2 Alternatives and Proposed Federal Actions

This chapter describes the Proposed Project and proposed Federal actions, and in addition, the Applicants' site selection and screening methods. These methods were used to determine which alternatives would be carried forward for analysis. This chapter provides detailed descriptions of the Crow Lake and Winner alternatives, Proposed Project facilities, construction, operation, and decommissioning activities. It also describes the No Action Alternative, and provides a summary of impacts by alternative. There were no additional alternatives identified during scoping but eliminated from further analysis as part of this NEPA process.

Proposed Federal Actions

The proposed Federal actions evaluated in this EIS by each of the involved Federal agencies are specific and limited and are based on the purpose and need for agency action as described in Section 1.2. Western and RUS need to make decisions as follows:

Western: Western's proposed action is to approve Basin Electric's interconnection to Western's transmission system at either Wessington Springs Substation or Winner Substation, an action which requires Western to complete modifications to one of these substations to support the interconnection.

RUS: PrairieWinds has requested financial assistance for the Proposed Project from RUS. RUS's Federal action is based on providing financial assistance; completing the EIS is one requirement, along with other technical and financial considerations in processing PrairieWinds' application.

Western System Modifications

Western proposes to modify its transmission system based on a preliminary review of the interconnection request. Western would need to add electrical equipment at the Wessington Springs Substation for the Crow Lake Alternative or Winner Substation for the Winner Alternative. Depending on additional transmission studies and electrical design work, the additional electrical equipment would, at a minimum, include installing new concrete foundations, substation bus work, cable trenches, buried cable grounding grid, and replacing existing equipment and/or conductors to accommodate the interconnection. Pending additional study and approval from Western, the Winner Alternative may require expansion of the Winner Substation for the transmission interconnection. Western would design, own, construct, and operate any additions and modifications at these substations. Because Western is a Federal agency, Western is not ceding any jurisdictional authority over Federal facilities to the State of South Dakota for the interconnection.

At this time, all the transmission system studies have not been completed. Details, requirements, and environmental impacts for other system improvements are unknown at this time, since they would be dictated by the on-going transmission system studies. These studies may identify additional upgrades needed to accommodate the proposed interconnection, including

modifications at other existing Western substations that could include installing new control buildings; new circuit breakers and controls; adding new electrical equipment, which would include installing new concrete foundations for electrical equipment and buildings, substation bus work, cable trenches, buried cable grounding grid, and new surface grounding material; and/or replacing existing equipment and/or conductors with new equipment and/or conductors to accommodate the proposed interconnection.

If any needed transmission system modifications are not identified until after the completion of the Proposed Project EIS, Western and RUS would address the environmental impacts of these modifications in accordance with regulatory requirements.

2.1 APPLICANTS' SITE SELECTION AND SCREENING ANALYSIS

Prior to submitting the interconnection request and financing request, the Applicants conducted a screening process to analyze types of generation and possible alternatives. The *PrairieWinds – SD 1 Alternative Evaluation Analysis and Site Selection Study*, was completed in January of 2009. The following information summarizes the findings of the Applicants' study and how the proposed wind project of 151.5-MW was determined to be the best available, least-cost renewable resource option to satisfy future load and RPS requirements. As described in the study, the Applicants identified six alternative sites for consideration. The study analyzed the six alternatives and conducted a screening process to determine which sites had the ability to meet the purpose and need of the Proposed Project. Screening criteria included technical feasibility, economic viability (able to be implemented), and public issues and concerns.

The screening assessment also included consideration of the ability of alternatives to meet the Applicants' project objectives listed below:

- Meet current incentives/regulations that encourage or require power from renewable or low environmental impact resources
- Conform with proposals in Congress for national RPS
- Meet Basin Electric's need for additional energy capacity to serve forecasted growth demands
- Meet Basin Electric's need for additional renewable energy capacity to meet State-mandated RPS

The Applicant considered other factors in the evaluation of potential project sites, including topography, proximity to the interstate highway system, proximity of nearby population centers, and land parcel sizes. A site with rolling topography, rather than steep, rugged topography was preferred because of less turbulent airflow and ease of construction. Distance to the interstate highway system was also considered, due to the large transportation effort associated with the delivery of project components. A site with low population density, but near a population center, would allow site operation and maintenance staff access to a wider array of housing, schools, and services, thereby aiding in staff recruitment and retention. Finally, a site with larger landowner

parcels would be preferred, since there would be a fewer number of leases and possible landowner conflicts.

To evaluate potential impacts to wildlife, a Potential Impact Index (PII) assessment was performed in general accordance with the USFWS Interim Guidance on Avoiding and Minimizing Wildlife Impacts from Wind Turbines dated May 13, 2003 (2003 USFWS Guidance). The PII represents a "first cut" analysis of the suitability of sites proposed for development. It does so by estimating use of the site by selected wildlife species as an indicator of potential impact. Emphasis of the PII is on initial site evaluation and is intended to provide more objectivity than simple reconnaissance surveys.

Based on the results of the PII, the Reference Site (Lake Andes National Wildlife Refuge) had a total score of 331 compared to a total score of 269 for the Winner Site, 239 for the Crow Lake Site, and 214 for the Fox Ridge Site.

Table 2.1 summarizes the site selection and evaluation criteria for the each of the six sites evaluated as potential Proposed Project alternatives.

Through the alternatives screening process, the Applicants found that Crow Lake and Winner were the most favorable alternatives to meet their purpose and need of the Proposed Project. The Highmore/Ree Heights and Reliance alternatives were considered for elimination from further consideration since the land was leased by other developers. The Wessington Springs Alternative was eliminated from consideration due to proximity to multiple waterfowl production areas. When the Fox Ridge Alternative was investigated, transmission congestion and operating constraints on the regional transmission system were observed. The Applicants' thus found that the instability of the system created too high of a risk for the Fox Ridge Alternative to be feasible; the Fox Ridge Alternative was eliminated from further consideration. The remaining alternatives (Winner and Crow Lake) appeared favorable for development. **Figure 2-1** depicts the general locations of the Proposed Project alternatives.

