4.0 ENVIRONMENTAL CONSEQUENCES

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

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

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

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

4.1 AIR QUALITY AND CLIMATE

4.1.1 Proposed Action

4.1.1.1 Introduction

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

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

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

4.1.1.2 Construction Phase

Construction of access roads and preparation of turbine sites and transmission line structure sites would involve the use of earth-moving equipment, including loaders, various-sized bulldozers, and backhoes. Delivery of turbine components and

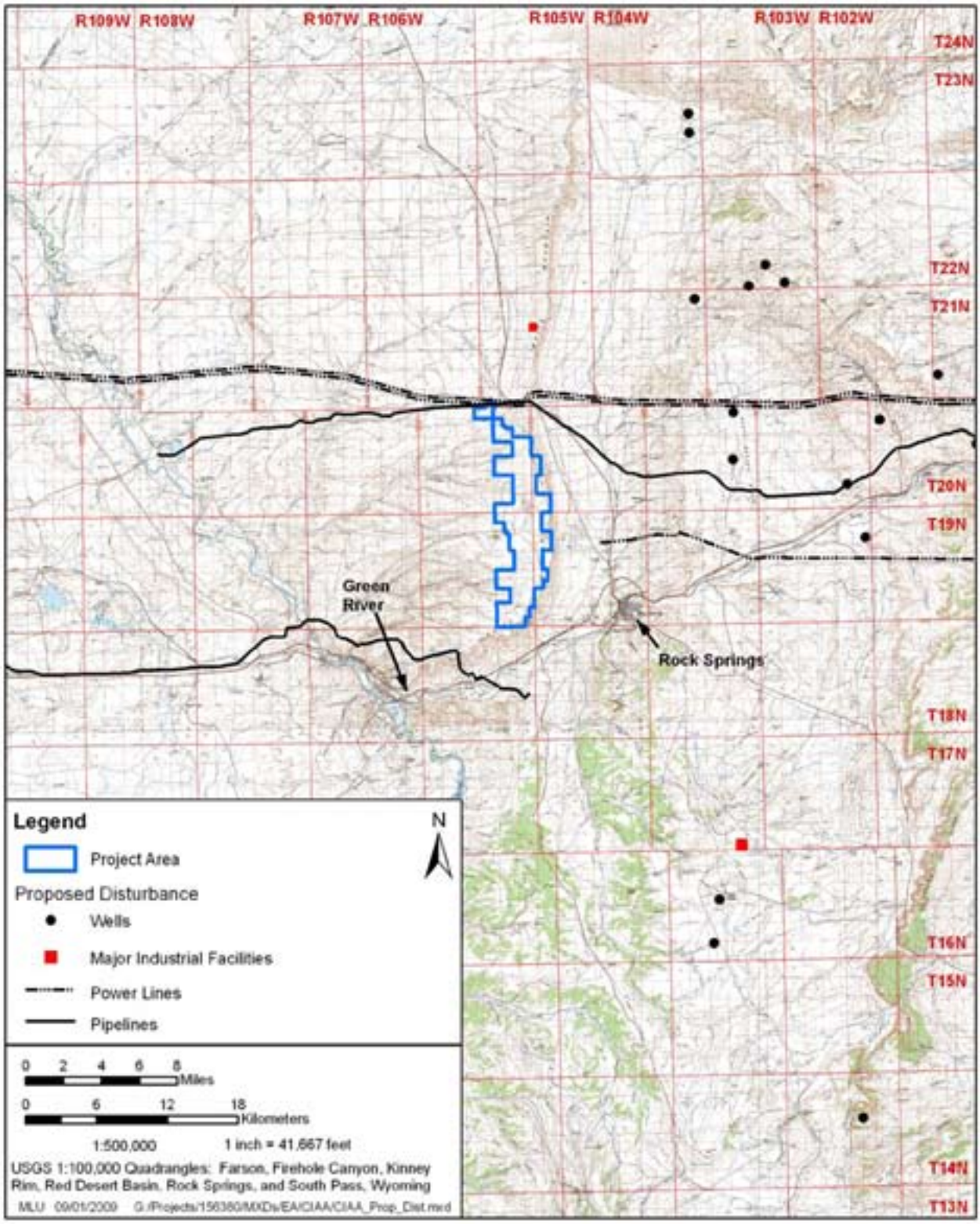

Figure 4.1 Location of Proposed Action and RFFAs.

Table 4.1 Project Emission Profile.

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

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

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

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

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

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

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

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

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

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

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

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

4 TSP = total suspended particles.

5 HAP = hazardous air pollutants.

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

4.1.1.3 O&M Phase

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

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

4.1.1.4 Decommissioning Phase

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

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

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

4.1.2 Alternative A - Development Only on Privately Owned Lands

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

4.1.3 No Action Alternatives

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

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

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

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

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

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

4 TSP = total suspended particles.

5 HAP = hazardous air pollutants.

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

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

4.1.4 Residual Impacts

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

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

4.1.5 Cumulative Impacts

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

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

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

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

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

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

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

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

4.2 CULTURAL RESOURCES (INCLUDING NATIVE AMERICAN CONCERNS)

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

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

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

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

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

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

4.2.1 Proposed Action

4.2.1.1 Effects to Cultural Resources Within the APE for Direct Effects

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

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

Direct Effects to Linear Historic Sites

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

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

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

4.2.1.2 Effects to Cultural Resources Within the APE for Visual Effects

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

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

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

Prehistoric Sites

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

Historic Sites

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

4.2.1.3 Native American Concerns

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

4.2.1.4 Summary of Project Effects

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

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

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

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

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

4.2.2 Alternative A - Development Only on Privately Owned Lands

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

4.2.3 No Action Alternative

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

4.2.4 Residual Impacts

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

4.2.5 Cumulative Impacts

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

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

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

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

4.3 GEOLOGY AND PALEONTOLOGICAL RESOURCES

4.3.1 Proposed Action

4.3.1.1 Construction Phase

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

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

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

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

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

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

4.3.1.2 O&M Phase

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

4.3.1.3 Decommissioning Phase

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

4.3.2 Alternative A - Development Only on Privately Owned Lands

4.3.2.1 Construction Phase

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

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

4.3.2.2 O&M Phase

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

4.3.2.3 Decommissioning Phase

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

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

4.3.3 No Action Alternative

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

4.3.4 Residual Impacts

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

4.3.5 Cumulative Impacts

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

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

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

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

4.4.1 Proposed Action

4.4.1.1 Construction Phase

Grazing

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

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

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

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

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

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

Recreation

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

Transportation

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

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

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

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

4.4.1.2 O&M Phase

Grazing

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

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

Recreation

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

Transportation

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

4.4.1.3 Decommissioning Phase

Grazing

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

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

Recreation

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

Transportation

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

4.4.2 Alternative A - Development Only on Privately Owned Lands

4.4.2.1 Construction Phase

Grazing

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

Recreation

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

Transportation

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

4.4.2.2 O&M Phase

Grazing

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

Recreation

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

Transportation

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

4.4.2.3 Decommissioning Phase

Grazing

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

Recreation

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

Transportation

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

4.4.3 No Action Alternatives

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

4.4.4 Residual Impacts

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

4.4.5 Cumulative Impacts

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

Grazing

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

Recreation

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

Table 4.5 Cumulative Impacts for Land Use.

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

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

Transportation

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

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

4.5 NOISE

4.5.1 Proposed Action

4.5.1.1 Construction Phase

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

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

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

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

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

4.5.1.2 O&M Phase

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

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

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

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

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

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

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

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

4.5.1.3 Decommissioning Phase

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

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

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

4.5.2 Alternative A - Development Only on Privately Owned Lands

4.5.2.1 Construction Phase

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

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

4.5.2.2 O&M Phase

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

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

4.5.2.3 Decommissioning Phase

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

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

4.5.3 No Action Alternatives

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

4.5.4 Residual Impacts

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

4.5.5 Cumulative Impacts

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

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

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

4.6 SOCIOECONOMICS

4.6.1 Proposed Action

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

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

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

4.6.1.1 Construction Phase

Employment and Income

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

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

Sales and Use Taxes

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

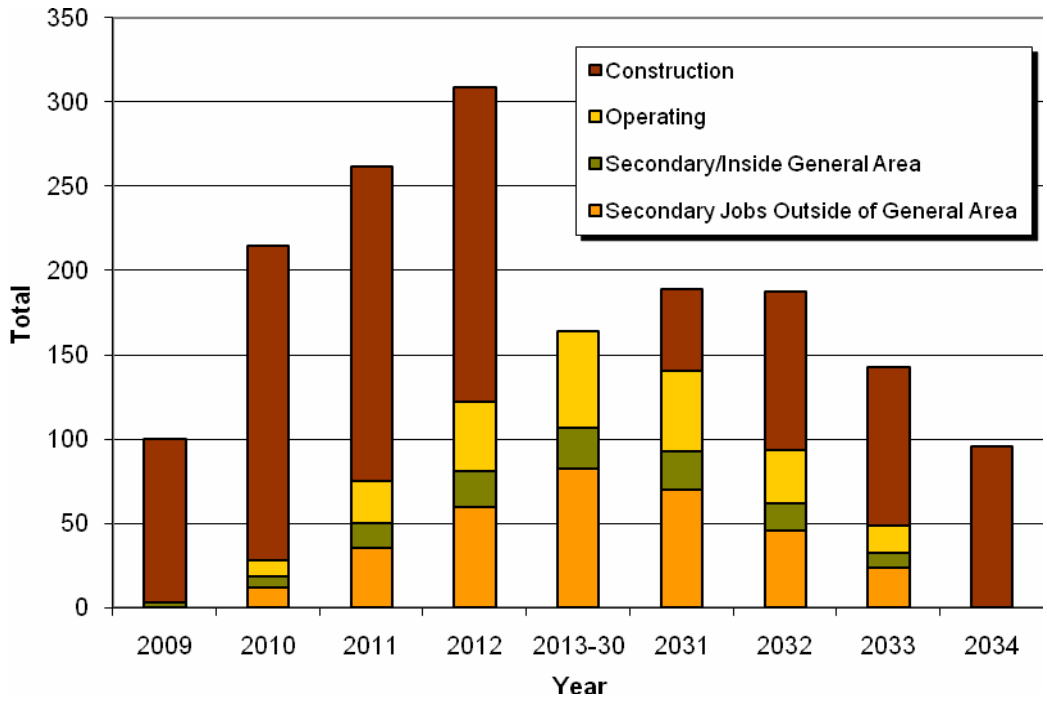

Figure 4.2 Total Number of Jobs Created, Proposed Action.

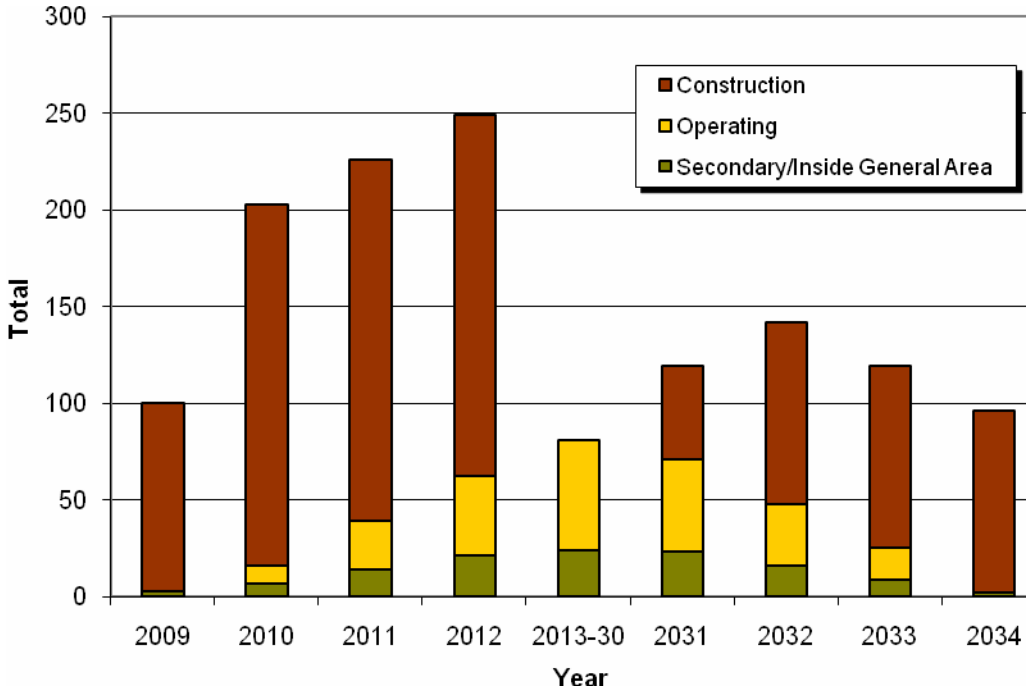

Figure 4.3 Jobs Created in Rock Springs/Green River, Proposed Action.

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

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

[1] Source: LLC (2008).

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

Property Taxes

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

Housing

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

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

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

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

[1] Source: LLC (2008).

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

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

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

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

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

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

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

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

Community Facilities and Services

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

4.6.1.2 O&M Phase

Employment and Income

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

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

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

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

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

Sales and Use Taxes

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

Property Taxes

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

Housing

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

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

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

[1] Source: LLC (2008).

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

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

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

Community Facilities and Services

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

Property Values

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

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

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

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

4.6.1.3 Decommissioning Phase

Employment and Income

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

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

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

Sales and Use Taxes

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

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

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

Property Taxes

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

Housing

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

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

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

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

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

Community Facilities and Services

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

4.6.2 Alternative A - Development Only on Privately Owned Lands

4.6.2.1 Construction Phase

Employment and Income

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

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

Sales and Use Taxes

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

Property Taxes

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

Housing

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

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

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

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

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

Community Facilities and Services

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

4.6.2.2 O&M Phase

Employment and Income

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

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

Sales and Use Taxes

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

Property Taxes

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

Housing

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

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

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

Community Facilities and Services

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

4.6.2.3 Decommissioning Phase

Employment and Income

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

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

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

Sales and Use Taxes

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

Property Taxes

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

Housing

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

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

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

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

Community Facilities and Services

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

4.6.3 No Action Alternative

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

4.6.4 Residual Impacts

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

4.6.5 Cumulative Impacts

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

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

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

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

4.7 SOILS

4.7.1 Proposed Action

4.7.1.1 Construction Phase

Construction activities associated with the Proposed Action would result in the initial disturbance of 866 acres of land within the 13,165 acres of project area, and 162 acres of land would remain occupied by roads, turbine foundations, and facilities for the life of the project.

Construction activities, including topsoil salvage, grading, cut-and-fill activities, and construction of access roads, would compact or destabilize the soil surface and increase the potential for soil erosion

by water or wind. The most likely time for erosion to occur is after initial disturbance and before re-establishment of vegetative cover or placement of concrete foundations. An increase in erosion can result in an increase in runoff and sedimentation into receiving waters. In addition, erosion can cause a number of problems, including damage to foundations, roadways, and other structures, loss of topsoil, slowed restoration rates, and loss of structure in soils that are disturbed or driven on during construction. Impact to soils from excavation activities include a mixing of soil horizons, susceptibility to wind and water erosion, and reduced range productivity.

Equipment travel throughout the project area would result in increased soil compaction. Moderate or severe soil compaction would affect soil productive potential. The extent of compaction would depend in large part on soil moisture content and the physical characteristics of a particular soil type. Compaction tends to be less severe when soils are dry and more severe when soils are moist to wet.

