan Basin Energy Connect Transmission Line Project Magnetic Fields and Audible Noise. October 2009. Available online at http://www.sjbenergyconnect.com/documents/TS_San-Juan_EMF_Report.pdf.U.S. Census Bureau.
2000 Census 2000. Available online at http://www.census.gov/main/www/cen2000.html. Accessed September 2009.
2002 2002 Economic Census. Available online at http://factfinder.census.gov/servlet/SAFFEconFacts?_sse=on&_submenuId=business_1. Accessed September 2009.
2008 2006-2008 American Community Survey. Available online at http://factfinder.census.gov.

U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS).
2005 Vehicle Cleaning Technology for Controlling the Spread of Noxious Weeds and Invasive Species. Available online at http://gacc.nifc.gov/rmcc/administrative/docs/weed_wash_unit.pdf.
2006 Hydric Soils List – All Components (OR). Available online at ftp://ftp-fc.sc.egov.usda.gov/MO1/hydric_pdf/oregon/OR620_hydric.pdf. Accessed December 2009.
2009 Plants Database. Available online at http://plants.usda.gov/. Accessed December 2009.
2009 Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed December 2009.

U.S. Department of Agriculture and Bureau of Land Management (USDA and BLM)
1994 Record of Decision for Amendments to USFS and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl.

U.S. Department of Energy (USDOE)

2006 Wind Energy Guide for County Commissioners. October 2006. Available online at http://www.nrel.gov/wind/pdfs/40403.pdf.

U.S. Department of Transportation, Federal Aviation Administration (FAA)

2007 ADVISORY CIRCULAR AC 70/7460-1K Obstruction Marking and Lighting. pp. 33-34. 2/1/07. Available online at http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/b993dcdfc37fcdc486257251005c4e21/$FILE/AC70_7460_1K.pdf.

U.S. Environmental Protection Agency (EPA)

2005 Emission Facts: Average Carbon Dioxide Emissions Resulting from Gasoline and Diesel Fuel. EPA420-F-05-001. February 2005. Available online at http://www.epa.gov/otaq/climate/420f05001.htm.

2009a Air Data: Access to Air Pollution Data. Available online at http://www.epa.gov/air/data/index.html. Accessed September 2, 2009.

2009b Climate Change Site. Glossary of Climate Change Terms. September 08, 2009. Available online at http://www.epa.gov/climatechange/glossary.html#G.

2009c Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2007. April 15, 2009. Available online at http://www.epa.gov/climatechange/emissions/downloads09/GHG2007entire_report-508.pdf.

2009d Greenhouse Gas Equivalencies Calculator. November 2009. Available online at http://www.epa.gov/rdee/energy-resources/calculator.html.

U.S. Fish & Wildlife Service (USFWS)

2003 Service Interim Guidance on Avoiding and Minimizing Wildlife Impacts from Wind Turbines. May 13, 2003.

2007 National Bald Eagle Management Guidelines. Arlington, VA.

2008 Greater Sage-Grouse Interim Status Update. October 31, 2008.

2009 National Wetlands Inventory. Wetlands Mapper. http://www.fws.gov/wetlands/Data/Mapper.html. Accessed December 2009.

2010 Federal Register. Endangered and Threatened Wildlife and Plants; 12-Month Findings for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered. 50 *Code of Federal Regulations* (CFR) 17. *Federal Register* 75(55).

U.S. Geological Survey (USGS)

2001 Gannett, M.W., Lite, Jr., K.E., Morgan, D.S., and Collins, C.A., 2001, Ground-water hydrology of the upper Deschutes Basin, Oregon: U.S. Geological Survey Water-Resources Investigations Report 00-4162, 74 p. Available online at http://pubs.usgs.gov/wri/wri004162/.

2002 1998 assessment of undiscovered deposits of gold, silver, copper, lead, and zinc in the United States. U.S. Geological Survey National Mineral Resource Assessment Team. U.S. Geological Survey circular; 1178. Available online at http://pubs.usgs.gov/circ/c1178/.

2007 Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and Its Habitats. *A release of a scientific monograph with permission of the authors, the Cooper Ornithological Society, and the University of California Press.*

2009 Earthquake Hazards Program. Quaternary Fault and Fold Database of the United States. Data Updated October 30, 2009. Available online at http://earthquake.usgs.gov/hazards/qfaults/.

U.S. Global Change Research Program

2009 Global Climate Change Impacts in the United States. Available at http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts.

United States Government Accountability Office (USGAO)

2005 Wind Power Impacts on Wildlife and Government Responsibilities for Regulating Development and Protecting Wildlife. GAO-05-906.

Verts, B.J. and Carraway, L.N.

1998 Land mammals of Oregon, University of California Press, Berkeley, p. 128-131. Available at http://books.google.com/books?id=8KI1AmzIDnwC&printsec=frontcover#.