2.1.1 CROW LAKE ALTERNATIVE

This area was identified as an excellent wind resource through the National Renewable Energy Laboratory (NREL) wind resource map (NREL 2009), supplemented by existing meteorological data from a site established by the South Dakota State University Wind Resource Assessment Network (WRAN) (WRAN 2008). Wind Logics, a meteorological consultant from Minneapolis, was contracted to develop a 500-meter wind map for the area, with the results indicating an excellent wind resource. Meteorological towers were assembled to measure the wind and correlation of this meteorological tower data with the WRAN site was initiated. In general, subsequent wind measurements for speed and direction are taken at different heights. These measurements confirm the site is a Class IV or better wind resource as defined by the U.S. DOE NREL.

Table 2.1 Site Selection and Evaluation Criteria

Site	Local Transmission Available	Additional Transmission Line Needed	Sufficient Land Available to Lease	Topography	Proximity to Interstate Highway System	Proximity to Population Center	Parcel Size
Highmore/ Ree Heights	Yes (Request Submitted)	10-12 Miles	Compromised by other developers	+	-	+	+
Wessington Springs	Yes	Not investigated	Wildlife Habitat	-	-	-	-
Reliance	Yes (Non-firm)	20+ Miles	Compromised by other developers	-	+	-	+
Fox Ridge	Yes (High Risk – weak regional transmission system)	5-6 Miles	Yes	-	-	-	+
Winner	Yes (Request Submitted)	5-6 Miles	Yes	-	-	+	-
Crow Lake	Yes (Request Submitted)	9-12 Miles	Yes	+	+	+	+

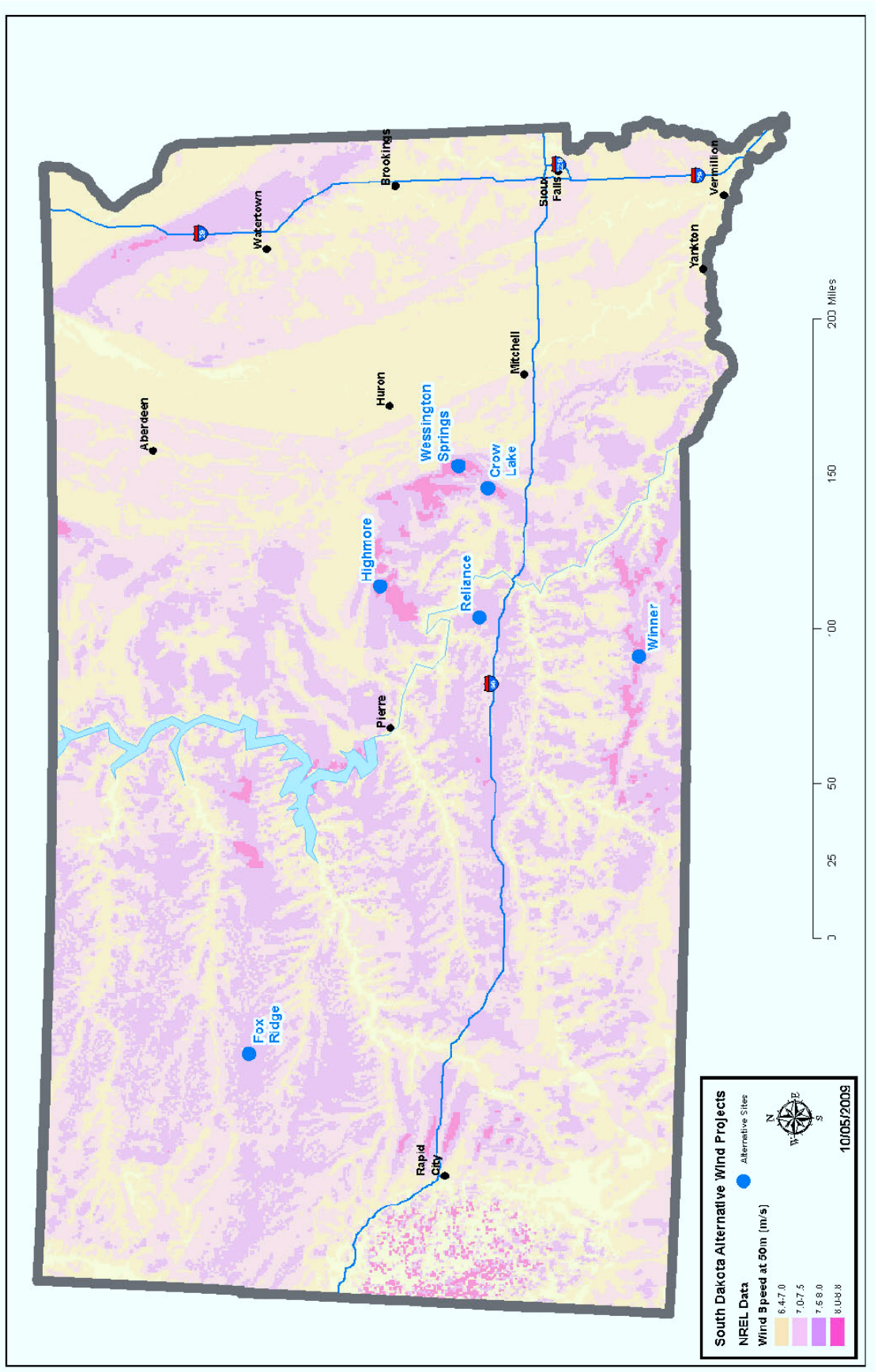

Figure 2.1 Locations of Sites Considered in Screening Assessment

The Applicants conducted environmental studies at the Crow Lake Alternative in late 2007. Various resources such as vegetation, water, wetlands, soils, wildlife, cultural and community issues were assessed to facilitate the evaluation of potential impacts. The Applicants noted that while there are potential issues that need to be addressed, it appears the site is viable for wind energy development. A PII was also done to better assess potential wildlife impacts.

2.1.2 WINNER ALTERNATIVE

This alternative, located in south-central South Dakota near the City of Winner, was identified as an excellent wind resource through the NREL wind resource map (NREL 2009). The Applicants' site reconnaissance also indicated good wind potential, with several ridges oriented somewhat transverse to the expected predominant wind direction. Subsequent wind mapping, using historical wind data provided additional confirmation of preliminary wind assessments, indicating this site has an excellent wind resource. Meteorological towers were installed to measure the wind for speed and direction taken at different heights. This data was correlated to the WRAN site to confirm the wind resource and assist in micro-siting (WRAN 2008).