The project area includes soil types that are categorized as either sandy or erosive (BLM 1996). In order to minimize potential erosion and prior to the initiation of construction operations, an SWPPP, which includes erosion control measures, would be prepared and implemented for the project area. The SWPPP would be based on the 1992 EPA document entitled *Storm Water Management for Construction Activities-Developing Pollution Prevention Plans and Best Management Practices* (1992). Implementation of the SWPPP would minimize the impact to soils and erosion to low levels. All surface-disturbed or compacted areas not needed during the O&M phase of the project would be regraded, ripped, retopsoiled, and revegetated in accordance with the reclamation plan outlined under the Proposed Action. Application of design features to prevent soil erosion would be used throughout the implementation of the project. After erosion control and reclamation operations have been successfully completed, soil stability would likely be achieved, and the rate of erosion would return to predisturbance levels.

4.7.1.2 O&M Phase

No additional impacts beyond those discussed under construction impacts are expected to occur during the O&M phase of this project. Impacts to soils during the O&M phase of the project would largely be associated with limited soil erosion induced by vehicle traffic on existing roads; however, soil erosion from this source is expected to be minor. Teton will continue to implement the SWPPP for this project and will monitor and repair any areas of erosion or soil instability.

4.7.1.3 Decommissioning Phase

No additional impacts beyond those discussed under construction impacts are expected to occur during the decommissioning phase of this project. Soil erosion and some compaction are the primary impacts that would be expected from removal of roads, turbines, and other structures. Control of surface runoff and sedimentation during the decommissioning phase of the project would be accomplished by the continued implementation of SWPPP and other design features specified in Chapter 2.0 of this EA and would generally reduce the impact to soils to low levels. After final reclamation operations have been successfully completed, soil stability would likely be achieved, and the rate of erosion would return to predisturbance levels. Reclaimed areas would be considered stable if there are no large rills or gullies, no slumping or subsidence, no substantial soil movement, no headcutting in drainages, and no slope instability that can be attributed to construction, O&M, and after decommissioning of the project. Specifically, for BLM-administered lands, Wyoming Rangeland Standards would be met, and applicable standards would be met on private and state lands.

4.7.2 Alternative A - Development Only on Privately Owned Lands

4.7.2.1 Construction Phase

Potential direct and indirect impacts associated with soil resources under the construction phase of Alternative A would be similar to the type of impacts described in the Proposed Action.

Implementation of this alternative would involve the construction of 170 wind turbines on privately owned land; therefore, direct impacts to soil resources could include the disturbance of 619 acres of soils from the excavation of the turbine pads, the substation, and the collector lines. The potential impact to soils would be 30% less than those anticipated under the Proposed Action.

Control of surface runoff and sedimentation during the construction phase of the project would be accomplished by the implementation of the SWPPP and other design features specified in Chapter 2.0 of this EA, and would generally reduce the impact to soils to low levels. Teton would implement stability and erosion practices for all temporary and permanent reclamation in accordance with the SWPPP for the project. After temporary reclamation operations have been successfully completed following construction, soil stability would likely be achieved, and the rate of erosion would return to predisturbance levels.

4.7.2.2 O&M Phase

Under the O&M phase of Alternative A, no additional impacts beyond those discussed under construction impacts are expected to occur. Control of surface runoff and sedimentation during the O&M phase of the project would be accomplished by the implementation of the SWPPP and other design features specified in Chapter 2.0 of this EA.

4.7.2.3 Decommissioning Phase

Under the decommissioning phase of Alternative A, no additional impacts beyond those discussed under construction impacts are expected to occur. Soil erosion and some compaction are the primary impacts that would be expected from removal of roads, turbines, and other structures. Control of surface runoff and sedimentation during the decommissioning phase of the project would be accomplished by the implementation of the SWPPP and other design features specified in Chapter 2.0 of this EA and would reduce the impact to soils to low levels. After final reclamation operations have been successfully completed following decommissioning, soil stability would likely be achieved, and the rate of erosion would return to predisturbance levels. Reclaimed areas would be considered stable if there are no large rills or gullies, no slumping or subsidence, no substantial soil movement, no headcutting in drainages, and no slope instability that can be attributed to construction, O&M, and after decommissioning of the project. Specifically, for BLM-administered lands, Wyoming Rangeland Standards would be met, and applicable standards would be met on private and state lands.

4.7.3 No Action Alternatives

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

4.7.4 Residual Impacts

Implementation of the Proposed Action or Alternative A would result in some temporarily increased and unavoidable soil loss and sedimentation to the receiving waters as a result of water and wind erosion. Productivity of some disturbed soils would be reduced due to vegetation removal, soil compaction and exposure, mixing of horizons, and increased susceptibility to wind and water erosion.

4.7.5 Cumulative Impacts

Impacts to soil resources would be minimized by implementation of the SWPPP and other design features specified in Chapter 2.0 of this EA. These mitigation measures will address temporary disturbance and life-of-project disturbance. Within 2-3 years after the BMPs have been installed, soil stability would likely be achieved. In addition, temporary and permanent reclamation operations would eventually (within 10-20 years) return vegetation cover to predisturbance levels, and the rate of erosion would also return to predisturbance levels.

Based on the disturbance calculations presented in Chapter 3.0, approximately 19,954 acres are

currently disturbed within the IAA. This represents 7.43% of the total area within the IAA. RFFA (including the Proposed Action) within the cumulative IAA would result in an additional 1,250 acres of disturbance--189 acres of disturbance due to the Proposed Action and 1,061 acres from other RFFAs. This represents 21,204 acres of the total within the IAA or 7.89% based on the total disturbance due to past, present, and RFFAs.

Provided that reclamation efforts are timely and successful, cumulative impacts to soils resources should be within acceptable limits and would not result in impacts beyond those that already exist or have already been identified and discussed in Chapter 4.0 of this EA.

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

4.8.1 TEPC Species

No federally listed TEPC species were documented in the WMWE project area during wildlife surveys conducted in association with this project (TRC 2008a, 2008b, 2008c, 2008d, 2009b) or would be expected to be found in the WMWE project area. Therefore, the risk to such species during construction, O&M, and decommissioning phases of the WMWE Project would be minimal.

In addition, the BLM consulted with the USFWS concerning the 420-acre-ft life of project water depletion for the WMWE project and potential impacts on Colorado River endangered fish species. On October 2, 2009, the USFWS issued a biological opinion and in accordance with the RIP for Endangered Species in the Upper Colorado River Basin determined that annual water depletion would require payment to the USFWS in order to offset effects of the project. Therefore, Teton would make a one-time payment prior to the commencement of construction to mitigate water depletion and potential impacts to Colorado River endangered fish species.

4.8.2 BLM Sensitive Species

4.8.2.1 Construction Phase

Several BLM listed avian sensitive species (BLM 2002) were documented in the WMWE project area including: ferruginous hawk, Brewer's sparrow, sage sparrow, sage thrasher, loggerhead shrike, and greater sage-grouse (TRC 2009b). Ferruginous hawks could be impacted as a result of construction-related disturbance during the nesting season (BLM 2005; National Research Council 2007; Arnett et al. 2007). The BLM has established seasonal and no surface occupancy restriction areas that Teton will comply with according to BLM policy (BLM 1997). Additionally, Teton has committed to adopting a 50-m (164-ft) minimum setback from the ridgeline of White Mountain, as well as the edge of inter-gorge of large intermittent or ephemeral drainages to further reduce impacts to avian species. Table 2.9 lists the seasonal restriction areas, as well as the no surface occupancy buffers, and Teton would not place any wind turbines within these no surface occupancy buffer areas. In addition, to reduce the risk of electrocution to ferruginous hawks, all electrical systems and components will be designed, constructed, operated, and maintained in conformance with the National Electrical Safety Code and other applicable codes and standards, as well as *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (Avian Power Line Interaction Committee 2006). As a result, implementation of these design features would minimize risk to ferruginous hawks during construction operations. The risk to ferruginous hawks would be low and the impact would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

Construction impacts to sparrow, sage sparrow, sage thrasher, and loggerhead shrike could result from habitat disturbance (i.e., the removal of vegetation during site preparation) and direct injury or mortality (BLM 2005; National Research Council 2007; Arnett et al. 2007). However, the removal of natural vegetation (grassland and shrub communities) would be minimized to the extent possible during construction. In addition, ground disturbing activity and the movement of

construction personnel and equipment on-site would be limited to the extent possible to the construction areas to avoid inadvertent impacts to all wildlife species. The risk to PSB during the construction phase of this project would be low, and the impact would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

Construction impacts to greater sage-grouse could result from habitat disturbance (i.e., the removal of vegetation during site preparation), displacement, and direct injury or mortality (BLM 2005; National Research Council 2007; Arnett et al. 2007). To minimize potential impacts, construction personnel would be informed that greater sage-grouse occur in the project area and that they are not allowed to haze or harass greater sage-grouse, and they should minimize any direct disturbance to the greater sage-grouse whenever possible. In addition, ground-disturbing activity and the movement of construction personnel and equipment on-site would be limited to the extent possible to the construction areas to avoid inadvertent impacts to greater sage-grouse.

Mountain plover in the general project area are found in cushion plant communities and on windswept ridges (personal communication, June 10, 2002, with Lorraine Keith, BLM RSFO), and breeding/nesting habitat is often associated with active prairie dog towns (Dinsmore 2003). A small portion of proposed project area is composed of greasewood fans and flats and basin exposed rock with areas that are relatively void of vegetation, and it is possible that these areas could provide suitable nesting and foraging habitat for mountain plover. However, no mountain plovers were observed during 20+ weeks of diurnal and nocturnal avian migration studies conducted in 2008 (TRC 2009b). No mountain plover observations have been recorded in the vicinity the proposed WMWE project area (WNDD 2009). To minimize potential impacts to nesting mountain plover, Teton would conduct presence/absence surveys prior to vegetation removal and construction. If mountain plovers are found, Teton would work with the BLM to modify turbine placement to avoid the nesting birds, or they would wait to conduct construction activities until nesting activities have been completed. It is also possible that some mountain plovers could collide with a rotating wind turbine blades; however, while possible, these events are unlikely to occur because of the low density of mountain plovers in the WMWE project area. Therefore, the Proposed Action is expected to have minimal direct impacts on any nesting mountain plovers and minimal indirect impacts (through increased mortalities due to wind turbine and vehicle collisions) on any mountain plovers in the immediate project area. The risk to mountain plovers would be low, and the impact would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

Pygmy rabbit habitat occurs throughout the project area as inclusions of preferred vegetation densities and heights within Wyoming big sagebrush; therefore, impacts to pygmy rabbits could result from the removal of vegetation (clearing, grubbing, etc.) and compaction of soil during site preparation. It is also possible that increased human presence during the life of the project could lead to an increased number of predators such as coyotes and red foxes. The increased presence of predators could result in increased predation on pygmy rabbits and other small mammals. The removal of natural vegetation (grassland and shrub communities) would be minimized to the extent possible during construction. In addition, the movement of personnel and equipment on-site would be limited to the extent possible to construction areas to avoid inadvertent compaction of soil. Presence/absence surveys for pygmy rabbits and their associated habitat would be conducted prior to vegetation removal and construction. If pygmy rabbits are found, Teton would work with the BLM to modify turbine placement to avoid habitat to the extent possible. The risk to pygmy rabbits would be low, and the impact would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

Impacts to other BLM sensitive passerine birds (e.g., not recorded in the project area) and mammal species (e.g., Wyoming pocket gopher) during the construction phase of the Proposed Action would likely be the same as discussed for wildlife, including birds, presented in Section 4.12

of this EA. These potential impacts are within the range documented and acknowledged in the BLM Wind Energy Programmatic EIS (BLM 2005). Impacts to midget-faded rattlesnakes and other reptiles or amphibians would be eliminated or reduced after the results of the den survey and appropriate mitigation can be developed with the BLM, WGFD, and Teton if these species are found.

It is possible that cedar rim thistle could be found within suitable habitats within the WMWE project area. To mitigate potential impacts to cedar rim thistle, Teton would conduct surveys for cedar rim thistle and their associated habitat prior to vegetation removal and construction. If any cedar rim thistle is found, Teton would avoid physical disturbance to these plants and work with the BLM to modify turbine/road placement.

4.8.2.2 O&M Phase

During the O&M phase of the project, impacts to ferruginous hawk, Brewer's sparrow, sage sparrow, sage thrasher, loggerhead shrike, and greater sage-grouse would be different and primarily related to potential collisions with the operating wind turbines and service vehicles (BLM 2005; National Research Council 2007; Arnett et al. 2007).

Ferruginous Hawk. Based on the avian use study, 20 ferruginous hawk observations were recorded during the RLB continuous surveys, and the species is known to nest adjacent to the project area (TRC 2009b). Forty-five percent of the ferruginous hawks were observed flying, and five of the nine flying observations (56%) were within the rotor swept area. At 0.0270, the risk index for ferruginous hawk was seventh highest among RLBs but lowest among the raptor species observed in the study (TRC 2009b). Based on the preponderance of the abovementioned species in the project area and/or their flight characteristics, it is likely that operation of the proposed wind development could result in some ferruginous hawk fatalities. However, the risk to ferruginous hawks would be low, and the impact would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

Brewer's Sparrow and Sage Sparrow. Based on the avian use study, Brewer's sparrow and sage sparrow were the second and third most abundant PSB species with 325 (14.8% of total PSB observation) and 211 (11.2% of total PSB observation) individuals documented, respectively. Horned larks accounted for the majority of observations (933 [41.6%]). Twenty-six percent of the Brewer's sparrows and 21% of the sage sparrows were recorded flying, but none were observed within the rotor-swept area. Thus, based on the data, a valid risk index cannot be calculated, meaning that these two species may have a negligible or relatively low potential for turbine-related collisions compared to other species documented in the study area (TRC 2009b). Based on use studies conducted in the WMWE project area, Brewer's sparrows and sage sparrow appear to be locally abundant, and the project is unlikely to have an adverse impact on these species at the population level (TRC 2009b). The risk to Brewer's sparrow and sage sparrow would be low, and the impact would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

Sage Thrashers. Based on the results of the avian use study, sage thrashers were common in the WMWE project area, with 196 individuals documented (8.8% of the birds observed). Of those, 15 were flying, and one was observed in the rotor-swept area. Risk value for the sage thrasher was low at 0.0027 (TRC 2009b). Based on the use study conducted in the WMWE project area, sage thrashers appear to be locally abundant, and the project is unlikely to have an adverse impact on these species at the population level (TRC 2009b). The risk to sage thrashers would be low, and the impact would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

Loggerhead Shrike. One loggerhead shrike was recorded during the avian studies, but it was recorded as an incidental observation and was not flying and would therefore have a negligible or low risk index potential for turbine-related collisions compared to other species documented in the study area (TRC 2009b). The risk to loggerhead shrikes would be low, and the impact

would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

Greater Sage-grouse. Much of the following analysis for impacts to greater sage-grouse breeding, nesting, brood-rearing, and winter activities and habitat changes is from the summary article by Becker et al. (2009). Wind energy development is relatively new, and few field studies have been conducted concerning greater sage-grouse and potential impacts of wind energy projects (Becker et al. 2009). Lek use is widely studied to monitor greater sage-grouse population size and distribution locally and at the landscape scale. Factors affecting lek use and persistence are put forth with information on the effective distance of such factors as the time period required to detect lek abandonment following oil and gas field development (Becker et al. 2009). It is likely that similar types of effects would be observed in relation to wind energy development. However, it should also be recognized that oil and gas development and wind energy developments involve some important differences in the level of disturbance and human activity that are not directly comparable to each other (Strickland 2009).