Walker, B.L., D.E. Naugle, and K.E. Doherty

2007 Greater Sage-Grouse Population Response to Energy Development and Habitat Loss. Journal of Wildlife Management: Vol. 71, No. 8, pp. 2644-2654.

Walter, D. et al.

2006 American Midland Naturalist. Response of Rocky Mountain Elk (Cervus elaphus) to Wind-power Development. Vol 156: 2. Pg 363-375.

Weiss, N.T., and Verts, B.J.

1984 Habitat and distribution of pygmy rabbits (Sylvilagus idahoensis) in Oregon, Great Basin Naturalist v. 44, p. 563-571.

Western Bat Working Group (WBWG)

2005 Townsend's Big-eared Bat (Corynorhinus townsendii): Species account. http://www.wbwg.org/speciesinfo/species_accounts/vespertilonidae/coto.pdf. Accessed February 12, 2010.

Western Ecosystems Technology, Inc. (WEST)

2006 The Cumulative Impacts Analysis for Avian Resources from Wind Projects in Sherman County, WA, Final Report, March 2006. p. 6-8.

Western Regional Climate Center 1968-1981. Pine Mountain Observatory, Oregon (356662)

2009 Accessed December 2009. Available online at http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?or6662.

West Butte Wind Power LLC (WBWP)
2008a West Butte Wind Power Project, Crook County Conditional Use Permit Application, Project Description. December 2008.
2008b West Butte Wind Power Project, Crook County Conditional Use Permit Application, Environmental Setting and Analysis. December 2008.
2008c West Butte Wind Power Project, Crook County Conditional Use Permit Application, Applicant Proposed Mitigation Measures. December 2008.
2009 West Butte Wind Power project, Deschutes County Land Use Application, February 2009.

White, Scott W. and Gerald L. Kulcinski
1998 Birth to Death Analysis of the Energy Payback Ration and CO2 Gas Emission Rates from Coal, Fission, Wind, and DT Fusion Electrical power Plants. March 1998 (revised February 1999). Available online at http://www.webcitation.org/query?url=http%3A%2F%2Ffti.neep.wisc.edu%2Fpdf%2Ffdm1063.pdf&date=2008-10-31.

Willamette Cultural Resources Associates
2010 West Butte Wind Project Cultural Resource Survey Technical Memorandum.

Wisdom, M. J., R. S. Holthausen, and B. C. Wales
2000 Source habitats for terrestrial vertebrates of focus in the interior Columbia Basin: Broad-scale trends and management implications. General Technical Report INT-GTR 58. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, Utah.

Wisdom, M. J., B. C. Wales, and M. M. Rowland
2002 "Performance of greater sage-grouse models for conservation assessment in the interior Columbia Basin, USA." Conservation Biology 16: in press.

Wisdom, M. J., M. M. Rowland, and L. H. Suring, eds.
2005 Habitat Threats in the Sagebrush Ecosystem: Methods of Regional Assessment and Applications in the Great Basin. Lawrence, Kansas: Alliance Communications Group.

Wooley, Robert L.
2001 Sensitive Plant Monitoring Report for 2001. Fremont-Winema National Forests. http://www.fs.fed.us/r6/frewin/ecology/botany/plantmonitor.shtml#green.

Wyoming Game and Fish Department (WGFD).
2008 Stipulations for Development in Core Sage Grouse Population Areas. July 31, 2008. Available online at http://gf.state.wy.us/wildlife/wildlife_management/sagegrouse/FINALStateLandCoreAreaSageGrouseStips7312008.pdf.

2009 Recommendation for Wind Energy Development in Crucial and Important Wildlife Habitat: Draft. Available online at http://gf.state.wy.us/downloads/pdf/Finalpublicwindenergyrecommendtaionsdraft10.pdf. Accessed December 15, 2009.

Yahner, R.H.
1998 "Changes in Wildlife Communities near Edges." Conservation Biology 2(4):333–339.

Young, D. P. Jr., W. P. Erickson, R. E. Good, M. D. Strickland, and G. D. Johnson
2003a Avian and bat mortality associated with the initial phase of the Foote Creek Rim Windpower Project, Carbon County, Wyoming: November 1998 - June 2003. Technical Report prepared by WEST, Inc. (2003 Central Ave, Cheyenne, Wyoming, 82001) for Pacificorp, Inc., SeaWest Wind Power, Inc. and Bureau of Land Management; 35 p.

Young, D.P., W.P. Erickson, M.D. Strickland, R.E. Good, and K.J. Sernka
2003b Comparison of avian responses to UV-light-reflective paint on wind turbines. Subcontract report July 1999 – December 2000. National Renewable Energy Laboratory, Colorado. Available from www.nrel.gov/publications.

Zeiler Hubert P. and Veronika Grunschachner-Berger.
2009 March 2009. Impact of Wind Power Plants on Black Grouse, Lyrurus tetrix in Alpine Regions. Folia Zool. – 58(2): 173-182. Available online at: http://findarticles.com/p/articles/mi_7539/is_200904/ai_n32334209/.

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Appendix A
Figures