The Applicants conducted environmental studies at the Winner Alternative in late 2008. Various resources such as vegetation, water, wetlands, soils, wildlife, cultural, and community issues were assessed to facilitate the evaluation of potential impacts. The Applicants noted that while there are potential issues that need to be addressed, it appears the site is also viable for wind energy development. A PII was also done to better assess potential wildlife impacts.

Western and RUS have reviewed the results of the Applicants' screening and siting studies. Based on this review and input received during the EIS scoping process, the Agencies fully analyzed the Crow Lake and Winner alternatives in the EIS.

2.1.3 APPLICANTS' PRELIMINARY SITING PARAMETERS

The following siting parameters were developed by the Applicants and were used in their micro-siting process for Crow Lake and Winner alternatives.

Preliminary siting parameters for turbine locations:

- Wind potential and topography
- Minimum distance of 400 feet from section lines or existing roads
- Minimum distance of 1,000 feet from occupied residences
- Minimum distance of 400 feet from existing transmission line
- Avoidance of wetlands and hydric soils areas
- Site near edges of USFWS grasslands easements to minimize impact
- 1,000 to 2,000-foot minimum distance between turbine locations within the predominant wind direction
- Avoidance of existing microwave paths
- FAA regulations and proximity to airports

- 1,320-foot minimum distance between turbine locations and USFWS Waterfowl Production Areas (WPA)

Preliminary siting parameters for transmission line locations:

- Minimize transmission line length
- Right-of-way requirements and availability of contiguous parcels of land
- Land use considerations (*i.e.*, potential visual impacts, proximity to residences, potential impact to agricultural activities and existing/future land use)
- Environmental resource considerations such as potential impacts to sensitive resources (*i.e.*, cultural resources, wildlife, vegetation and wetlands)
- Jurisdiction and regulatory considerations
- FAA regulations, military, weather and radar installations, and proximity to airports

2.2 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FULL ANALYSIS

Western and RUS reviewed the results of the Applicants' screening and siting studies (as discussed in **Section 2.1**) and concurred with the conclusion to eliminate the Highmore/Ree Heights, Wessington Springs, Reliance and Fox Ridge alternative sites from full analysis in the EIS.

Generally during the scoping process, any additional reasonable generation facility alternatives identified through comments received in response to the scoping process are considered. To be considered reasonable, alternatives would need to meet the Applicants' and Agencies' purpose and need, be technically feasible and economically viable. With publication of the NOI in the *Federal Register* (74 FR 15718) on April 7, 2009, interested parties were invited to participate in the scoping process. Aside from the Proposed Project alternatives (Crow Lake and Winner), no additional alternatives were identified during the scoping process.

For these reasons, only the Crow Lake and Winner alternatives are fully analyzed in this EIS.

2.3 CROW LAKE ALTERNATIVE

2.3.1 PROPOSED PROJECT COMPONENTS

The proposed Crow Lake Alternative would involve the installation and operation of a 151.5-MW nameplate capacity wind energy facility that would feature 101 wind turbine generators. Ten additional turbine locations were identified and analyzed in this DEIS. These turbines may be utilized as contingent turbine locations for the Proposed Project if specific turbine locations are eliminated as a result of additional resource surveys and engineering siting; or they may be installed within the selected site at a later date, pending future load, transmission availability, and renewable production standard requirements. The Crow Lake Alternative is located on

approximately 37,000 acres approximately 15 miles north of the City of White Lake, South Dakota, within Brule, Aurora, and Jerauld counties.

The Proposed Project would be constructed within the boundaries of the site. The areas of disturbance would include the turbine generator foundations, operation and maintenance (O&M) building and fence perimeter, underground communication system and electrical collector lines (within the same trench), collector substation and microwave tower, overhead transmission line, temporary equipment/material storage or lay-down areas, crane walks, and new and/or upgraded service roads to access the facilities, (collectively termed the Proposed Project Components). A map depicting the Crow Lake Alternative is included in **Chapter 1 Figure 1-3**.

Temporary and permanent disturbance acreages for each of the Proposed Project Components are summarized in **Section 2.6** at the end of this chapter. **Table 2.4** provides a comparison of the Crow Lake Alternative and Winner Alternative estimated surface disturbances. The No Action Alternative would not result in any surface disturbances.

Turbines: The Applicants' plan to install 101 General Electric 1.5 super long extreme (sle) model wind turbines for the Proposed Project. Each wind turbine would have a nameplate capacity output of 1.5-MW of power, with a combined nameplate capacity of 151.5 MW. Each wind turbine would have a hub height of 262 feet (80 meters) and a wind turbine rotor diameter of 252 feet (77 meters). The total height of each wind turbine would be 389 feet (118.5 meters) with a blade in the vertical position. The wind turbine tower would be constructed of tubular steel, approximately 15 feet in diameter at the base, with internal flanges. The color of the towers and rotors would be standard white or off-white. **Figure B-1** in **Appendix B** provides a diagram of a General Electric 1.5sle wind turbine for the Proposed Project, and **Figure B-2** in **Appendix B** depicts the main components of a typical wind turbine. During construction, a work/staging area at each wind turbine would include the crane pad and rotor assembly area. This would temporarily disturb an area of approximately 500 feet by 500 feet; and permanently disturb a 25-foot radius around each turbine. The wind turbine foundations would typically be mat foundations or a concentric ring shell foundation. The excavated area for the wind turbine foundations would typically be approximately 70 feet by 70 feet. Pad mounted transformers would be placed next to each wind turbine, with the pedestal 17 feet in diameter, and crushed rock apron extending 10 feet wide around the pedestal. For step-and-touch voltage compliance, an area around each wind turbine and transformer would be covered in gravel four inches deep and ten feet in all directions. See **Figure B-3** in **Appendix B** for a depiction of a typical crane pad layout and **Figure B-4** in **Appendix B** for a depiction of a typical layout for a turbine apron plan.