In the Powder River Basin of northeastern Wyoming from 2001 to 2005, the number of males observed on leks inside coalbed natural gas (CBNG) fields that had been confirmed active in 1997 declined more rapidly than leks outside the CBNG fields. Lek count indices (counts of birds at leks that provide an indication of population size [Walsh et al. 2004]) inside gas fields declined by 82%, whereas indices outside such development declined by 12%. By 2005, leks in CBNG fields had 46% fewer males per active lek than leks outside the fields. Of leks active in 1997 or later, only 38% of 26 leks in CBNG fields remained active by 2004-2005, compared to 84% of 250 leks outside CBNG fields. Persistence of 110 leks was influenced positively by the proportion of sagebrush habitat. Lek persistence was influenced negatively by CBNG development and the proportion of power lines (considered as two separate factors) within about 4 mi of the lek, as well as the proportion of (heavily traveled all weather) roads within about 2 mi of the lek. Full development of the landscape within 2 mi of leks reduced the average probability of lek persistence from 87 to 5%. Leks disappeared on average within 3-4 years of CBNG development. It is nevertheless unclear whether declines in lek attendance within CBNG fields were caused by impacts to breeding birds at the lek, reduced survival or productivity of birds in the surrounding area, avoidance of developed areas, or some combination thereof (Walker et al. 2007).

Three studies were conducted in the Pinedale Anticline area of southwestern Wyoming--one during the initial stages of natural gas development (Lyon 2000) and two in more full stages of development (Holloran 2005; Kaiser 2006). These studies describe reductions in lek fidelity of male and female greater sage-grouse in response to natural gas development.

Holloran (2005) found that in areas subjected to full-field natural gas development, populations of breeding males on leks declined by an average of 51% compared to only a 3% decline at undisturbed leks. Males at three leks surrounded by natural gas development declined by 89%, and two of the three leks were abandoned within 3-4 years of initiation of gas drilling. Active drilling within 3.1 mi of a greater sage-grouse lek reduced the number of breeding males by displacing adult males and reducing recruitment of juvenile males. Increases in road traffic and well density also reduced the number of breeding males at leks.

Kaiser (2006) reported that yearling males tended to avoid leks (less recruitment) highly immersed in developing gas fields and, as distance from drilling rigs decreased, there was less recruitment. Hens continued to breed and initiated nests despite natural gas development; however, yearling hens tended to avoid visiting leks as proximity to a producing well increased. Both yearling males and females (9% and 11%, respectively) showed low fidelity to natal leks. Forty-three percent of yearling males and 14% of yearling females established a lek within 3.1 mi of the nest location from which they hatched, indicating some level of natal area fidelity but less philopatry than greater sage-grouse in other studies, in which 53-100% fidelity was observed.

Lyon (2000) found a small number of males returning to breed on the same lek during 2 years despite disturbance from natural gas development. However, at the time of the Lyon study, gas development in the area was in its initial stages (in contrast to being more developed during the later studies [Holloran 2005; Kaiser 2006]), and impacts on lek fidelity could take longer to detect (Holloran 2005; Walker et al. 2007). To maintain a stable number of males using a lek, yearling recruitment must equal adult mortality. Assuming 50% mortality (Connelly et al. 2004) and no yearling recruitment, the number of males attending a lek would decline by 50% per year, and the lek would become inactive within 4-6 years, the approximate amount of time lag documented by Walker et al. (2007) and Holloran (2005). Thus, the Lyon (2000) study may have begun too early during gas development and not lasted long enough to detect differences in lek attendance.

Impacts to sage-grouse have been documented up to 3.7 mi away from vertical structures such as overhead power transmission and communication distribution lines (Manville 2004). Collisions with power lines and vehicles and increased predation by raptors may increase mortality of birds at leks (Connelly et al. 2000). Further, direct greater sage-grouse mortality associated with roads and power lines have been documented year-round (Walker et al. 2007). Thus, power lines (i.e, vertical structure) may also alter the productivity or survival of greater sage-grouse outside the reproductive season, thereby indirectly reducing the number of birds that use leks, increasing lek abandonment (Naugle et al., in press).

Data on greater sage-grouse indicate that there are no greater sage-grouse leks within the WMWE project area, and the nearest lek to the WMWE project area is located approximately 3.1 mi west of the WMWE project area. The next closest lek known to occur near the WMWE project area is 4.4 mi away. Although these leks are located near the outer limit of where impacts have been documented based on the oil and gas information presented above, it is still unknown how taller rotating structures would affect persistence for these leks. Monitoring of these two leks would need to continue to try and evaluate these impacts.

Other attributes of species reproduction are studied to monitor greater sage-grouse populations locally and at the landscape scale. This subsection synthesizes the results of studies of declines in reproductive metrics, such as nest initiation, nest area fidelity, and adult and chick survival, which are attributed to oil and gas development. Factors affecting these declines are put forth with information on the effective distance of such factors. It is likely that similar types of effects could be observed in relation to wind energy development.

In the Pinedale Anticline area, Lyon and Anderson (2003) found that the nest initiation rate for females from leks disturbed by natural gas development was 24% lower than for females from undisturbed leks, and that hens from disturbed leks traveled twice as far to nest sites (Lyon 2000). In habitat fragmented by natural gas development, only 26% of hens captured on disturbed leks nested within 1.8 mi of the lek of capture, whereas 91% of hens from undisturbed areas nested within 1.8 mi of the lek of capture. Average distance between nests in consecutive years was 0.37 mi, indicating hens initially shifted nest locations due to disturbance but afterward showed fidelity to new-found nest locations (Lyon and Anderson 2003).

Holloran (2005) found that females strongly avoided nesting in areas of high well density, and there was a 21% decline in the population of nesting females compared to undisturbed females over the 5 years of the study. Females nesting in developed areas had a significantly lower survival rate than female grouse in undeveloped areas. Although nest success rates were higher in developed areas, this increase was not sufficient to overcome the reduced female survival rates, resulting in an overall 21% decline in greater sage-grouse population growth in developed gas fields compared to undeveloped areas. The distance between selected nesting sites and gas field infrastructure shifted between 2000-2003 and 2004, with females selecting nesting habitat farther from active drilling and producing wells in

2004. Population reductions likely resulted from a combination of dispersal away from gas fields and increased mortality rates for birds affected by development. A lag period occurs between the time when female greater sage-grouse are affected by development and when survival probabilities are influenced, suggesting negative fitness consequences for females subjected to natural gas development during the breeding and nesting periods.

In the Manyberries oil field in southeastern Alberta, sage-grouse selected heterogeneous patches of moderate sagebrush cover and avoided anthropogenic edge habitat for nesting (Aldridge and Boyce 2007). Nests were more successful in heterogeneous than anthropogenic edge habitats, but nest success was independent of anthropogenic features. Similarly, broods selected heterogeneous high-productivity habitats with sagebrush (at >0.6 mi^2) while avoiding human developments, cultivated cropland, and high densities of oil wells. Chick mortalities tended to occur in proximity to oil and gas developments and along riparian habitats. Limited source habitats appear to be the main reason for poor nest success (39%) and low chick survival (12%) (Aldridge and Boyce 2007). Risk of chick mortality was 1.5 times higher for each additional well site visible within 0.6 mi of brood-rearing habitat (Aldridge 2005; Aldridge and Boyce 2007).

Recent studies of greater sage-grouse conducted in southwest Wyoming indicated that 64 to 87% of hens nest within 3.0 mi of leks where the hens were bred (Holloran and Anderson 2005; Slater 2003). Therefore, it is possible that some nesting greater sage-grouse (36 to 13%) may experience displacement and/or reduced survival rates. This displacement and/or reduction in survival could be expected to occur for approximately 2-5 years after construction begins, until following generations of greater sage-grouse can occupy other areas. However, these areas are expected to be already occupied by greater sage-grouse, or of lower habitat quality, which may reduce sustainability.

The WMWE project area has been anecdotally shown to be a greater sage-grouse brood-rearing area based on WGFD observations and spring and fall avian surveys conducted in 2008 (TRC 2009b). It is anticipated that greater sage-grouse chicks may experience higher mortalities (1.5 times higher) in this area and extending out by 0.6 mi (Aldridge 2005; Aldridge and Boyce 2007) as turbines will be visible in most of these areas. Reduced survival and decreased recruitment may impact the local population and persistence of historic breeding grounds and seasonal use areas.

Avoidance of winter habitat is also known to occur in relation to oil and gas development and may affect the viability of greater sage-grouse populations. In the Powder River Basin, greater sage-grouse avoided CBNG development during winter at the 2.5 mi^2 scale (Doherty et al. 2008). Greater sage-grouse were 1.3 times less likely to use otherwise suitable winter habitats that had been developed for CBNG at a density of 12 wells/ 2.5 mi^2. Impacts were indiscernible at densities of 1-12 wells within 20 mi^2 of a lek (~1 well/640 acres) (Doherty et al. 2008). Impacts to winter habitat may have a disproportionate effect on regional greater sage-grouse population size and persistence if the species uses a small percentage of available sagebrush habitat in an area (Doherty et al. 2008).

While no winter concentration areas for greater sage-grouse have been identified in or near the WMWE project area, sagebrush habitat provides shelter and food during this time of the year, and habitat selection during the winter is influenced by factors such as snow depth and hardness, topography (elevation, slope, and aspect), and vegetation height and cover (Connelly et al. 2004). Although no greater sage-grouse were encountered during winter preconstruction surveys within the project area (TRC 2008a), it is possible that the WMWE project area is used by greater sage-grouse during the winter operations, and the WMWE Project could displace greater sage-grouse from using winter habitat within the project area.

Greater sage-grouse were recorded within the WMWE project area during spring and fall avian surveys conducted in 2008 (TRC 2009b) and documented in the WNDD (2009). A potential

concern for greater sage-grouse is the potential for collision with the rotating wind turbine blades. Preconstruction avian use surveys conducted at Foote Creek Rim wind energy project located in south-central Wyoming did not document any greater sage-grouse within the project area; however, the survey methodology did not include incidental observations, lek, or winter concentration surveys, which might explain the low use in this study. While the avian use surveys did not document any greater sage-grouse use, greater sage-grouse pellet density surveys did indicate the presence and use of the Foote Creek Rim project area (a range of a low of 0/hectare [ha] in the winter of 1997/1998 to a high of 69/ha in the winter of 1994/1995) (Johnson et al. 2000). Once the wind farm became operational, post-construction mortality surveys were conducted for 3.5 years. During these surveys, no greater sage-grouse were documented as being killed or injured as a result of the operation of the wind turbines (Young et al. 2003). Therefore, while greater sage-grouse use of Foote Creek Rim was assumed to be low, no species mortalities were documented during subsequent post-construction surveys. Information about greater sage-grouse within the WMWE project area was collected during avian surveys conducted in 2008, and for those greater sage-grouse documented as flying, 100% of the observations indicated that the grouse flew within the 0 to 35-m flight height category (i.e., below the rotor-swept area). These birds would not be at risk for collision with wind turbines (i.e., risk index of 0.0) (TRC 2009b). It is also possible that greater sage-grouse could collide with vehicles being operated in association with the Proposed Action. Posted speed limit signs would limit vehicle speeds and reduce the chances of accidental collisions.

It is also possible, but unlikely, that some high flying migrating individual greater sage-grouse might be at an increased risk during the fall if the birds migrate into or through the area at higher altitudes. Although greater sage-grouse are heavy-bodied and require time to gain altitude on short-distance flights (for instance, being flushed by a predator), during long-distance flights, these strong fliers may fly at greater heights and thus may be increasingly susceptible to collision with turbines and blades. Therefore, while possible, it is unlikely that operation of the WMWE Project would result in many greater sage-grouse fatalities.

Approximately 515 acres (3.9%) of privately owned lands in the project area in the northwestern corner occurs along the southern boundary of the South Pass greater sage-grouse core habitat (refer to Figures 3.5 and 4.4). The South Pass core habitat area encompasses approximately 2.5 million acres. It is likely that the portion of core habitat located within the WMWE project area would be of decreased value to greater sage-grouse since this area has three large 345-kV transmission lines that bisect this corner of the core habitat area. Research has indicated that greater sage-grouse prefer areas away from overhead transmission lines because the transmission line structures can serve as hunting perches and nesting locations for raptors (Connelly et al. 2000). In addition, Braun (1998) determined habitat use by greater sage-grouse was impacted by power lines up to a distance of at least 600m. Raptor nest surveys conducted in this area in 2008 (TRC 2008c) have documented two active raptor nests (a red-tailed hawk and common raven) on transmission power line structures located at the northern end of the WMWE project area that could affect the usefulness of this area for core greater sage-grouse habitat (refer to Figure 4.4) (TRC 2009b). In addition, it can also be documented that no greater sage-grouse were observed within the WMWE project area within the greater sage-grouse core area near the three large 345-kV transmission lines during the 2008 winter and spring aerial surveys and during the 2008 21-week long ground-based avian surveys (TRC 2008a, 2008b, 2009b). As a result, the existing 345-kV transmission lines have likely already adversely affected the corner of the core habitat area, thereby limiting its usefulness in protecting important greater sage-grouse habitat. Under the Proposed Action, 12 turbines and associated facilities are proposed in this area, and all 12 turbines and associated facilities would be located on private land. The 12 wind turbines and associated disturbance would result in approximately 24 acres of initial direct disturbance and 5.0 acres of life-of-project disturbance. Based on this analysis, the Proposed Action is expected to add to the existing adverse impacts to this specific portion of the

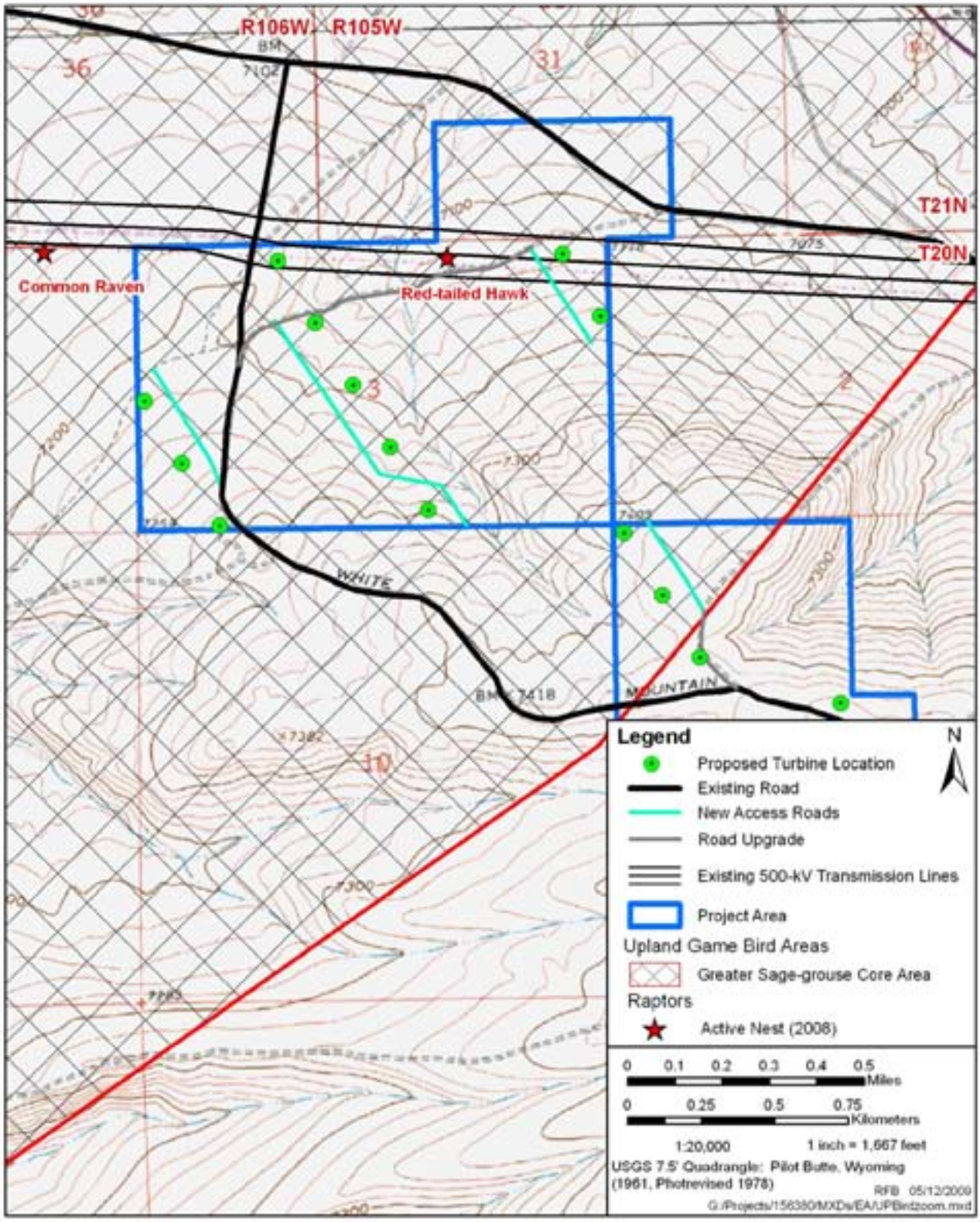

Figure 4.4 Greater Sage-grouse Core Habitat Area, Northeast of WMWE Project Area.

South Pass core habitat area by increasing habitat fragmentation and vertical structures.

Other BLM Sensitive Species. Impacts to other BLM sensitive passerine birds (e.g., not address above or not recorded in the project area), reptiles (e.g., midget faded rattlesnake), and mammal species (e.g., pygmy rabbits, Wyoming pocket gopher) during the O&M phases of the Proposed Action would be the same as discussed for wildlife, including birds, presented in Section 4.12 of this EA.

The O&M phase of the Proposed Action would not have any impacts to BLM sensitive plant species.

4.8.2.3 Decommissioning Phase

During the decommissioning phase, a limited amount of area would be redisturbed by crews removing the project components, and most of these areas would be associated with access roads and the tower and turbine lay down areas at the turbine pads. The removal of revegetated areas would be minimized to the extent possible during decommissioning operations. In addition, ground disturbing activity and the movement of decommissioning personnel and equipment on-site would be limited to the extent possible to the required areas to avoid inadvertent impacts to all wildlife species. No additional impacts to BLM sensitive species (including plant and animal species) during the decommissioning phase are expected beyond those already discussed above, and the risk to BLM sensitive species during the decommissioning phase of this project would be low, and the impact would fall within the range acknowledged in the Wind Energy PEIS (BLM 2005).

4.8.3 Alternative A - Development Only on Privately Owned Lands

No federally listed TEPC species were documented in the project area during the WMWE avian surveys (TRC 2009b), so risk to such species during the construction of the WMWE Project likely would be limited.

Potential direct and indirect impacts to BLM sensitive species under Alternative A would be the same as discussed under the Proposed Action. Implementation of this alternative would involve the construction of 170 wind turbines on privately owned land; therefore, direct impacts to wildlife habitat would include the disturbance of 619 acres of habitat from the construction of the turbine pads, the access roads, the substation, and the collector lines. Most of the disturbed area would be reclaimed and revegetated, with 115 acres (less than 1.0% of the project area) remaining occupied by roads, turbines, and facilities for the life of the project. The potential impacts to BLM sensitive species habitat would likely be reduced by 30%, compared with those described under the Proposed Action. Teton would also implement the same mitigation measures to minimize impacts to these species.

The short- and long-term impacts to BLM sensitive species and their habitat under Alternative A would be minimal.

4.8.4 No Action Alternatives

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

4.8.5 Residual Impacts

There would be no impacts to federally listed species. However, under Proposed Action, it is possible that there could be some loss of BLM sensitive species or their habitat within the WMWE project area. Although some individual mortality is possible, operation of the WMWE Project under Alternative A is not expected to impact local population numbers for BLM sensitive species, and, in general, mortality rates are expected to be relatively low.

4.8.6 Cumulative Impacts

All developmental activities would comply with the *Endangered Species Act*, which requires avoidance or mitigation for impacts to TEPC

species, so no impacts would occur. Therefore, there would be no cumulative impacts to federally listed TEPC species.

In order to assess potential cumulative impacts to select BLM sensitive species, various IAAs have been established to evaluate the Proposed Action, and quantitative data for the various IAAs are summarized in Table 4.11.

Cumulative impacts to BLM sensitive species would be similar to those described under the Proposed Action. Standard mitigation measures presented in the Proposed Action would also reduce potential short- and long-term impacts to BLM sensitive species during the construction, O&M, and decommissioning phases of the project. In addition, the Proposed Action would not cause any BLM sensitive species to be petitioned for listing under the *Endangered Species Act*.

Implementation of the various mitigation measures to limit disturbance and encourage prompt reclamation of disturbance and other appropriate mitigation measures (including seasonal restrictions) presented in the Proposed Action would minimize impacts to TEPC species and BLM sensitive species. Cumulative impacts to populations of these species within the IAA are expected to be minimal. Therefore, Proposed Action and RFFAs are expected to have only minimal adverse impacts on population numbers and would be expected to have limited cumulative impacts.

Table 4.11 Cumulative Impacts Due to Direct Disturbance to BLM Sensitive Species.

Resource	Description	Total Area (acres)	Amount of Current Disturbance (acre and %)	Amount of Disturbance Related to RFFA (Including Proposed Action) (acre and %)	Total Amount of Current and RFFA Disturbance (acre and %)
Pygmy rabbits	WMWE Project area plus 2.17-mi buffer	66,189	5,201 (7.86%)	441 (0.66%)	5,642 (8.52%)
Pocket gopher	WMWE Project area plus 0.22-mi buffer	18,893	573 (3.03%)	281 (1.49%)	854 (4.52%)
Greater sage-grouse	Area north of Bitter Creek, east of the Green River, south of the Big Sandy River to Farson, then east to Killpecker Sand Dunes	545,351	10,508 (1.93%)	976 (0.18%)	11,484 (2.11%)
Midget faded rattlesnake	WMWE Project area plus 1.3-mi buffer	44,235	2,061 (4.66%)	356 (0.80%)	2,417 (5.46%)

4.9 VEGETATION (INCLUDING WETLANDS AND INVASIVE SPECIES)

4.9.1 Proposed Action

4.9.1.1 Construction Phase

Direct impacts to vegetation would include initial surface disturbance of 865 acres during construction. These impacts include disturbance and/or removal of native vegetation and grading and compaction of soil. Direct impacts to vegetation from clearing and grading for new roads, wind turbine pads and crane pads, the substation, and O&M facilities would be permanent because these areas would be occupied by the project facilities. Impacts to vegetation from installation of the electrical collector system between the turbines would be temporary.

Approximately 841 acres (97%) of the 866 acres of initial disturbance would occur in Wyoming big sagebrush vegetation. The width of the access roads and turbine pad footprints would be reduced and reclaimed following construction. In areas where potential construction impacts to vegetative resources are possible, BMPs from the SWPPP would be implemented. Most of the temporarily disturbed areas would be reclaimed and revegetated upon the completion of the construction phase of the project, with 162 acres (approximately 1.4% of the project area) of mostly preconstruction Wyoming big sagebrush habitat remaining occupied by roads, turbine foundations, and facilities for the life of the project. Since the project footprint would be relatively small compared with the overall size of the project area, these long-term direct impacts would be minimal.

A review of digital NWI information (USFWS 2003) indicates that the occurrence of a linear palustrine seasonally flooded wetland (PEMC) and two intermittent streams (R4SBA) located in the project area could potentially support seasonal riparian areas (refer to Figure 3.7). In addition, NWI data indicate the occurrence of several small playa areas (refer to Figure 3.7) scattered throughout the project area. The turbines, substation, and O&M project facilities would not be located in any NWI-identified wetland or riparian areas. Minimization of impacts to any wetland or riparian area would be accomplished by proper facility siting (i.e., avoidance of wetlands and riparian areas), implementation of SWPPP, and ensuring proper reclamation and revegetation. In addition, project facilities would be sited following procedures listed within the BLM Green River Management Plan (1997) regarding riparian areas and ephemeral channels (i.e., 100 ft from the edge of major drainages). To reduce avian impacts, this condition has been modified to limit placement of turbines within 50 m (164 ft) of major drainages. Therefore, the Proposed Action would have minimal impacts to wetlands and riparian areas.

Few noxious weeds or introduced species occur on the site; however, clearing, grading, and excavation activities associated with construction of the project creates potential new habitat for invasive nonnative species. Weed infestations could constitute an adverse effect, and the same is true where vegetation is crushed, and similar actions degrade existing native habitat. The effects of these impacts are usually permanent or require several years to heal in arid environments like that found in the project area. Adjacent undisturbed areas are indirectly impacted by the invasion of weed species due to proximity. Invasive nonnative species can also be introduced through the use of reclamation materials such as seed and mulch that are not certified weed free.

The control of invasive nonnative species is difficult, and some weeds can enter the project area on equipment and vehicles, while others may spread from distant areas by spores blowing onto the site in the wind. As discussed in Chapter 2.0 of this EA, Teton would design and build the project so that the least amount of ground disturbance occurs, thereby exposing the least amount of soil possible. Large construction equipment that travel off project roads will be cleaned prior to entering the site. Teton also would work with the BLM and the Sweetwater County Board of Weed and Pest Control to establish a weed control program (e.g., washing construction vehicles before going on-site, avoiding weedy areas once on-site, and controlling weeds in accordance with landowner wishes or

easement agreements) for the project. This may entail spot spraying with an approved herbicide along disturbed areas for invasive nonnative species. Teton would also use only certified weed free reclamation materials such as seeds and mulch. With implementation of a weed control program, impacts from invasive species are anticipated to be minimal.

4.9.1.2 O&M Phase

No additional impacts beyond those discussed under construction impacts to vegetation are expected to occur during the O&M phase of this project. O&M personnel would continue to implement appropriate weed control efforts in cooperation with the BLM and the Sweetwater County Board of Weed and Pest Control.

4.9.1.3 Decommissioning Phase

No additional impacts beyond those discussed under construction phase are expected to occur during the decommissioning phase of this project. With implementation of the project mitigation measures, including vehicle washing, the reclamation plan, and weed control plan, impacts to vegetation after the decommissioning phase of the project is complete is expected to be minimal.

4.9.2 Alternative A - Development Only on Privately Owned Lands

4.9.2.1 Construction Phase

Potential direct and indirect impacts to vegetation resources under the construction phase of Alternative A would be similar to the type of impacts described under the Proposed Action. Implementation of this alternative would involve the construction of 170 wind turbines on privately owned land; therefore, direct impacts to vegetation resources would include the initial disturbance of 619 acres of vegetation from the excavation of the turbine pads, the substation foundations, and collector lines. Most of the temporary disturbed areas would be reclaimed and revegetated, with 116 acres (less than 1.0% of the project area) remaining occupied by roads, turbine foundations, and facilities for the life of the project. The potential impact to vegetation would be reduced by 30%, compared with those described under the Proposed Action.

4.9.2.2 O&M Phase

Under Alternative A, no additional impacts beyond those discussed under the O&M phase of the Proposed Action are expected to occur.

4.9.2.3 Decommissioning Phase

Under Alternative A, no additional impacts beyond those discussed under the decommissioning phase of the Proposed Action are expected to occur.

4.9.3 No Action Alternatives

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

4.9.4 Residual Impacts

Implementation of the Proposed Action would result in the temporary but unavoidable removal of vegetation from 865 acres. Under the Proposed Action, approximately 163 acres would be disturbed for the life of the project, but all disturbed areas would be permanently reclaimed during the decommissioning phase of the project. There would also be the potential for an unavoidable increase in the population of invasive nonnative plant species within the project area.

4.9.5 Cumulative Impacts

Based on the disturbance calculations presented in Chapter 3.0, approximately 19,954 acres are currently disturbed within the IAA. This represents 7.43% of the total area within the cumulative IAA. RFFA (including the Proposed Action) within the IAA would result in an additional 1,224 acres of disturbance--163 acres of disturbance due to the Proposed Action and 1,061 acres from other RFFAs. This represents

21,178 acres of the total within the IAA or 7.84% based on the total disturbance due to past, present, and RFFAs.

Vegetation resources would be protected from long-term impacts by implementation of temporary and permanent reclamation operations, the invasive species control plan, and wetland/riparian mitigation measures included in the Proposed Action, and the vegetation would eventually (within 10-20 years) be capable of supporting predisturbance land uses once reclamation operations have been completed and vegetation becomes established. Nonnative invasive species would be controlled, and wetland and riparian areas would be protected. There are a few proposed linear facilities within the IAA; however, the facilities would be expected to contribute limited disturbance, and all of the disturbed lands would be revegetated. In addition, all RFFAs would also comply with the same requirements to control nonnative species and protect wetland and riparian areas.

4.10 VISUAL RESOURCES

4.10.1 Proposed Action

It is widely acknowledged that aesthetic impacts are among the most important impacts associated with wind energy development and operations. However, it is difficult to determine the relative significance of aesthetic impacts. Visual impacts are intangible, highly subjective, and dynamic, and because they cannot be completely avoided, they are one of the greatest sources of objection to wind energy development projects. Because of the subjective and experiential nature of visual resources, the human response to those changes and the importance of the impacts cannot be quantified, even though the visual impact of a proposed development can be described specifically (BLM 2005).

Based on information presented in Chapter 3.0 of this EA, approximately 85% of the WMWE project area is located in a BLM Class IV VRM area, and the remaining 15% is located in a BLM Class III VRM area; although, BLM visual classifications do not apply to private or state-owned lands. The Proposed Action would not impact any important or sensitive viewsheds (i.e., VRM Class I or II areas). The primary impact to visual resources due to the Proposed Action would be the installation and operation of up to 240 wind turbines. The construction of the access roads, substation, collection lines, and other support facilities would likely not be visible to most observers since White Mountain slopes off to the west and these areas would not be visible from the Rock Springs/Green River area.

Under the Proposed Action, and as a requirement of FFA, the wind turbines would be white with no daytime lighting and would change the aesthetics of the landscape with the addition of tall towers and rotating blades, and whether the effect is deemed a beneficial or adverse effect depends on the perspective and sensitivity of the viewer. The WMWE Project would be more visible than any other manmade structure in the immediate project area because the wind turbines would be located on White Mountain, a highly visible topographic feature. Other man-made features are visible along the face of White Mountain, including roads, microwave reflector and commercial communication towers, and the 230-kV power line.

In addition, night-time lighting on 84 of the 240 wind turbines would be required by the FAA, who approved the specific location and method of lighting to be used on this project. Because the FAA requires wind turbines located throughout the WMWE project area to be lit, an estimated 31 of the wind turbines visible along the 13-mi length of White Mountain could be lighted and visible at night.

The WMWE Project would be highly visible because of the introduction of turbines into a rural or natural landscape that has few other comparable structures. Photosimulations have been prepared and are presented in Appendix C. The photosimulations were developed based on the dimensions of a comparably sized wind turbine that would be used in the WMWE Project and the proposed wind turbine locations in UTM coordinates. These photosimulations allow the viewer to see the landscape with and without the

proposed wind turbines. These photosimulations illustrate the visual resource contrast elements from the wind energy project on the landscape. Visual evidence of wind turbines cannot be avoided, reduced, or concealed, owing to their color, size, and exposed location; therefore, effective mitigation would be limited (BLM 2005). However, Teton, in cooperation with BLM, has developed other design features to mitigate potential visual impacts. These design features are presented in Table 4.12 and comply with the visual resource mitigation measures included in the Wind Energy PEIS (BLM 2005).