Collector System: Each wind turbine would be interconnected with underground power and communication cables, called the collector system. The underground collector system would be placed in one trench or multiple parallel trenches within a 15-foot-wide corridor and connect each of the wind turbines to one central collector substation. The estimated trench length, including parallel trenches, is approximately 317,000 feet (60 miles). The communication system would be located within the same trenches. This trench would temporarily disturb the entire 15-

foot-wide corridor; it would not result in any permanent impacts. This system would be used to route the power from each wind turbine to a central collector substation where the electrical voltage would be increased from 34.5-kV to 230-kV. The collector substation would be enclosed in a fence with dimensions of roughly 350 feet by 140 feet, temporarily disturbing 10 acres and permanently disturbing 1.8 acres. **Figure B-5** in **Appendix B** shows the proposed Crow Lake Alternative collector substation layout and electrical bus arrangement.

Fiber Optic Communication Lines: The fiber optic communication lines for the Proposed Project would be installed in the same trenches as the underground electrical collector cables and connect each wind turbine to the O&M building and collector substation. There would be a small microwave tower within the substation fence. Using the Integrated Microwave Communication System, the facility would be able to communicate with the operations center.

O&M Building: It is anticipated that a 6,000-square-foot (55 feet by 110 feet) O&M building would be built in the vicinity of the collector substation, temporarily disturbing 20 acres, and permanently disturbing approximately one acre to accommodate personnel parking and the fence. The final location would be determined in consultation with future operations personnel.

Roads: New access roads would be built to facilitate construction and maintenance of the wind turbines. This road network would include approximately 75 miles of new or upgraded roads. These roads would be designed to minimize length and construction impact. The new and upgraded roads would temporarily disturb a corridor up to 40 feet wide to allow movement of wind turbine assembly cranes. Upon completion of construction, the wind turbine access roads would be narrowed to an extent allowing for the routine maintenance of the facility, anticipated to be a permanent 16-foot-wide corridor. Temporary portions of the access roads would be reclaimed.

Existing roads, State and county roads, and section line roads would be improved to aid in servicing the wind turbine sites. Approximately 30 to 40 miles of new wind turbine access roads would be built and 25 to 35 miles of existing roads would be used and where appropriate, improved. Private wind turbine access roads would be built to the towers. The specific wind turbine placement would determine the amount of private roadway needed.

Crane Walks: In some areas of the Proposed Project, it may be more efficient to move the wind-turbine-assembly crane cross-country, from wind turbine to wind turbine, on a route off of roads. These routes are referred to as “crane walks.” Crane walks would be approximately 40-foot wide temporary disturbances that would be reclaimed following construction, similar to other disturbed areas of the Proposed Project Components. The final distance and placement of crane walks would be determined as a result of the final turbine layout.

Lay Down Areas: The temporary staging area would be developed on approximately 40 acres, primarily consisting of cropland to minimize grading (although final locations would need to be determined). The staging area would house the construction office trailers and would provide worker vehicle and equipment parking areas, construction staging for limited project components, and a location for construction safety meetings. To prepare the temporary staging

area, vegetation would be cleared, as needed, and graded. Gravel would be placed to provide a level ground surface and control dust. Excess spoil material and topsoil salvaged from the site would be stockpiled. After construction has been completed, the area would be restored.

Transmission: For the Crow Lake Alternative, a new 230-kV transmission line would be required to deliver the power from the collector substation to a 230-kV interconnection point at Western's Wessington Springs Substation. The Wessington Springs Substation is located approximately nine miles from the collector substation.

The Applicants have identified three alternate transmission line corridors. Due to engineering considerations, the alternative 1 transmission line corridor includes an area outside of the original Crow Lake Alternative boundary; this boundary will reflect the revised transmission line route in the Final Environmental Impact Statement (FEIS). Each of the three transmission line corridors are approximately 11 miles in length. The transmission line would be built using steel single-pole structures. The structures would be about 85 to 95 feet high and span about 800 feet; the right-of-way for the transmission line would be 125 feet wide. Each transmission line structure construction area would have temporary impacts encompassing 100-feet by 125-feet, and there would be a permanent impact of a 20-foot radius around each structure. The transmission line corridor would include a 12-feet wide centerline area to allow for the movement of equipment along the route of the transmission line and include six to eight structures per mile. In addition, pulling sites for each of the alternative transmission line corridor options would include two 125-foot by 300-foot areas for each of the turning locations.

2.3.2 PRE-CONSTRUCTION ACTIVITIES

Based on guidance from Western and RUS in coordination with the Applicants, additional resource surveys and engineering siting would occur that may adjust the currently proposed turbine locations. Pre-construction activities include site-specific surveys and studies, securing landowner agreements, project planning and design, and securing applicable permits. The final layout would depend on the results of these pre-construction activities. Factors which may affect the locations of individual turbines include, but are not limited to, Class III archaeological survey results, biological assessments, a wetland delineation (including jurisdictional Waters of the U.S. [WUS], collectively termed "wetlands") and other resource and engineering considerations. The following list describes the pre-construction activities that have currently been identified.

- A Biological Assessment (BA) will be prepared for consultation with the USFWS in accordance with Section 7 of the ESA. The BA will be prepared and submitted to the USFWS by the Agencies. The results of the BA will be incorporated into the FEIS and the Record of Decision (ROD)
- Avian and bat use surveys are currently being conducted to determine species presence, composition and suitable habitat
- Biological monitoring activities would also be conducted, and coordination with USFWS would occur before and during the geotechnical investigations

- It is anticipated that a wetland delineation would be conducted prior to the start of construction in accordance with USACE standard protocols to identify any wetland potentially affected by the Proposed Project
- To determine what type(s) of concrete foundations would be needed for each wind turbine generator, the Applicants anticipate conducting geotechnical investigations to identify subsurface soil conditions, rock types and strength properties
- Prior to the geotechnical field investigation, a Class III archaeological survey would be conducted in consultation with the South Dakota SHPO
- A Class I cultural resources inventory has been completed. The inventory includes a review of existing cultural resources documentation on file in State repositories, a preliminary architectural history windshield survey within the Proposed Project study area, and a review of 19th century Public Land Survey maps
- On-the-ground Class III field surveys will be conducted along the areas of future ground disturbance including all Proposed Project Components. The results of the Class III survey would be considered in the final engineering of the Proposed Project
- The Proposed Project would be located entirely on privately-owned lands pursuant to lease agreements negotiated between the landowners and the Applicants. These leases would allow construction and operation of wind facilities for a negotiated term
- Additional permits would be obtained and are described in **Chapter 1** in **Table 1.1**

2.3.3 CONSTRUCTION

The Applicants would like to begin construction in mid-2010 and complete construction by the end of 2010. It is anticipated that local workers from the counties would fill the majority of the open construction jobs. Anticipated labor trades required during construction include electricians, crane operators, heavy equipment operators, and other skilled construction laborers. Construction activities would entail the following phases, listed in approximate order of occurrence, although some of the activities would be carried out concurrently:

- Road clearing for access roads for construction and maintenance
- Construction of wind turbine foundations (grading, excavation, reinforcing steel placement, and concrete pouring)
- Grading, trenching, and placement of underground utilities and collector substation (including electric and communication lines)
- Overhead transmission line construction
- Tower assembly, nacelle installation, rotor assembly, rotor installation, and equipment installation including installation of the communication system, supervisory control and data acquisition (SCADA) software and hardware, and telephone or fiber-optic cables
- Final road grading, erosion control and reclamation

Construction activities would be temporary and would involve the use of heavy equipment including bulldozers, graders, trenching machines, concrete trucks, tractor-trailer trucks, and large cranes.

A contractor would be primarily responsible for construction management. The contractor would use the services of local contractors, where possible. Construction management would consist of:

- Securing building, electrical, grading, road, and utility permits
- Performing detailed civil and structural engineering
- Scheduling execution of construction activities
- Completing surveying and geotechnical investigations
- Forecasting project labor requirements and budgeting

The Proposed Project would be constructed under the direct supervision of the on-site construction manager with the assistance of local contractors. The construction consists of the following tasks:

- Site development, including roads
- Foundation excavation
- Installation of concrete foundations
- Electrical and communication system installation
- Tower assembly and machine assembly
- System testing

Throughout the construction phase, ongoing coordination would occur between the Proposed Project development and the construction teams. The on-site construction manager would help coordinate the project, including engaging in ongoing communication with local officials, citizens groups, and landowners.

2.3.4 OPERATION AND MAINTENANCE

Each wind turbine would communicate directly with the SCADA system for the purposes of operation performance monitoring, energy reporting and trouble-shooting. Under normal conditions each wind turbine operates autonomously, making its own control decisions. The Proposed Project would be operated and maintained by the Applicants or a third-party contractor.

The Applicants and the appropriate supplier would control, monitor, operate, and maintain the Proposed Project by means of a SCADA computer software program. In addition to regularly scheduled on-site visits, the wind project could be monitored via computer. The primary functions of the SCADA system are to:

- Monitor status
- Allow for autonomous turbine operation
- Alert operations personnel to conditions requiring resolution
- Provide a user/operator interface for controlling and monitoring wind turbines
- Monitor field communications
- Provide diagnostic capabilities of wind turbine performance for operators and maintenance personnel

- Collect wind turbine, material and labor resource information
- Provide information archive capabilities
- Provide inventory control capabilities; and
- Provide information reporting on a regular basis

There would be a full-time operation and maintenance crew of 10 to 12 people that work in teams of two. If possible, the crews may work in staggered shifts. The two person crews would make trips to the turbines with an average of two turbines per day. With that schedule, the six crews conducting two trips per day would enable 12 trips from the maintenance building to turbines in a typical day.

In general, the heavy equipment and materials needed for site access, site preparation, turbine blade delivery, and foundation construction are typical of heavy construction projects and do not pose unique transportation considerations, except for the delivery of some turbine components as noted below. The movement of equipment and materials to the site during construction would cause a relatively short-term increase in traffic levels on local roadways during the construction period.

Transportation logistics have become a major consideration for wind energy development projects; the trend is toward larger rotors and taller towers and the associated equipment needed to erect them. Depending on the design, some of the turbine components would be extremely long (*e.g.*, blades) or heavy (*e.g.*, the nacelle). The size and weight of these components would dictate the specifications for site access roads for required rights-of-way, turning radii, and fortified bridges. Each turbine would require multiple truck shipments of components, some of which could be oversized or overweight.

Erecting the towers and assembly of the wind turbine generators would require a main crane with a capacity likely to be between 300 and 750 tons, depending on the turbine design, and may require several overweight and/or oversized shipments. In addition, main crane assembly would require a smaller assist crane, and several assist cranes would likely be required for rotor/hub assembly. Cranes would remain on site for the duration of construction activities.

Overweight permits usually are issued with specific dates during which transport is prohibited. These dates are State-specific but tend to eliminate periods during the spring when frozen ground is thawing. Over-dimension permits are likely to have travel time limits in congested areas, limiting movement to non-rush hour periods.

During operations, larger sites may be attended during business hours by a small maintenance crew. Consequently, transportation activities would be limited to a small number of daily trips by pickup trucks, medium-duty vehicles, or personal vehicles. It is possible that large components may be required for equipment replacement in the event of a major mechanical breakdown. Such shipments would be expected to be infrequent.

2.3.5 DECOMMISSIONING AND RESTORATION

The Applicants have a contractual obligation to the landowners to remove the wind facilities, including foundations to a depth of four feet, when the wind easement expires. They also reserve the right to explore alternatives regarding project decommissioning. Retrofitting the turbines and power system with upgrades based on new technology may allow the wind project to produce efficiently for many more years. Based on estimated costs of decommissioning and the salvage value of decommissioned equipment, the salvage value of the wind project may exceed the cost of decommissioning.

With some exceptions, transportation activities during site decommissioning would be similar to those during site development and construction. Heavy equipment and cranes would be required for dismantling turbines and towers, breaking up tower foundations, and regrading the site to the original contours. With the possible exception of a main crane, oversized and/or overweight shipments are not expected during decommissioning activities because the major turbine components can be disassembled, segmented, or reduced in size prior to shipment.