In addition to the VRM class and the photosimulations, the BLM VRM system also uses a visual contrast rating analysis to evaluate visual impacts of the proposed project and to develop mitigation measures to reduce potential visual impacts. The locations where the visual contrast rating analyses are conducted are referred to as Key Observation Points (KOPs). The degree to which a proposed activity would affect visual quality depends on the contrast between the existing landscape and the proposed development. Contrast is measured by comparing the basic elements of form, line, color, and texture of the existing landscape with the elements introduced by the proposed project, and the degree of contrast are listed as either none, weak, moderate, or strong. Visual contrast ratings were computed for eight KOPs located between 1.0 and 17.0 mi from the WMWE project area, and the results of these analyses are presented in Table C.1 in Appendix C.

As expected, the degree of contrast is directly related to the distance the viewer is from the proposed project feature (i.e., the wind turbines). Those sites that are located closer to the WMWE project area tended to have a strong contrast while those sites located further from the project area have a weak degree of contrast.

The presence of the wind turbines under the Proposed Action would change the aesthetics of the landscape with the addition of tall towers and rotating blades. Whether the effect is deemed a beneficial or adverse effect depends on the perspective and sensitivity of the viewer (BLM 2005). The FAA has determined no hazard to air navigation based on the use of white wind turbines and towers. To reduce the contrast created by the color of the structures, it has been recommended that the color of the wind turbines be changed from white to light gray, if possible. However, according to FAA Advisory Circular AC 70/7460-1K (Chapter 13, 131F), use of gray turbines appears to be significantly less effective in providing daytime warning and would require daytime and nighttime lighting of all 240 wind turbines with medium intensity white strobes, which may be more visually intrusive than white towers with no daytime lighting (personal communication, August 12, 2009, with Michael Blaich, FAA, Fort Worth, Texas). Therefore, the use of white wind turbines with no daytime lighting would have reduced visual impacts compared to light gray wind turbines equipped with daytime lighting of all 240 wind turbines (personal communication, August 12, 2009, with Michael Blaich, FAA, Fort Worth, Texas). Visual impacts would not exceed those outlined in the Wind Energy PEIS (BLM 2005).

The WMWE Project would be constructed over a 3- to 4-year period, and the O&M phase would last approximately 20 years, after which time the wind turbines would be decommissioned and removed from the site. The decommissioning phase would eliminate most of the visual impacts of the WMWE Project.

4.10.2 Alternative A - Development Only on Privately Owned Lands

Potential direct and indirect impacts to visual resources under Alternative A would generally be the same as discussed under the Proposed Action, except this alternative would involve the construction of 170 wind turbines instead of the 240 planned under the Proposed Action. There would be a 30% reduction in the number of wind turbines, and some of the visual impacts would also likely be reduced depending on the location of the observer. However, many of the wind turbines would also likely still be visible from the KOPs discussed, since the most visible wind turbines would be located on private or state-owned lands nearest the edge of White Mountain, and there

Table 4.12 Design Features to Minimize Impacts to Visual Resources.

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

- The design of the WMWE Project would provide visual order and unity among clusters of turbines (visual units) to avoid visual disruptions and perceived "disorder, disarray, or clutter" (BLM 2005)
- To the extent possible given the terrain of a site, Teton would create clusters or groupings of wind turbines when placed in large numbers; avoid a cluttering effect by separating otherwise overly long lines of turbines or large arrays; and insert breaks or open zones to create distinct visual units or groups of turbines.
- Teton would create visual uniformity in the shape, color, and size of rotor blades, nacelles, and towers.
- Teton would use tubular towers. Tubular towers present a simpler profile and less complex surface characteristics and reflective/shading properties.
- Components of the wind turbines would be in proper proportion to one another. Nacelles and towers would be planned to form an aesthetic unit and would be combined with particular sizes and shapes in mind to achieve an aesthetic balance between the rotor, nacelle, and tower.
- Color selection for turbines would be applied uniformly to tower, nacelle, and rotor in accordance with FAA requirements.
- The wind turbines would use nonreflective coatings to reduce reflection and glare.
- The O&M building would be painted before or immediately after installation with a green shale color.
- Uncoated galvanized metallic surfaces would be avoided whenever possible because they would create a stronger visual contrast, particularly as they oxidize and darken.
- Commercial messages on turbines and towers would be prohibited.
- The site design would be integrated with the existing landscape by using as many of the existing roads as possible.
- The operator would bury power collection cables or lines on the site in a manner that minimizes additional surface disturbance.
- Site design would minimize security lights, and any security lights located at the O&M building would be turned off except when activated by motion detectors.
- Teton would minimize ground disturbance and control erosion by avoiding steep slopes and by minimizing the amount of construction and ground clearing needed for roads, staging areas, and turbine pads.
- Dust suppression techniques would be employed where and when required to minimize impacts of vehicular and pedestrian traffic, construction, and wind on exposed surface soils.
- Disturbed areas would be regraded as soon as possible to their original contour and revegetated immediately after, or as contemporaneously as possible with construction. Teton would be prompt to limit erosion and to accelerate restoring the preconstruction color and texture of the landscape.
- Teton would maintained the WMWE Project during operation as inoperative or incomplete turbines cause the misperception to viewers that "wind power does not work" or that it is unreliable. Inoperative turbines would be completely repaired, replaced, or removed. Except during specific maintenance operations, nacelle covers and rotor nose cones would always be in place and undamaged.

Table 4.12 (Continued)

- The WMWE Project would evidence environmental care, which would also reinforce the expectation and impression of good management for benign or clean power. Nacelles and towers would also be kept clean to remove any spilled or leaking fluids and the dirt and dust that would accumulate.
- Facilities would be kept clean of debris, "fugitive" trash or waste, and graffiti.
- Scrap heaps and material dumps would be prohibited and prevented.
- The material stored at the O&M building would be screened and kept to an absolute minimum. Any surplus, broken, or disused materials and equipment would be maintained in an orderly manner.
- Teton would prepare a decommissioning plan, and it would include the removal of all turbines and ancillary structures and reclamation and revegetation of the site.

would be a proportional level of traffic over the life of the project compared to the Proposed Action. Similar mitigation measures presented in the Proposed Action would be implemented under Alternative A.

4.10.3 No Action Alternatives

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

4.10.4 Residual Impacts

Residual impacts to visual resources under the Proposed Action would include the short-term disturbance of 866 acres. Additional residual impacts would include the construction and operation of 240 wind turbines on White Mountain and the perceived visual impacts. At the end of the life of the project, the wind turbines would be decommissioned and removed from the site.

4.10.5 Cumulative Impacts

The IAA for visual resources is the WMWE project area plus a 20-mi buffer. Based on the disturbance calculations presented in Chapter 3.0, approximately 38,289 acres are currently disturbed within the IAA. This represents 3.26% of the total area within the IAA. RFFA (including the Proposed Action) within the IAA would result in an additional 2,035 acres of disturbance--189 acres of life-of-project disturbance due to the Proposed Action and 1,846 acres from other RFFAs. This represents 40,324 acres of the total with the IAA or 3.43% based on the total disturbance due to past, present, and RFFAs.

In addition to the existing visual intrusions in this area and the Proposed Action, the RFFAs include two additional commercial wind energy projects (one north and one south of the Proposed Action). Both of these additional wind energy projects would be located in BLM VRM Class III and IV areas. Depending on the specific number, location, color, and size of the proposed wind turbines, these projects could result in cumulative visual intrusions on the landscape. As expected, the degree of contrast and visual perception would be directly related to the number, location, size, and color of the wind turbines and distance the viewer is from specific project features (i.e., the wind turbines). Those sites that are located closer to the viewer would tend to have a stronger contrast while those sites located farther from the various project areas would have a weaker degree of contrast and would be less noticeable.

Cumulative impacts to visual resources would result from the addition of two wind energy projects and other power line projects within the IAA (identified as RFFAs), when combined with the Proposed Action, would result in increased

localized visual impacts. However, these past, present, and RFFAs would not impact any important or sensitive BLM viewsheds (i.e., VRM Class I or II areas). Impacts would not exceed those outlined in the Wind Energy PEIS (BLM 2005).

4.11 WILD HORSES

4.11.1 Proposed Action

Impacts during the construction and O&M phase of the Proposed Action for wild horses would be similar to those impacts to big game species. These impacts would include loss of foraging habitat, displacement, direct mortality due to collisions with vehicles, displacement from portions of the project area due to the human presence, noise, and loss of habitat by alteration and/or fragmentation.

Initially, there would be 865 acres of disturbance (6.6% of the project area), and approximately 162 acres (1.2% of the project area) would be unavailable over the life of the project. Since the overall footprint of the project would be relatively small compared to the size of the project area, loss of forage for wild horses would be minimal. However, the existing habitat within the footprint of the project, including wind turbines, access roads, and support facilities, would be disturbed and some disruption of grazing by wild horses due to habitat fragmentation might occur. However, wild horses appear to habituate relatively quickly to the presence of humans, so habitat fragmentation would likely not result in widespread displacement of horses from the project area. Reclamation and revegetation of temporarily disturbed areas would reduce the extent of habitat losses, but these effects would likely persist for 2 to 5 years after construction until vegetation is re-established. Since the number of horses in the White Mountain WHHMA is at the appropriate herd objectives, the habitat alteration effects would likely cause temporary small-scale reduction or temporary displacement of the wild horses found in the White Mountain project area. Teton would also post speed limit signs and inform employees that wild horses occur in the project area. These mitigation measures would minimize direct impacts to wild horses. Therefore, the Proposed Action would not be expected to have any long-term impacts on the population level of wild horses in the White Mountain WHHMA.

In order to manage wild horses in the White Mountain WHHMA, they are occasionally rounded up by the BLM using a helicopter. The presence of cranes and wind turbines during the life of the project would affect the ability of the BLM to roundup wild horses from within the WMWE project area. Vehicle or horseback roundups could still continue within the project area, and the nBLM and Teton would coordinate access and shutting down wind turbines for 4-6 hours over 2 days when roundups and surveys would be conducted.

Impacts to wild horses during the decommissioning phase of the WMWE Project would be similar to impacts associated with construction, but of reduced magnitude. Noise and visual disturbance to wild horses may temporarily increase during decommissioning and site restoration relative to conditions during project operation. Additional habitat loss would be negligible, and wild horse mortality due to vehicle collisions would be much lower than during construction because of the reduced number of personnel. Disturbance to wild horse habitats and wild horses during decommissioning of the WMWE project facilities are expected to be localized, short-term, and minor. The number of wild horses and amount of habitat in the project area would eventually (10-20 years) return to preconstruction levels following site restoration, and wild horse habitat would be fully restored after decommissioning of the WMWE project facilities.

Impacts to wild horses would be minimized where practicable, and the implementation of design features during the life of the project, including the posting of speed limit signs to reduce the likelihood of wild horse/vehicle collisions. Teton personnel would be informed that wild horses occur in the project area, that they are not allowed to haze or harass wild horses, and that they should minimize any direct disturbance to the wild horses

whenever possible. Should an accident occur, the BLM Authorized Officer would be notified immediately.

4.11.2 Alternative A - Development Only on Privately Owned Lands

Under Alternative A, no additional impacts to wild horses beyond those discussed under the Proposed Action are expected to occur during the construction, O&M, and decommissioning phases of this project. Under Alternative A, the project would initially disturb 619 acres of rangeland in the White Mountain WHHMA. This disturbance would be reduced to 116 acres during the O&M phase of the project, and all disturbed lands would be revegetated during the decommissioning phase. Total disturbance and related impacts to wild horses would be expected to be reduced by 30% compared to the Proposed Action.

Impacts to wild horses would be minimized where practicable, and the implementation of design features during all phases of Alternative A, including the posting of speed limit signs, would reduce the likelihood of wild horse/ vehicle collisions. Teton personnel would be informed that wild horses occur in the project area. They are not allowed to haze or harass wild horses, and they should minimize any direct disturbance to the wild horses whenever possible. Should an accident occur, the BLM Authorized Officer would be notified immediately. The BLM and Teton would coordinate access and shutting down wind turbines for 4-6 hours over 2 days when roundup and surveys would be conducted.

4.11.3 Residual Impacts

Residual impacts to wild horses under the Proposed Action would include the short-term disturbance of 865 acres and life-of-project disturbance of 189 acres of wild horse habitat within the WMWE project area. There would also be a minor increased risk of collisions with wild horses and vehicles. Residual impacts would be mitigated by implementation of the appropriate design features discussed in the Proposed Action.

4.11.4 Cumulative Impacts

Based on the disturbance calculations presented in Chapter 3.0, approximately 18,013 acres are currently disturbed within the IAA. This represents 9.13% of the total area within the IAA. RFFAs (including the Proposed Action) within the IAA would result in an additional 824 acres of disturbance--189 acres of total life-of-project disturbance due to existing activities and 635 acres of disturbance due to RFFAs. This represents 18,837 of the total acres with the IAA or 9.53% based on the total disturbance due to existing activities, the Proposed Action, and RFFAs.

Cumulative impacts to wild horses would be similar to those discussed under the Proposed Action (e.g., habitat disturbance and increased risk of wild horse/vehicle collisions), and there are no RFFAs that, when combined with the Proposed Action, would result in anything but minor impacts to wild horses.

4.12 WILDLIFE

The BLM *Wind Energy Programmatic Environmental Impact Statement* describes potential wildlife impacts associated with wind energy development in detail (BLM 2005). *Impacts of Wind Energy Facilities on Wildlife and Wildlife Habitat* (Arnett et al. 2007) and *Environmental Impacts of Wind-Energy Projects* (National Research Council 2007) also provide an overview of potential direct and indirect impacts to wildlife from wind energy facilities. General wildlife data for Wyoming and specifically for the WMWE project area also illustrate potential areas of wildlife conflict (refer to Figure 1.2). The principal impacts to wildlife associated with construction and operation of the facilities would occur from: 1) habitat loss, 2) disturbance and disruption effects on wildlife behavior, and 3) potential injury and mortality of wildlife associated with collisions with turbines and other facilities.

4.12.1 Proposed Action

4.12.1.1 Construction Phase

Wildlife (Including Big Game)

Impacts to wildlife species (including big game) during the construction phase of the Proposed Action could include direct mortality due to collisions with vehicles; loss of foraging, nesting, brood-rearing, and winter habitats; displacement from portions of the project area due to human presence, fugitive dust, or noise; and loss of habitat by alteration and/or fragmentation (BLM 2005; Arnett et al. 2007; and National Research Council 2007). Construction location and timing may also affect migratory and other behavioral activities of some species of wildlife and big game. It is also possible that big game could be struck by construction vehicles; however, posted speed limit signs would be installed on project roads in cooperation with Sweetwater County officials, and mortalities due to vehicular collisions should be minimal. Initial direct removal of wildlife habitat would include 866 acres (6.6% of the project area), and approximately 189 acres of wildlife habitat (1.4% of the project area) would be unavailable over the life of the project.

Since the overall direct footprint of the project would be small compared to the size of the project area (6.6%), loss of forage would be minimal. However, the existing habitat within the footprint of the project, including wind turbines, access roads, and support facilities, would be disturbed, and habitat fragmentation would increase. To minimize habitat fragmentation, Teton would upgrade as many of the existing access and two-track roads as possible. Reclamation and initial revegetation efforts of the temporarily disturbed areas would reduce the extent of habitat loss, but these effects would likely persist for 2 to 5 years after construction until revegetation of grasses and forbs is established. Sagebrush would take longer to become re-established (20 years). The Wyoming big sagebrush vegetation habitat found within the WMWE project area is common in the area, and large continuous tracts of similar habitats occur adjacent to the project area. However, the sagebrush ecosystem is one of the fastest declining habitat types (Knick et al. 2003). The effects of habitat alteration on big game due to construction of wind energy developments are mostly unknown. However, a recent study regarding interactions of transplanted elk populations during the construction and operations phase of a wind facility found no evidence that construction or operating activities had any significant impacts on elk use of the surrounding area (Walter et al. 2004). However, based on responses of mule deer to natural gas development in Wyoming, it is likely that some reduction in use and/or displacement of local big game species could occur (Sawyer et al. 2009). At this time, long-term effects cannot be predicted. Studies are being initiated to assess the impact of wind development on big game found in Wyoming.

For pronghorn antelope, approximately 12,144 acres (92%) of the project area occurs in habitat the WGFD has designated as yearlong habitat, and 1,021 acres (8%) of the proposed project area occurs in habitat the WGFD has designated as crucial winter/yearlong antelope range and is located near the eastern ridge of the project boundary and the rim of White Mountain (refer to Figure 3.10). In order to minimize potential impacts to pronghorn antelope in crucial winter ranges, Teton would comply with seasonal restrictions and would not conduct any project-related activities within antelope crucial/ yearlong range from November 15 to April 30. However, Teton may request an exception from the seasonal restriction stipulation from the BLM or the landowner, who would evaluate the request on a case-by-case basis. This seasonal mitigation measure would minimize impacts to antelope on the crucial winter/yearlong range located within the WMWE project area during the construction period.

For mule deer, approximately 12,028 acres (91%) of the proposed project area occurs in habitat the WGFD has designated as yearlong mule deer range, and 8% is designated as winter yearlong. The remaining 108 acres (1%) located in the northwest corner of the project area is designated as “out” under the WGFD habitat designations, meaning that this area is not part of any herd unit;

this area does not contain enough animals to be important habitat or the habitats are of limited importance to this species (WGFD 2006) (refer to Figure 3.11). No mule deer crucial winter range or parturition areas occur within the proposed project area. Therefore, during construction operations, the Proposed Project is not expected to have any adverse impacts to important mule deer ranges.

For elk, approximately 11,559 acres (88%) of the project area occurs in habitat the WGFD has designated as spring/summer/fall habitat, and 1,097 acres (8%) of the proposed project area occurs in habitat the WGFD has designated as winter/yearlong elk range. Approximately 509 acres (4%) of the western project area intersects the boundary of habitat designated as crucial winter/yearlong range (WGFD 2006) (refer to Figure 3.12). An elk parturition area is located 0.5 to 2.0 mi west of the project boundary. In order to minimize potential impacts to elk in crucial winter ranges, Teton would comply with seasonal restrictions and would not conduct any project-related activities within elk crucial/ yearlong range from November 15 to April 30. However, Teton may request an exception from the seasonal restriction stipulation from the BLM or the landowner, who would evaluate the request on a case-by-case basis. This seasonal mitigation measure would minimize impacts to elk on the crucial/yearlong ranges located within the WMWE project area during the construction period. The WMWE project area is approximately 0.5 mi away from the nearest elk parturition area, and the Proposed Action is not expected to impact elk parturition areas.

Construction noise would also be a potential impact to wildlife in the WMWE project area. Potential noise sources during construction could include heavy trucks and equipment operation, and human presence during construction activities are likely to temporarily displace wildlife species that may be present within or near construction areas. The duration and distance an animal is displaced are dependent on the individual species, and an individual's response to disturbance may change over time (BLM 2005; Arnett et al. 2005; National Research Council 2007). The construction of the WMWE Project could affect local wildlife by disturbing normal behavioral activities such as foraging and mating. Wildlife may avoid foraging and mating near the active construction areas or may vacate the active construction areas. Wildlife may temporarily or permanently abandon construction area habitats and adjacent habitats (BLM 2005; National Research Council 2007).

Direct impacts from mortality or injury to smaller less-mobile species (e.g., reptiles, small mammals) could occur during construction if those species are present. These impacts are expected to be low and of short duration (BLM 2005; National Research Council 2007).

Assuming appropriate design features are implemented, erosion and sedimentation, contaminant exposure, and fugitive dust from construction of the WMWE facility would have minimal impacts on wildlife. Surface disturbance could increase the introduction and establishment of invasive and exotic vegetation. Establishment of such vegetation could reduce habitat quality and alter the biotic community (BLM 2005; National Research Council 2007). Because there are no perennial waters in the project area and water erosion and sedimentation would be avoided through the implementation of appropriate protective measures (i.e., the SWPPP), impacts to wildlife from a decrease in water quality would be minor. Fugitive dust would also be minimized through the implementation of appropriate dust abatement measures, and impacts to wildlife would be minor. Contaminants within the project area would be contained, and any potential impacts to wildlife from contaminants would be short-term, localized, and minimized by implementation of appropriate measures (i.e., SPCCP). Introduction of invasive vegetation has the potential to reduce habitat quality and locally affect wildlife occurrence and abundance. These potential impacts would be minimized through the implementation of appropriate design features to manage nonnative invasive species as outlined in Chapter 2.0.

Short-term ground disturbance impacts to small wildlife species (e.g., pocket gopher or burrowing rodents) would result from direct disruption of

soils and vegetation, as well as from the presence of humans and vehicles in the construction areas. Most of these wildlife species would likely move away from the construction activities to undeveloped areas located outside of the disturbed area. However, some species such as burrowing rodents would be vulnerable to mortality from the physical disruption of soils and vegetation or displacement. These short-term ground disturbance impacts would include temporary loss of 866 acres of primarily Wyoming big sagebrush habitat. Habitat disturbance would include a series of string corridors consisting of tower assembly areas and pads (160 x 200 ft), the construction or upgrading of access roads and the construction of the substation area, staging area, O&M building area, and concrete batch plant area.

Impacts include the life-of-project loss of 163 acres of Wyoming big sagebrush habitat and habitat fragmentation due to the presence of the access roads, turbine strings, and new facilities, as well as regular disturbance from humans during periodic maintenance. There would be a permanent loss of 9 acres of burrowing rodent habitat from below grade concrete pads used to support the turbines.

Bats

The construction phase of the Proposed Action is expected to have minimal impacts on resident or migrant bat species that may occur in the WMWE project area. The primary impact to bats during the construction phase is from collision-related mortality with the turbines prior to operation or into towers and/or guide wires (BLM 2005; National Research Council 2007). Since bats are not known to roost in the area, impacts to bats during the construction phase are expected to be low (TRC 2008d). In addition, the WMWE project area does not contain topographic features likely to funnel or provide roosting areas for migrating bats, and the project area lacks large tracts of forest cover, open water, or other suitable foraging areas. Based on the topography of the WMWE project area, it is expected that a majority of bat mortalities during the construction phase of the project would occur as individuals migrate through the area. While it is possible that bats could fly into construction equipment and the turbines prior to operation, it is anticipated that bat mortality would be minimal during the construction phase of the project. While not documented as a proven mitigation measure, Teton would avoid siting wind turbines within 50 m (164 ft) of large drainages within the project area.

Raptors and Other Migratory Birds

Impacts to birds during the construction phase would be similar to those discussed for wildlife habitat loss and fragmentation due to vegetation disturbance, human presence, and noise. Additional impacts during the construction phase to raptors and other birds may be collisions with construction vehicles, turbines, met towers, and substation structures (BLM 2005; National Research Council 2007; Arnett et al. 2007).

The *Migratory Bird Treaty Act* provides protection to most PSBs found in or migrating through the project area. Impacts to migratory species could result from the removal of vegetation (clearing, etc.) during site preparation or from inadvertent compaction of vegetation. The removal of natural vegetation (grassland and shrub communities) would be minimized to the extent possible during construction. In addition, the movement of construction personnel and equipment on-site would be limited to the extent possible to the construction areas to avoid inadvertent impacts to all wildlife species.

Raptors could be impacted as a result of construction-related disturbance during the nesting season. The BLM has established seasonal and no surface occupancy restriction areas that Teton would comply with according to BLM policy (BLM 1997). Additionally, Teton has committed to adopting a 50-m (164-ft) minimum setback from the ridgeline of White Mountain, as well as the edge of large drainages to further reduce impacts to avian species. Table 2.9 lists the seasonal restriction areas, as well as the no surface occupancy buffers, and Teton would not place any wind turbines within these no surface occupancy buffer areas. In addition, to reduce the risk of electrocution, all electrical systems and

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

4.12.1.2 O&M Phase

Wildlife (Including Big Game)

Impacts to wildlife (including big game) during the O&M phase of the WMWE Project would result from the loss of foraging habitat, avoidance of the project area due to vehicle traffic and project related noise, and increased wildfire potential. During the O&M phase, turbine assembly areas would be reduced and revegetated to an 80 x 80-ft pad area, and road widths would be reduced and revegetated from 54 ft to approximately 26 ft. Trenches for collection and communications lines would be backfilled and revegetated. These temporarily disturbed areas would be primarily located adjacent to roads that would be utilized by O&M personnel. Temporary disturbance areas would be reclaimed and revegetated and allowed to return to its previous use as wildlife habitat. The timing of seeding operations would typically occur during the fall, but some reseeding efforts may occur during the spring. However, approximately 189 acres of wildlife habitat would be occupied by the WMWE facility during project operation. The predominant habitat type affected by operation on the WMWE facility is the Wyoming big sagebrush vegetation community. This habitat is common in the area, and large continuous tracts of similar habitats occur adjacent to the project area.

The primary noise-generating activities associated with routine O&M operations include pickup trucks and maintenance equipment noise and wind turbine noise. Truck and maintenance equipment noise is expected to be minor and periodic and associated with vehicle traffic on established project roads (as described in Chapter 2.0). O&M activity (i.e., maintenance operations) may disturb and/or displace some wildlife species from the area of activity. Some species may move permanently, and some species may be drawn to the project due to human activities (e.g., coyotes and common ravens could be attracted to human activity and these species could adversely impact ground-nesting species). New or improved access roads in the project area may increase access by recreational users, especially during winter, which may also disturb wildlife. It is also possible that with improved access within the project area there could be an increased potential for poaching or harassment of wildlife. However, if O&M personnel observe such illegal activity, they would immediately report it to WGFD.

As discussed in Section 4.5 of this EA, the wind turbines identified for this project (the GE 1.5 SLE unit) are expected to have a maximum sound power level less than 104 dBA (General Electric 2004). According to the Wind Energy PEIS (BLM 2005), considering geometric spreading, a wind turbine with a sound power level of 104 dBA would have a resulting sound power level of 58 to 62 dBA at a distance of 164 ft from the turbine, which is about the same level as conversational speech at a distance of about 3 ft. This level of noise could disturb foraging and reproductive behaviors of various wildlife species that could lead to habitat avoidance (BLM 2005). However, it is unclear what impact this level of noise from wind turbines might have on wildlife species, including big game, because to date, few wildlife studies related to noise impacts of wind energy projects have been conducted (BLM 2005). It should also be noted that as wind speeds increase, background noise levels (from the wind) would also increase and would be louder than the operating wind turbine (BLM 2005; Rogers et al. 2006).

For big game species (pronghorn antelope, mule deer, and elk), the O&M phase of the project could result in some level of disruption and/or displacement of big game in the project area. Wind energy development is relatively new and few field studies have been conducted concerning big game species and potential impacts from wind energy projects. A recently completed multi-year study of mule deer in west-central Wyoming indicates that mule deer populations were adversely affected by disturbance from natural gas

development and associated human activity (Sawyer et al. 2009). As a result, it is possible that similar types of effects could be observed in relation to wind energy development. However, it should also be recognized that oil and gas development and wind energy developments involve some important differences in the level of human activity and disturbance that are not directly comparable to each other (Strickland 2009; Erickson 2009). Typical oil and gas well disturbance entails between 0.8 to 2.7 acres during operations depending on the type of well whereas a typical wind turbine surface disturbance entails 0.1 to 0.15 acres. However, there are other aspects of these developents that are not directly comparable (i.e., height of facilities and moving parts).

Disruption and/or displacement during the O&M phase of the project would likely be a continuation of construction-related impacts discussed above (Strickland 2009). However, the level of human activity during the O&M phase would be much less than during the construction phase of the Proposed Action. Two studies related to big game species and wind energy facilities documented the following results. A study of pronghorn antelope at the Foote Creek Rim wind project in south-central Wyoming conducted in association with raptor use studies indicate that no substantial change in pronghorn abundance in the immediate project area (Johnson et al. 2000). In addition, a recent study regarding interactions of transplanted elk populations during the construction and O&M phases of a wind facility found no evidence that the construction or operation of the wind turbines had significant impacts on elk use of the surrounding area (Walter et al. 2004).

No linear fences that could interfere with movement of big game species would be installed as part of the Proposed Action, and fences would only be installed around individual structures such as the electrical substation and O&M facility to protect public health and safety and to protect the company's assets.

There are no known migratory corridors for mule deer or elk within or immediately adjacent to the WMWE project area. As discussed in Chapter 3.0, no known pronghorn antelope migration corridors occur near the project area; however, there are several migration routes documented north of the WMWE project area (refer to Figure 3.10). Based on WGFD migration corridor data and range maps (refer to Figure 3.10), crucial winter range is located in the southeastern and northeastern edge of the WMWE project area. During the winter, it appears likely that most pronghorn antelope migrate east to crucial winter range below White Mountain and would likely avoid the top and rim of White Mountain due to typically heavy snow accumulations. It is possible that some pronghorn antelope may cross through the project area in the winter/spring and could travel on project roads or other roads (such as County Road 53) where snow removal operations occur, and they could become stranded on top of White Mountain during periods of heavy deep snows if the roads become impassable. Since Teton would be conducting yearlong operations, project roads would be plowed and would typically remain open all winter long. Any impediment to pronghorn antelope movement in the project area would be negated since Teton has committed to plowing openings (at least one opening every 0.25 mi or as directed by the BLM) in the snow berms to allow big game species to move off and away from road activities. Therefore, the Proposed Action is expected to have limited impacts on migrating pronghorn antelope.

In addition, the project would result in the unavoidable life-of-project direct loss of 189 acres of big game habitat within the project area. It is also possible that big game could be struck by O&M vehicles; however, posted speed limit signs would be installed on project roads in cooperation with Sweetwater County officials. Operation of the facility is not expected to have any long-term effects on big game once they have habituated to the increased level of traffic and the presence of the wind turbines. O&M personnel will be informed that wildlife (including big game species) occur in the project area, that they are not allowed to haze or harass the animals, and that they should minimize any disturbance to the animal whenever possible. Any incidents of

poaching will be immediately reported to the WGFD.

Increased O&M activity in the project area could increase the potential for wildfires. While possible, wildfires associated with the O&M phase of the Proposed Action are unlikely to occur. In the event of a wildfire, impacts to wildlife (including big game) would include direct mortality, reduction of habitat, and/or reduction in habitat quality. Implementation of the wildfire prevention plan outlined in the Proposed Action would minimize the chance of a wildfire occurring.

While unlikely, wildlife could also be affected by exposure to contaminants during operation of the WMWE Project. Although petroleum products (e.g., fuel, mineral oil, hydraulic oil, lubricating oil, etc.) would be stored and used at the facility, exposures are not expected under normal facility operations. In addition, a SPCCP would be implemented to minimize potential impacts from any spills that might occur. In general, wildlife (including big game) would not be affected by contaminant exposure during operation of the project.

The implementation of design features during the O&M phase, including using noise reducing turbines, employees carrying fire extinguishers to prevent the spread of wildfire, disposing of trash properly, restricting site maintenance activities to the minimum area necessary, designating travel corridors with reasonable speed limits, and control efforts for nonnative invasive species, would minimize potential disturbance or impacts to wildlife habitats and species (including big game).