2.3.6 APPLICANTS' AND AGENCIES' INCLUDED BEST MANAGEMENT PRACTICES AND APPLICANTS' PROPOSED MEASURES

The Applicants and Agencies have included Best Management Practices (BMPs) and Applicants' Proposed Measures (APMs), by resource area, and as applicable, for the Proposed Project and proposed Federal actions to minimize impacts associated with construction, operation and decommissioning. The Applicants and Agencies have committed to these included BMPs and APMs prior to the evaluation of environmental impacts. **Table 2.2** summarizes the Applicants' and Agencies' included BMPs, and **Table 2.3** summarizes the APMs. The Applicants would follow standard construction practices, BMPs and APMs during the construction, operation and decommissioning of the Proposed Project Components; these measures may be imposed by State, local or other jurisdictions as the result of approvals for stormwater management, grading permits, building permits, *etc.* or may be the result of efficient and/or responsible construction. Further, Western maintains standard practices for constructing and modifying transmission lines and substations. The BMPs would be followed for any system modifications performed at Western facilities for the proposed Federal action. In addition, Western provides additional requirements for BMPs as part of its contracting requirements. These provisions are outlined in Western's Construction Standard 13 and are applied on a project-specific basis.

Table 2.2 Applicants' and Agencies' Included BMPs

Geology and Soils	Applicants identified: • The Applicants would use BMPs during construction and operation to protect topsoil and water resources and to minimize soil erosion. Practices may include containing excavated material, applying water, use of silt fences, protecting exposed soil with fabrics (especially near wetlands), stabilizing restored material, and revegetating disturbed areas with native grasses and forbs. • Additional geotechnical testing and engineering siting would occur that may adjust the locations of turbines. Engineering design would provide for site specific controls, as needed.
Water Resources	Applicants identified: • Additional resource surveys and engineering siting would occur that may adjust the locations of turbines. Water resource factors which may affect the locations of individual turbines include, but are not limited to, a wetland delineation (including jurisdictional WUS [collectively termed "wetlands"]), and other resource and engineering considerations. Wetlands would be avoided to the extent practicable during the construction phase. • The Applicants would use BMPs during construction, operation, and decommissioning of the site to protect topsoil and water resources and to minimize soil erosion. Practices may include containing excavated material, applying water, use of silt fences and fabrics, protecting exposed soil, stabilizing restored material, and revegetating disturbed areas with native species. Western identified: • Watering facilities and other range improvements would be repaired or replaced if they are damaged or destroyed by construction activities to their condition prior to disturbance, as agreed to by the parties involved.
Air Quality	Applicants identified: • The Applicants would use BMPs during ground disturbing activities and may include applying water, containing excavated material, use of silt fences, protecting exposed soil, stabilizing restored material, and revegetating disturbed areas to minimize short-term air quality effects. • Complaints regarding fugitive dust emissions would be addressed in an efficient and effective manner.
Threatened and Endangered Species	Applicants, RUS and Western identified: • Special status species or other species of particular concern would continue to be considered during post-EIS phases of the Proposed Project's development following management policies set forth by the appropriate land managing agency. This may entail conducting surveys for plant and wildlife species of concern along access and spur roads, staging areas, and construction sites as agreed upon by the land managing agency. In cases where such species are identified, appropriate action would be taken to avoid adverse impacts on the species and its habitat and may include, but is not limited to altering the placement of roads or structures as practical and monitoring construction activities.
Vegetation Resources	Western identified: • The areal limits of construction activities normally would be predetermined, with activity restricted to and confined within those limits. No paint or permanent discoloring agents would be applied to rocks or vegetation to indicate limits of survey or construction activity. • In construction areas where recontouring is not required, vegetation would be left in place wherever possible and original contour would be maintained to avoid excessive root damage and allow for resprouting.

Table 2.2 Applicants' and Agencies' Included BMPs

Cultural Resources	• Prior to construction, all construction personnel would be instructed on the protection of cultural, paleontological, and ecological resources. To assist in this effort, the construction contract would address (a) Federal, State and tribal laws regarding cultural resources, fossils, plants and wildlife, including collection and removal; and (b) the importance of these resources and the purpose and necessity of protecting them.
Land Use	<u>Applicants identified:</u> • The Applicants would work closely with landowners to site access roads to minimize land-use disruptions to the extent possible; for further detail reference the Applicants' Fish and Wildlife Resources APMs in Table 2.3. <u>Western identified:</u> • Fences and gates would be repaired or replaced to their original condition prior to disturbance caused by the proposed Federal action as required by the landowner or the land management agency if they are damaged or destroyed by construction activities. Temporary gates would be installed only with the permission of the landowner or the land managing agency. • In construction areas (e.g., staging yards, spur roads from existing access roads) where ground disturbance is substantial or where recontouring is required, surface restoration would occur as required by the landowner or land management agency. The method of restoration normally would consist of returning disturbed areas back to their natural contour, reseeding (if required), installing cross drains for erosion control, placing water bars in the road, and filling ditches.

Table 2.2 Applicants' and Agencies' Included BMPs

Health and Safety	Applicants identified: Electric and Magnetic Fields (EMF): • To reduce the potential for EMF exposure, the Applicants would encourage conservation, encourage distributed generation, continue to monitor EMF research, encourage utilities to work with customers on household EMF issues, and provide public education. Hazardous Material and/or Hazardous Waste: • All petroleum fluids would be contained within the wind turbines and electrical equipment. Any petroleum wastes generated would be handled and disposed of in accordance with local, State and Federal regulations. Any spills would be immediately reported to construction inspectors so that cleanup activities could be implemented. All spill materials would be labeled and stored at a designated facility for appropriate disposal. Safety and Security: • The turbines would be placed approximately 400 feet from road right-of-way and 1,000 feet from any occupied residences unless a county or township variance is obtained. These distances are considered to be safe based on developer experience and are consistent with the required local setbacks. They also serve to reduce noise. • Security measures would be taken during construction and operation, including temporary and permanent (safety) fencing at the substation(s), warning signs, and locks on equipment and wind power facilities. Also, turbines would sit on solid steel enclosed tubular towers in which all electrical equipment would be located, within the towers except for the pad-mounted transformer. Access to the tower would only be through a solid steel door that would be locked when not in use. Western identified: • Hazardous materials would not be drained onto the ground or drainage areas. Totally enclosed containment would be provided for all trash. All construction waste including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials would be removed to a disposal facility authorized to accept such materials.