<u>Bats</u>

The causes of bat mortality due to wind turbines are relatively unknown, and studies are ongoing (Kunz et al. 2007). To date, only a limited number of post-construction monitoring studies have been conducted at wind energy projects in the western U.S., and the results of these studies suggest: 1) migratory species with low frequency calls (e.g., hoary and silver-haired bats) comprise almost 75% of reported bats killed; 2) the majority of bat fatalities occur during the postbreeding or fall migration season (roughly August and September); and 3) the highest reported fatalities occur at wind facilities located along forested ridgetops (Arnett et al. 2008; Gruver 2002; Johnson et al. 2003; Kunz et al. 2007), although recent studies in agricultural regions of Iowa and Alberta, Canada, report relatively high fatalities as well (Jain 2005; Baerwald 2006).

Currently, mortality surveys are the only source of information on the number of bat fatalities at wind energy facilities. The following analysis is based on previous bat mortality studies, but differences between the proposed project and previous study projects, including the number of turbines, geographic region, habitat, topography, bat populations, weather, and other unknown factors, may result in different levels of bat mortality at the project.

It is estimated that the large majority of bat fatalities at wind energy facilities involve solitary, migratory, and foliage- and tree-roosting species such as silver-haired, hoary, and red bats. Hoary bats account for nearly half of all bat fatalities at wind energy facilities (Arnett et al. 2007; Kunz et al. 2007; Erickson et al. 2002; Johnson et al. 2003; Johnson 2005). Although variable and periodic, bat fatalities consistently peak in late summer and fall, coinciding with migration (Arnett et al. 2007). Approximately 90% of fatalities occur from mid-July through late September, with over 50% occurring in August (Erickson et al. 2002; Johnson 2004; Johnson 2005). Mortality during the breeding season is low. One study showed that, although there were relatively large breeding populations of bats near an operating wind facility, bat collision mortality was low to nonexistent (Johnson 2004). Mortality during spring migration is also very low (Johnson 2005). Only a small fraction of bats that traverse wind energy facilities are actually impacted by wind turbines (Erickson et al. 2002; Johnson 2005). These data suggest that wind energy facilities do not currently affect resident breeding or foraging bat populations (Erickson et al. 2002; Johnson et al. 2003; Johnson 2004; Johnson 2005). Studies indicate that bat mortality rates were the highest in forested environments, moderate in open areas

close to forests, and lowest in open areas (Johnson 2005).

Based on bat surveys conducted at the WMWE Project in 2008, bat activity was highest in August compared to any other month of survey. Hoary bats were approximately 18.7% of total passes detected within the study area, and silver-haired and big brown bats were approximately 14.6% of the total passes detected within the study area. Studies indicate that the most likely species to travel within turbine rotor heights include hoary bats, western red bats, and silver-haired bats. These species would be most susceptible to impacts during fall migration. The remaining 66.7% of the bat passes were from bats with high frequency calls such as the little brown bat, long-legged bat, western small-footed bat, and western long-eared bat (TRC 2008d).

Comparisons between bat activity and mortality rates at operational wind energy facilities and recorded bat activity at the project suggest that mortality at the project could be similar to that experienced at the Foote Creek Rim wind farm in Wyoming. The Foote Creek Rim site contains habitat comparable to the project area (i.e., primarily mixed-grass prairie and sagebrush shrubland). Bat fatalities at Foote Creek Rim consisted of hoary bats (80%), little brown bats (9%), silver-haired bats (7%), and big brown bat (1%) and 3% could not be identified. Based on post-construction mortality surveys at the Foote Creek Rim wind farm, estimated bat mortality at this site is approximately 1.3 bats per turbine per year (Young et al. 2003).

Some bat studies at wind energy facilities have included both preconstruction surveys (i.e., Anabat detection studies) and post-construction surveys (i.e., bat mortality surveys), and the results are presented in Table 4.13. Based on the presumed relationship between preconstruction bat activity and post-construction fatalities, the overall bat mortality rates at the WMWE Project is estimated to be low, in the range of 1.3 bat fatalities per turbine per year (documented in the Foote Creek Rim wind farm site) to slightly higher than the 2.2 bat fatalities per turbine per year documented at the Buffalo Ridge wind farm site (TRC 2008d). Under the Proposed Action, approximately 312 to 528 bat deaths per year could occur as a result of the operation of the WMWE Project. While projects occurring in the eastern U.S. may have higher bat activity and mortalities per year, population sizes are believed to be much higher in these areas when compared to the sagebrush ecosystems. Therefore, while total bat mortalities may be low in the WMWE Project compared to eastern states, impacts to population levels could have a larger impact due to greater potential for loss of genetic diversity. The expected range of bat mortalities at the WMWE Project are within the range of bat mortalities documented and acknowledged in the Wind Energy PEIS (BLM 2005).

To minimize potential impacts to bats during the O&M phase of the project, Teton would work with the BLM to develop and implement an operational protocol to modify the cut-in speeds of wind turbines within the WMWE project area. These protocols would be implemented during a portion of evening and night time hours of operation during the peak bat migration season. This protocol would be developed based on the preliminary results of the Arnett et al. (2009) study that documented reduced bat fatalities by changing the cut-in speed of wind turbines. In this study, the experimental cut-in speeds ranged between 11.1 mph (5.0 m/s) and 14.5 mph (6.5 m/s) with a corresponding nightly reduction in bat fatalities from 53 to 87% (165 to 438 fewer animal fatalities). Results of on-site post-construction avian and bat mortalities would be used by Teton and the BLM to fine tune the cut-in speed protocol.

In addition, the proposed WMWE Project is not located near any known bat colonies or other features that are likely to attract large numbers of bats. The WMWE project area does not contain topographic features likely to funnel migrating bats, and the project area lacks large tracts of forest cover, unlike high- mortality sites in the eastern U.S. However, the relatively large numbers of bat fatalities recently reported in northern Iowa (Jain 2005) and southwestern Alberta (Baerwald 2006) indicate that an open landscape is no guarantee of low mortality. Based

Table 4.13 Wind Energy Facilities in the U.S. with both Preconstruction Anabat Sampling Data and Post-construction Mortality Data for Bat Species.[1]

Wind Energy Facility	Activity[2] (No./Detector-night)	Mortality (Bats/Turbine/Year)	Reference
WMWE, Wyoming	2.6	N/A	(2008d)
Foote Creek Rim, Wyoming[3]	2.2	1.3	Gruver (2002)
Buffalo Ridge, Minnesota[3]	2.1	2.2	Johnson et al. (2004)
Buffalo Mountain, Tennessee[3]	23.7	20.8	Fiedler (2004)
Top of Iowa, Iowa[3]	34.9	10.2	Koford et al. (2005)
Mountaineer, West Virginia[3]	38.3	38.0	Arnett et al. (2005)

1 Adapted from TRC (2008d).
2 Average detections during study duration.
3 Detection data based only on ground-mounted units.

on the topography of the WMWE project area, it is expected that a majority of bat mortalities associated with the operation of the wind energy facility would occur as individuals migrate through the area.

Mortality rates of solitary tree-dwelling species are expected to be highest during fall migration. Resident and foraging bat populations are at the lowest risk (Young et al. 2003). With proper design and siting of wind projects, bat mortality can be greatly reduced and population impacts avoided (BLM 2005). The expected range of bat mortalities at the WMWE project area are within the range of bat mortalities documented and acknowledged in the Wind Energy PEIS (BLM 2005).

Raptors and Other Migratory Birds

The majority of impacts to birds from operation of the WMWE Project would result from collision with the wind turbines. Studies have also shown that densities of bird populations in the vicinity of wind energy projects may be reduced near turbines if continuous noise levels are in the range of 40 dBA or higher (BLM 2005). Birds hear best between about 1 and 5 kHz (Dooling 2002), and studies have also shown that blade noise from a normally operating wind turbine would simply add to the background noise and would be inaudible to birds at a distance of approximately 80 ft from the turbine when the blade and wind noise levels are within 1.5 dBA of one other (BLM 2005). Birds cannot hear the noise from wind turbine blades as well as humans, and most likely a human with normal hearing can hear a wind turbine twice as far away as the average bird (Dooling 2002). Turbine blade defects that produce whistles may be more audible to birds and, at the same time, make no measureable contribution to overall noise level (Dooling 2002).

One study suggests that nesting grassland passerines may be displaced by wind energy facilities (Leddy et al. 1999) and occupy other areas. However, another displacement study in Montana has not detected any displacement of nesting grassland birds within a wind energy facility (TRC 2009c).

It is estimated that bird fatalities at wind energy facilities probably represent from 0.01 to 0.02% (i.e., 1 out of every 5,000 to 10,000 avian fatalities) of the annual avian fatalities in the U.S. (Arnett et al. 2007). Bird deaths caused by wind turbines are a small fraction of the total anthropogenic bird mortality (Committee on Environmental Impacts of Wind Energy Projects 2007). In 2003, it was estimated that turbine collisions killed 20,000 to 37,000 birds, with all but 9,200 of those deaths occurring in California.

In comparison, collisions with buildings kill 97 to 976 million birds annually, and collisions with cars may kill 80 million birds per year (Erickson 2004). It is estimated wind turbines kill 33,000 birds annually (Erickson et al. 2001; USFWS 2002). Data suggest an average of 2.19 avian fatalities per turbine per year in the U.S. for all species combined, and 0.033 raptor fatalities per turbine per year (Erickson et al. 2001). Studies show that avian mortality rates from wind energy facilities vary greatly by region and species, with higher concentrated impacts in northern California and Appalachia (General Accounting Office [GAO] 2005). Excluding California, an average of 1.83 avian fatalities per turbine per year and 0.006 raptor fatalities per turbine per year have been documented (Erickson et al. 2001). Studies conducted to date indicate that, in the U.S., passerines and raptors appear to be the most susceptible to turbine collisions (American Wind Energy Association [AWEA] 1995).

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

Risk index is the risk exposure to turbine collision for each bird species. A risk index value of zero for a species does not indicate that there would be no risk associated with operation of the wind energy facility; any bird flying in the area would be at risk of turbine collision. The risk index simply identifies species that may be at more risk than other species based on observed flight height relative to proposed turbine rotor height. Species with high relative exposure indices may actually not be at high risk of turbine collisions; they are just at more risk than species with lower indices based on the risk formula.

Estimating risk exposure is difficult because abundance and behavior influence the risk of exposure. An extensive preconstruction avian survey was conducted at the WMWE project area, and among the PSBs, the risk value for horned larks (0.0790) was the highest--over seven times higher than unidentified sparrows (0.0109), the second highest risk value. American robins (0.0054) had the third highest risk value, followed by sage thrashers (0.0027) (TRC 2009b). Based on avian surveys at the WMWE Project in 2008, horned lark was the most abundant of the species documented in the WMWE project area during both spring and fall surveys (TRC 2009b). Given its abundance in the project area and the high mortality rates documented for this species compared to other species in several wind farm avian mortality studies (Young et al. 2003; Erickson et al. 2002; Erickson et al. 2004), it is likely that wind farm-related mortality would be highest for horned lark relative to other bird species occurring in the WMWE project area. This species may be especially vulnerable to collision with turbines during the breeding season because of their distinct aerial courtship displays. Male horned larks may deliver flight songs lasting 0.5 to 8 minutes during the breeding season (Beason 1995). After ascending to heights of approximately 541 ft (range 262-820 ft), the birds glide toward the ground with wings and tail spread (Beason 1995). The birds repeatedly regain altitude and repeat their song. At the end of the song flights, the males dive to the ground. However, despite their potential vulnerability to collide with turbines, it is unlikely that turbine-related mortality in the WMWE project area would have a significant negative impact on horned lark populations. Many of the other passerine birds were not observed flying within the rotor-swept area, so risk value is assumed to be low.

Raptor use in the WMWE project area is dominated by northern harriers and golden eagles, whereas nonraptor large bird species most common in the area are common raven and black-

billed magpie. Similarly, the risk index among raptors and other large birds reflects the dominance of these species: common raven, golden eagle, and northern harrier, which rank in the top three in risk for turbine-related collision. Risk for black-billed magpies is assumed to be low, as no individuals were observed flying within the rotor-swept area.

Although the number of PSBs observed during the WMWE avian studies far exceeded the number of RLBs observed, RLBs had a notably higher risk level associated with turbine-related injury or mortality (0.8919 vs. 0.1499) because they were over six times as likely to fly within the rotor-swept area of a typical 1.5-MW turbine. Despite the apparent higher risk level, raptor mortality has been absent to very low at all newer-generation wind energy facilities in the U.S. (Erickson et al. 2002; Young et al. 2003). Other studies report that passerines appeared to be at greatest risk given their higher fatality rates compared to raptors (McCrary et al. 1986; Young et al. 2003). In the WMWE project area, some raptors appeared to use the area along the eastern edge of White Mountain preferentially. Raptors also used areas near drainages and hills. Based on these findings and the increased tendency for raptors to fly within the rotor-swept area along rim edges (Johnson et al. 2000), turbines located along the eastern edge of the mountain would pose the greatest risk to RLBs. Turbines along the edges of incised drainages also might pose higher than average risk to RLBs.

Although it has been widely used in wind energy studies (e.g., Johnson et al. 2000; Erickson et al. 2002; Young et al. 2003) to date, the exposure risk model has been validated by few post-construction fatality studies (for an exception see Johnson et al. 2000). The exposure risk does not take into account factors such as bird behavior, flight styles, and varying abilities of birds to detect turbines, all of which may be important factors in determining risk of collision with turbines. Therefore, the index is useful primarily as an indicator of those species in the project area that had the highest exposure to the wind turbine rotor-swept area. It also facilitates comparisons of risk among selected species in the project area. Because of the similarities of the WMWE project area to that of the Foote Creek Rim wind farm, it is estimated that the WMWE Project would result in approximately 1.5 avian fatalities per turbine per year, and most (possibly 90%) of the fatalities would be passerines and the remaining 10% would be RLBs. Under the Proposed Action, approximately 360 total avian mortalities per year could occur. Of these mortalities, approximately 324 mortalities could be PSBs and 36 could be RLBs. Based on other post-construction avian mortality studies, the mortalities are expected to include migratory and resident birds (Young et al. 2003). The potential avian mortalities expected at the WMWE Project are within the range of avian mortalities documented and acknowledged in the Wind Energy PEIS (BLM 2005), which acknowledges that an average of 1.83 avian fatalities per turbine per year has been documented and a range of 0.0 to 4.45 bird fatalities per turbine per year (excluding wind energy projects in California, which historically had higher fatality rates). With proper design and siting of wind projects, avian mortalities can be reduced (BLM 2005).

All mitigation measures listed in Chapter 2.0 to avoid avian collisions with wind turbines would be incorporated into the design of the wind turbine and the tower. These measures include solid tubular towers to eliminate perch locations, slow-rotating blades for increased visibility, and setback of wind turbines at least 50 m (164 ft) from the east edge of White Mountain and at least 50 m (164 ft) from the edge of large drainages within the project area. Lighting of the wind turbines would also be in accordance with USFWS and FAA recommendations to aid in the reduction of avian and bat mortalities (Gehring et al. 2009). Teton would conduct a 3-year post-construction avian and bat mortality study for the project unless sufficient evidence determines that continued monitoring is unneccesary.

In addition, all electrical equipment (including the substation) would be designed and constructed in accordance with *Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 2006* (Avian Power Line Interaction Committee 2006). In addition, all permanent met towers

would be self supported (i.e., nonguyed) to minimize avian collisions and mortalities and potential big game entanglement.