Source: Applicants' construction details and BMPs received by Tierra EC 2009; Agencies' construction details and BMPs received by Tierra EC 2009
Note: Only resource categories with identified BMPs are included in this table; the Applicants have agreed with and will implement the Agencies' identified BMPs

Table 2.3 APMs

Water Resources	Applicants identified: • If impacts to wetlands (including jurisdictional WUS [collectively termed "wetlands"]) are unavoidable, then the Applicants would obtain a section 404 Permit through the USACE. Temporary impacts to jurisdictional wetlands would be restored to their pre-construction condition in coordination with the USACE; permanent impacts would be mitigated according to USACE requirements. Temporary impacts to non-jurisdictional wetlands would also be restored to their pre-construction conditions. • Wetlands within USFWS easements on private property are under USFWS jurisdiction. If wetland impacts in USFWS easements could not be avoided, the Applicants would work with the USFWS to obtain permits for the impact and create/implement required mitigation.
Air Quality	Applicants and Agencies' identified: • Air quality effects caused by dust would be short-term, limited to the time of construction, and would not exceed National Ambient Air Quality Standards (NAAQS) particulate standards. • The construction, operation, and decommissioning of the site would adhere to all requirements of those entities having jurisdiction over air quality matters. Any permits needed for construction activities would be obtained. Open burning of construction trash would not be allowed unless permitted by appropriate authorities.
Threatened and Endangered Species	Applicants and Agencies' identified: • Whooping Crane Monitoring Plan/Sightings: The Proponent will develop a Whooping Crane Monitoring Plan as part of the Section 7 consultation process in coordination with the SDGFP. The plan will include, but will not be limited to, training project personnel in the identification of Whooping Cranes and Sandhill Cranes and USFWS reporting requirements; construction requirements; post-construction survey and reporting requirements; mortality monitoring; and adaptive management practices.

Table 2.3 APMs

Fish and Wildlife Resources	Applicants identified: • Prior to surface-disturbing activities during the avian breeding season, a qualified biologist would survey suitable habitat for nesting activity and other evidence of nesting (e.g., mated pairs, territorial defense, birds carrying nest material, transporting food). If active nests are located, or other evidence of nesting is observed, appropriate protection measures, including establishment of buffer areas and constraint periods, would be implemented until the young have fledged and dispersed from the nest area. These measures would be implemented on a site-specific and species-specific basis, in coordination with Western and RUS. • If construction is to occur during the breeding season for raptors, prior to construction activities, raptor breeding surveys would be conducted by a qualified biologist through areas of suitable nesting habitat (grasslands and wooded areas) to identify active nest sites within one half-mile from the Proposed Project area. If applicable, appropriate protection measures, including seasonal constraints and establishment of buffer areas would be implemented at active nest sites until the young have fledged and have dispersed from the nest area. These measures would be implemented on-site-specific and species-specific basis in coordination with Western and RUS. Reports of these activities will be submitted to USFWS and SDGFP. • Habitat impacts to migratory birds, due to both direct (project footprint) and indirect (avoidance effects) will be evaluated and quantified, and appropriate offsetting measures will be developed in coordination with the SDGFP and USFWS. • All temporary meteorological towers associated with the Proposed Project would be removed as soon as construction begins. Any permanent meteorological tower would be freestanding and have no guy wires. • Towers would be lit according to current USFWS guidance regarding reduction of avian mortality associated with turbine tower lights. • Avian and Bat Protection Plan (ABPP): An Avian and Bat Protection Plan will be developed in coordination with the USFWS and SDGFP. It will include, but not be limited to, construction requirements; post-construction avian and bat survey and reporting requirements; avian and bat mortality monitoring; and adaptive management practices
Vegetation Resources	Applicants identified: • The Applicant would develop a post-construction noxious weed monitoring program and would conduct surveys according to that program for three years post-construction, with follow-up surveys in problem areas. • Annual post-construction monitoring and treatment would occur as determined through coordination with the SDPUC and Western and RUS. • Grasslands within USFWS easements on private property are under USFWS jurisdiction. If grassland impacts in USFWS easements cannot be avoided, the Applicants would work with USFWS to obtain permits for the impact and create required mitigation. • Temporarily disturbed areas would be reclaimed by replacement of topsoil and seeding. Revegetation would occur as soon as possible to establish vegetative cover and avoid establishment of weeds. Agricultural lands would be returned to their original use. Regionally native seed or seed mix approved by the county and landowners would be used. If native prairie areas are disturbed they would also be reseeded with a native seed mix. • Noxious weeds would be controlled using appropriate weed control measures. • Dust emissions would be minimized during clearing, grading and other construction activities to avoid adversely affecting vegetation.

Table 2.3 APMs

Cultural Resources	Applicants and Agencies' identified: The following measures would be implemented to address impacts to the area of potential effects (APE): • The Applicants would continue to make a reasonable effort to design the project in such a manner as to minimize impacts to National Register of Historic Places (NRHP) listed and eligible properties. The following APMs would also be implemented to address impacts: • Tribes that are in the consultation process would be contacted if archaeological resources or other properties of tribal interest are identified during construction. • The appropriate tribal representatives and the State Historical Society would be contacted if a burial site is encountered during construction. NAGPRA allows tribes to protect American Indian graves and to repatriate human remains. • No surface disturbance would occur within the boundary of any NRHP eligible property prior to completion of the field phase of a data recovery plan that would be reviewed and approved by the South Dakota State Historical Society. • No surface disturbance would occur within the boundary of a site until its NRHP eligibility is determined. If a site is determined to be eligible, no surface disturbance would occur within the boundary of the site prior to completion of the field phase of a data recovery plan that would be reviewed and approved by the South Dakota State Historical Society. • Cultural resources would continue to be considered during post-EIS phases of project development following the development of an MOA in conjunction with preparation of the EIS. This would involve intensive surveys to inventory and evaluate new discoveries (cultural resources not previously identified). In consultation with appropriate land managing agencies, tribal and State Historic Preservation Officers, specific mitigation measures would be developed and implemented to mitigate any identified adverse impacts. These may include project modifications to avoid adverse impacts, monitoring of construction activities, and data recovery studies. American Indian Tribes would be involved in these consultations to determine whether there are effective or practical ways of addressing impacts on traditional cultural places.
Transportation	Applicants and Agencies' identified: Air Traffic: • The Applicants are coordinating with FAA on layout and lighting and would seek design approval from FAA. Wind turbines and meteorological • Structures and/or ground wire would be marked with highly visible devices where required by governmental agencies (e.g., FAA).
Noise	Applicants and Agencies' identified: • While there are no Federal noise standards that directly regulate noise from the operation of wind turbines, the EPA guidelines recommend a day-night average sound level (L_{dn}) of 55 dBA in typically quiet outdoor and residential areas. As a design characteristic, and in order to achieve the recommended L_{dn}, wind turbines would be set back at least 1,000 feet from occupied residences. • Noise associated with the short-term construction of the transmission corridor would be abated through engineering design by avoiding placement of a structure adjacent to a residence. • Western would continue to monitor studies performed to determine the effects of audible noise and electrostatic and electric and magnetic fields to ascertain whether these effects are significant.

Source: Applicants' Proposed Measures received by Tierra EC 2009; additional detail included from the Agencies' construction details and BMPs received by Tierra EC 2009
Note: Only resource categories with identified measures are included in this table

2.4 WINNER ALTERNATIVE

2.4.1 PROPOSED PROJECT COMPONENTS

The Winner Alternative is located on an approximately 83,000-acre area entirely within Tripp County, approximately eight miles south of the City of Winner, South Dakota. The facilities for the Winner Alternative would be similar to those described for the Crow Lake Alternative (**Section 2.3.1**). However, the difference is that the Winner Alternative would require a 34.5-kV to 115-kV collector substation as well as a 115-kV transmission line to interconnect to Western's existing 115-kV Winner Substation (compared to the 230-kV components described for the Crow Lake Alternative). The Winner Substation is located approximately nine miles from the proposed collector substation. Two alternative transmission line corridors are considered. Depending on the route, the transmission line would be approximately 10 to 11 miles long. The transmission line would be built using steel single-pole structures. The structures would be about 75 to 85 feet high and span about 800 feet. A map depicting the Winner Alternative is included in **Chapter 1** as **Figure 1-4**.

At this time, the Applicants have not prepared a drawing of an electrical bus arrangement for the Winner collector substation. An example layout is depicted in **Figure B-5, Appendix B**.

2.4.2 PRE-CONSTRUCTION ACTIVITIES

The pre-construction activities for the Winner Alternative would be the same as those described for the Crow Lake Alternative. Refer above to **Section 2.3.2** for the additional pre-construction detail.

2.4.3 CONSTRUCTION

The construction aspects for the Winner Alternative would be similar to those described for the Crow Lake Alternative. Refer above to **Section 2.3.3** for the additional details regarding construction.

2.4.4 OPERATION AND MAINTENANCE

The operation and maintenance aspects for the Winner Alternative would be the same as those described for the Crow Lake Alternative. Refer above to **Section 2.3.4** for the additional operation and maintenance detail.

2.4.5 DECOMMISSIONING AND RESTORATION

The decommissioning and restoration aspects for the Winner Alternative would be the same as those described for the Crow Lake Alternative. Refer above to **Section 2.3.6** for decommissioning and restoration detail.

2.4.6 APPLICANTS' AND AGENCIES' INCLUDED BMPS AND APMS

The Applicants' and Agencies' included BMPs and APMs, for the Winner Alternative would be the same as those described for the Crow Lake Alternative. Refer above to **Section 2.3.6** and **Table 2.2** and **Table 2.3** for the additional detail regarding those measures and practices.

2.5 NO ACTION ALTERNATIVE

Under the No Action Alternative, Western would deny the interconnection request (and RUS would not provide financial assistance). For the purpose of impact analysis and comparison in this EIS, it assumed that the Applicants' Proposed Project would not be built and the environmental impacts, both positive and negative, associated with construction and operation would not occur.

2.6 ESTIMATED SURFACE DISTURBANCE AREA

Table 2.4 below describes the anticipated estimated surface disturbance areas associated with the Proposed Project Components for each of the alternatives (note that the No Action Alternative would not result in any surface disturbances). These are conservative estimates based on 101 turbine locations and associated facilities, plus the ten additional turbine locations that may be utilized as contingent turbine locations for the Proposed Project if specific turbine locations are eliminated as a result of additional resource surveys and engineering siting; or they may be installed within the selected site at a later date, pending future load, transmission availability, and renewable production standard requirements. If the Proposed Project is approved and following identification of the preferred project site, the Applicants will determine the exact locations for the 101 turbines and project facility components. Western's action would be limited to previously disturbed areas within its existing substations, unless studies dictate the need to expand the Winner Substation.

2.7 SUMMARY OF IMPACTS BY ALTERNATIVE

Table 2.4 summarizes the quantity of surface disturbance areas for each of the alternatives discussed in the DEIS. **Table S.3** provides a summary of the impacts by resource type, as discussed in **Chapter 4**.

Table 2.4 Estimated Surface Disturbance Areas – Crow Lake and Winner Alternatives

Disturbance Type		Crow Lake Alternative Temporary (acres)	Crow Lake Alternative Permanent (acres)	Winner Alternative Temporary (acres)	Winner Alternative Permanent (acres)
Wind Turbine Generator Assembly Area/Pads		637	4.9	637	5.0
Crane Walks		282	N/A	530	N/A
Electrical Collections Lines (Underground)		105	N/A	198	N/A
Electrical Transmission Lines (Overhead)	Alternative 1	56*	0.13	42	0.12
	Alternative 2	53	0.13	56	0.18
	Alternative 3	55	0.13	NA	NA
Access Roads		255	126	1,710	254
Collection Substation		10	1.8	10	1.8
O &M Building		20	0.15	20	0.15
Temporary Lay Down Area		40		40	
Total Project Impacts (Max Preferred)		1,405	133	3,187	261
Total Alternative Area (acres within boundary)		37,000		83,000	

Note: Quantified impacts include the 101 turbine locations required for the Proposed Project plus the ten additional turbine locations that may be utilized as contingent turbine locations for the Proposed Project if specific turbine locations are eliminated as a result of additional resource surveys and engineering siting; or they may be installed within the selected site at a later date, pending future load, transmission availability, and renewable production standard requirements. This approach is conservative because it identifies a greater amount of disturbance than what would be required for the Proposed Project.

* Due to engineering considerations, the overhead transmission line location includes area outside of the Crow Lake Alternative boundary; this boundary will be revised to include the transmission line route in the FEIS.

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