4.12.1.3 Decommissioning Phase

Wildlife (Including Big Game)

Impacts to wildlife from decommissioning of the WMWE Project would be similar to impacts associated with their construction, but of reduced magnitude. Noise and visual disturbance to wildlife may temporarily increase during decommissioning and site restoration relative to conditions during project operation. New habitat loss would be negligible, and wildlife injury and mortality would be much lower than during construction. Removal of facilities components would eliminate the impacts associated with wildlife collisions with WMWE structures. Wildlife habitat in the area is expected to return to preproject conditions following decommissioning and site restoration (BLM 2005).

Disturbance to wildlife habitats and wildlife during decommissioning of the WMWE project facilities is expected to be localized, short-term, and minor. Impacts to wildlife would be minimized, where practicable, and the implementation of environmental protection measures during decommissioning, including seasonal wildlife stipulations, dust suppression, contaminant control, control of nonnative invasive species, and revegetation of impact areas with native seed mixtures, would minimize potential disturbance or impacts to wildlife habitats and species. Protection measures for the project can be found in Chapter 2.0 of this EA.

Bats

No additional impacts to bats beyond those discussed under construction impacts are expected to occur during the decommissioning phase of this project, and these impacts are expected to be minimal.

Raptors and Other Birds

No additional impacts to raptors and other birds beyond those discussed under construction impacts are expected to occur during the decommissioning phase of this project. The removal of a limited amount of natural vegetation (grassland and shrub communities) would be minimized to the extent possible during decommissioning of the project. In addition, the movement of personnel and equipment on-site would be limited to the extent possible to construction areas to avoid inadvertent compaction of vegetation.

Raptors could be impacted as a result of decommissioning-related disturbance during the nesting season. To avoid impacts on the nesting raptors during the decommissioning phase of the project, Teton will implement the same seasonal restriction areas in accordance with BLM policy (BLM 1997) as provided in Table 2.9 of this EA.

4.12.2 Alternative A - Development Only on Privately Owned Lands

4.12.2.1 Construction Phase

Potential direct and indirect impacts to wildlife, including big game, bats, and birds, under Alternative A would be the same as discussed under the Proposed Action. Implementation of this alternative would involve the construction of 170 wind turbines on privately owned land; therefore, direct impacts to wildlife habitat would include the disturbance of 619 acres of habitat from road construction, the excavation of the turbine pads, the substation and batch plant, and the collector lines. Most of the disturbed area would be reclaimed and revegetated, with 115 acres (less than 1.0% of the project area) remaining occupied by roads, turbine foundations, and facilities for the life of the project. The potential impact to wildlife habitat would be reduced by 30% compared to those described under the Proposed Action; however, if the construction of the 170 turbines occurs wholly on one vegetation type, impacts to that single vegetation community would be similar to that described under the Proposed Action. Noise and

human disturbance during construction activities under Alternative A are anticipated to be the same as under the Proposed Action.

The reduction in both short-term and life-of-project loss of wildlife habitat under Alternative A when compared to the Proposed Action would be negligible.

4.12.2.2 O&M Phase

Under Alternative A, no additional impacts beyond those discussed under the Proposed Action are expected to occur during the O&M phase of this project. Implementation of Alternative A may slightly decrease the total number of bird and bat turbine-related fatalities by 30% as a result of the construction of 30% fewer turbines. Under Alternative A, approximately 255 total avian mortalities per year and approximately 218 to 370 total bat mortalities could occur. Assuming all design features are implemented, potential avian and bat mortalities would be within the range of mortalities documented and acknowledged in the Wind Energy PEIS (BLM 2005).

4.12.2.3 Decommissioning Phase

Under Alternative A, no additional impacts beyond those discussed under the Proposed Action are expected to occur during the decommissioning phase of this project.

4.12.3 No Action Alternatives

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

4.12.4 Residual Impacts

The Proposed Action would result in the direct life-of-project loss of approximately 189 acres of wildlife habitat due to vegetation removal. Some wildlife species could be temporarily displaced from project-related construction activities and some species, especially small mammals, birds, amphibians, and reptiles, may be killed by construction, O&M, and decommissioning operations. Habitat effectiveness, especially for big game species, would likely be reduced, due to the change in the compaction of vegetation communities as revegetated areas become re-established and evolve toward a sagebrush dominated plant community. There would also be an unavoidable loss of wildlife due to wildlife/vehicle collisions.

4.12.5 Cumulative Impacts

In order to assess potential cumulative impacts to wildlife species, various IAAs have been established to evaluate the Proposed Action, and quantitative data for the various IAAs are summarized in Table 4.14.

4.12.5.1 Wildlife (Including Big Game)

For general wildlife (i.e., nongame and small mammals), habitat disturbance associated with the existing Proposed Action and RFFAs is expected to result in 8.15% disturbance of the IAA, and cumulative impact would be similar to those discussed under the Proposed Action.

Implementation of the various mitigation measures to limit disturbance and encourage prompt reclamation of disturbance and other appropriate mitigation measures presented in the Proposed Action would minimize impacts to wildlife species, and cumulative impacts to nongame and small mammal populations within the cumulative IAA are expected to be limited.

For pronghorn antelope, current disturbance accounts for a total of 17,409 acres (2.84%) of the IAA, and physical disturbance associated with the Proposed Action and RFFAs would represent an additional 973 acres (0.16%) of the IAA for a total current and projected physical disturbance of 18,382 acres (3.00%) of the IAA for pronghorn antelope (refer to Table 4.13). Impacts to pronghorn antelope during the life of these projects would be similar to those discussed under the Proposed Action and could include disturbance and/or displacement due to human presence, fugitive dust or noise, direct mortality due to

Table 4.14 IAAs for Wildlife Resources.

Resource	Description	Total Area (acres)	Amount of Current Disturbance (acre and %)	Amount of Disturbance Related to RFFA (Including Proposed Action) (acre and %)	Total Amount of Current and RFFA Disturbance (acre and %)
Wildlife, bats, and migratory birds	Level 12 HUC boundary	268,613	19,954 (7.43%)	1,080 (0.40%)	21,034 (7.83%)
Pronghorn antelope	WGFD - Sublette Herd Unit	612,496	17,409 (2.84%)	973 (0.16%)	18,382 (3.00%)
	Crucial Pronghorn antelope winter/yearlong range	279,452	9,944 (3.56%)	71 (0.02%)	10,015 (3.58%)
Mule deer	WGFD - Mule Deer Steamboat Herd Unit	2,554,688	27,191 (1.06%)	1,268 (0.05%)	28,459 (1.11%)
Elk	WGFD - Elk Steamboat Herd Unit	2,529,715	23,452 (0.93%)	1,207 (0.05%)	24,659 (0.98%)
	Crucial elk winter/yearlong range	280,448	1,896 (0.68%)	29 (<0.01)	1,925 (0.69%)
Raptors and other birds	Project area plus 14.45-mi buffer	693,604	29,676 (4.28%)	1,455 (0.21%)	31,131 (4.49%)

collisions with vehicles, and loss of habitat by alteration and/or fragmentation. Appropriate design features as discussed in Chapter 2.0 (including prompt revegetation efforts) would be implemented for each federally authorized project and would mitigate potential impacts. The Proposed Action and RFFAs would add 973 acres of disturbance (0.16% of the total IAA), and this represents a small percentage of direct disturbances. However, indirect disturbance (due to human presence, noise, dust, etc.) and habitat fragmentation would likely increase and would result in some reduction in use and/or displacement.

In addition, the largest amount of current disturbance is in pronghorn crucial winter/ yearlong range and these disturbances account for a total of 9,944 acres or 3.56% of the crucial winter/yearlong range within the IAA. Physical disturbance associated with the Proposed Action and RFFAs would represent an additional 71 acres or 0.02% of the crucial winter/yearlong range within the IAA for a total physical disturbance for current and projected disturbance of 10,015 acres or 3.58% of the crucial winter/yearlong range within the IAA (refer to Table 4.14). Impacts to pronghorn antelope crucial winter/yearlong ranges during the life of these projects would be similar to those discussed above and could include disturbance and/or displacement due to human presence, fugitive dust or noise, direct mortality due to collisions with vehicles, and loss of habitat by alteration and/or fragmentation. Implementation of all appropriate seasonal restriction for all federally authorized projects would minimize potential impacts to pronghorn antelope in crucial winter ranges, Teton and other companies would comply with seasonal restrictions and would not conduct any project-related activities within antelope crucial winter/yearlong range from November 15 to April 30. However, Teton and the other companies may request an exception from the seasonal restriction stipulation from the BLM or the landowner, who would evaluate the request on a case-by-case basis. This seasonal mitigation measure would minimize impacts to antelope on the crucial/yearlong ranges located within the various projects during the construction periods. The Proposed Action and RFFAs would add 71 acres of disturbance (0.02% of the crucial winter/yearlong range in the IAA), and this represents a small percentage of direct disturbances. However, indirect disturbance (due to human presence, noise, dust, etc.) and habitat fragmentation would likely increase and could result in some reduction in use and/or displacement.

For mule deer, current disturbance accounts for a total of 27,191 acres (1.06%) of the IAA, and physical disturbance associated with the Proposed Action and RFFAs represents approximately 1,268 acres (0.05%) of the IAA for a total current and projected physical disturbance of 28,459 acres (1.11%) of the IAA for mule deer (refer to Table 4.14). Impacts to mule deer during the life of these projects would be similar to those discussed under the Proposed Action and could include disturbance and/or displacement due to human presence, fugitive dust or noise, direct mortality due to collisions with vehicles, and loss of habitat by alteration and/or fragmentation. Appropriate design features as discussed in Chapter 2.0 (including prompt revegetation efforts) would be implemented for each federally authorized project and would mitigate potential impacts. The Proposed Action and RFFAs would add 1,268 acres of disturbance (0.05% of the total IAA), and this represents a small percentage of direct disturbances. However, indirect disturbance (due to human presence, noise, dust, etc.) and habitat fragmentation would likely increase and would result in some reduction in use and/or displacement.

There are no crucial winter, severe winter relief, or mule deer parturition areas within or immediately adjacent to the WMWE project area. Therefore, the Proposed Action would not result in any cumulative impacts to these important mule deer habitats.

For elk, current disturbance accounts for a total of 23,452 acres (0.93%) of the IAA, and physical disturbance associated with the Proposed Action and RFFAs would represent an additional 1,207 acres (0.05%) of the IAA for a total current and projected physical disturbance of 24,659 acres

(0.98%) of the IAA for elk (refer to Table 4.14). Impacts to elk during the life of these projects would be similar to those discussed under the Proposed Action and could include disturbance and/or displacement due to human presence, fugitive dust or noise, direct mortality due to collisions with vehicles, and loss of habitat by alteration and/or fragmentation. Appropriate design features as discussed in Chapter 2.0 (including prompt revegetation efforts) would be implemented for each federally authorized project and would mitigate potential impacts. The Proposed Action and RFFAs would add 1,207 acres of disturbance (0.05% of the total IAA), and this represents a small percentage of direct disturbances. However, indirect disturbance (due to human presence, noise, dust, etc.) and habitat fragmentation would likely increase and would result in some reduction in use and/or displacement.

In addition, current disturbance in elk crucial winter/yearlong range accounts for a total of 1,896 acres or 0.68% of the crucial winter/ yearlong range within the IAA. Physical disturbance associated with the Proposed Action and RFFAs would represent an additional 29 acres or less than 0.01% of the crucial winter/yearlong range within the IAA for a total physical disturbance for current and projected disturbance of 1,925 acres or less than 0.69% of the crucial winter/yearlong range within the IAA (refer to Table 4.14). Impacts to elk crucial winter/yearlong ranges during the life of these projects would be similar to those discussed above and could include disturbance and/or displacement due to human presence, fugitive dust or noise, direct mortality due to collisions with vehicles, and loss of habitat by alteration and/or fragmentation. Implementation of all appropriate seasonal restriction for all federally authorized projects would minimize potential impacts to elk in crucial winter ranges. Teton and other companies would comply with seasonal restrictions and would not conduct any project-related activities within elk crucial winter/yearlong range from November 15 to April 30. However, Teton and the other companies may request an exception from the seasonal restriction stipulation from the BLM or the landowner, who would evaluate the request on a case-by-case basis. This seasonal mitigation measure would minimize impacts to elk on the crucial/yearlong ranges located within the various projects during the construction periods. The Proposed Action and RFFAs would add 29 acres of disturbance (less than 0.01% of the crucial winter/yearlong range in the IAA), and this represents a small percentage of direct disturbances. However, indirect disturbance (due to human presence, noise, dust, etc.) and habitat fragmentation would likely increase and could result in some reduction in use and/or displacement. The Proposed Action would not result in any disturbance to elk parturition areas. Therefore, the Proposed Action would not result in any cumulative impacts to elk parturition areas.

4.12.5.2 Bats

For bats, habitat disturbance associated with the existing Proposed Action and RFFAs is expected to result in 7.83% disturbance of the IAA. The Proposed Action would be expected to primarily affect migratory bats during the fall; however, studies indicate that the population of migratory bats is generally limited. In addition, the WMWE project area does not contain topographic features likely to funnel migrating bats, and the project area lacks large tracts of forest cover, unlike high-mortality sites in the eastern U.S. Assuming all design features are implemented for the Proposed Action and all BLM-authorized RFFAs, potential cumulative impacts to bats would likely be within the range of mortalities and impacts documented and acknowledged in the Wind Energy PEIS (BLM 2005).

4.12.5.3 Raptors and Other Birds

For raptors and other birds, current disturbance accounts for a total of 29,676 acres (4.28%) of the IAA, and disturbance associated with the Proposed Action and RFFAs would represent an additional 1,455 acres (0.21%) of the IAA for a total current and projected disturbance of 31,131 acres (4.49%) of the IAA for raptors and other birds (refer to Table 4.14). Impacts to raptors and other birds during the life of these projects would be similar to those discussed under the Proposed Action and could include habitat loss and fragmentation due

to vegetation disturbance, human presence, and noise. Additional impacts during the construction and decommissioning phases to raptors and other birds may be collisions with construction vehicles, turbines, meteorological towers, substations, and other structures. The primary impact during the O&M phase of the Proposed Action and other wind energy projects would be avian collisions with the operating wind turbines. In addition to the Proposed Action, one other wind energy project is located within the IAA and it would be located north of the WMWE project area. It is estimated that there would be approximately 1.5 avian fatalities per turbine per year for the Proposed Action and for the proposed Lonesome Bronco wind energy project. Most (possibly 90%) of the fatalities would likely be PSBs, and the remaining 10% would likely be RLBs.

Raptors could be impacted as a result of construction-related disturbance during the nesting season. The BLM has established seasonal and no surface occupancy restriction areas that Teton would comply with according to BLM policy (BLM 1997). Additionally, Teton has committed to adopting a 50-m (164-ft) minimum setback from the ridgeline of White Mountain and the edge of large drainages to further reduce impacts to avian species. Table 2.9 lists the seasonal restriction areas, as well as the no surface occupancy buffers, and Teton and all other BLM-authorized RFFAs would not place any wind turbines or other disturbances within these no surface occupancy buffer areas. In addition, to reduce the risk of electrocution, all electrical systems and components would be designed, constructed, operated, and maintained in conformance with the National Electrical Safety Code and other applicable codes and standards, as well as *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (Avian Power Line Interaction Committee 2006). In addition, the removal of natural vegetation (grassland and shrub communities) would be minimized to the extent possible during construction. The movement of construction personnel and equipment on-site would be limited to the extent possible to the construction areas to avoid inadvertent impacts to all wildlife species.

Therefore, potential cumulative impacts to avian species would be within the range of mortalities and impacts acknowledged and documented in the Wind Energy PEIS (BLM 2005).

4.13 ENVIRONMENTAL PROTECTION MEASURES

The environmental protection measures for the Proposed Action are presented in Section 2.5 of this EA as design features.