# Final Environmental Impact Statement

*for the*

# South Dakota PrairieWinds Project

## DOE/EIS #0418

**July 2010**

Joint Lead Agency

U.S. Department of Agriculture

Rural Utilities Service

Joint Lead Agency

U.S. Department of Energy

Western Area Power Administration

Cooperating Agency

U.S. Department of The Interior

Fish and Wildlife Service

# COVER SHEET

**LEAD FEDERAL AGENCIES:** U.S. Department of Energy (DOE), Western Area Power Administration (Western); U.S. Department of Agriculture (USDA), Rural Utilities Service (RUS)
**COOPERATING AGENCIES:** U.S. Department of the Interior (DOI), U.S. Fish and Wildlife Service (USFWS)
**TITLE:** Final Environmental Impact Statement for the South Dakota PrairieWinds Project, DOE/EIS-0418
**LOCATION:** Aurora, Brule, and Jerauld counties; or Tripp County, South Dakota
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**ABSTRACT:** PrairieWinds, SD1, Incorporated (PrairieWinds) is a wholly owned subsidiary of Basin Electric Power Cooperative (Basin Electric). PrairieWinds proposes to construct, own, operate, and maintain the South Dakota PrairieWinds Project, a 151.5-megawatt (MW) nameplate capacity wind-powered generation facility, including 101 General Electric 1.5-MW wind turbine generators, electrical collector lines, collector substation, transmission line, communications system, and wind turbine service access roads. Two alternative locations are being evaluated: 1) the Crow Lake Alternative is on about 36,000 acres approximately 15 miles north of White Lake, South Dakota, within Brule, Aurora, and Jerauld counties, South Dakota, and would interconnect with Western's Wessington Springs Substation, located in Jerauld County, South Dakota; and 2) the Winner Alternative is on about 83,000 acres approximately eight miles south of Winner, South Dakota, entirely within Tripp County, South Dakota, and would interconnect with Western's Winner Substation, located in Tripp County, South Dakota. In January 2010, South Dakota Wind Partners, LLC (Wind Partners) proposed adding seven turbines within the Crow Lake Alternative.

Western's purpose and need is to respond to Basin Electric's interconnection requests (one for the South Dakota PrairieWinds Project and one for the Wind Partners' proposed development, cumulative total of 184 MW) under Western's Open Access Transmission Service Tariff and make a decision whether to approve or deny the interconnection requests. If the decision is to approve the requests, Western's action may include making necessary system modifications to accommodate the interconnection. Basin Electric has requested financial assistance for the South Dakota PrairieWinds Project from RUS. RUS's Federal action is whether to approve or deny financial assistance; accordingly, completing the Environmental Impact Statement (EIS) is one requirement, along with other technical and financial considerations. Wind Partners would finance and own their proposed development.

Western and RUS have prepared this EIS to analyze the environmental impacts of their proposed actions and range of reasonable alternatives, including the "No Action" alternative. The agencies will use the EIS to ensure that the environmental information needed for informed decision-making is available. The agencies will issue separate decisions, in the form of Records of Decision, no sooner than 30 days after publication of the FEIS.

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# Acronym and Abbreviation List

| | |
|---|---|
| ADT | Average daily traffic |
| AMSL | Above mean sea level |
| APE | Area of Potential Effects |
| APLIC | Avian Power Line Interaction Committee |
| APMs | Applicants' Proposed Measures |
| ABPP | Avian and Bat Protection Plan |
| Applicants | Basin Electric Power Cooperative, PrairieWinds SD1, Incorporated and South Dakota Wind Partners, LLC |
| AR | Administrative Rule |
| AWEA | American Wind Energy Association |
| BA | Biological Assessment |
| Basin Electric | Basin Electric Power Cooperative |
| BCC | Birds of Conservation Concern |
| BGEPA | Bald and Golden Eagle Protection Act |
| bgs | Below ground surface |
| BIA | Bureau of Indian Affairs |
| BLM | Bureau of Land Management |
| BMPs | Best Management Practices |
| BO | Biological Opinion |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| CO | Carbon monoxide |
| $CO_2$ | Carbon dioxide |
| CR | County Road |
| CRP | Conservation Reserve Program |
| CWA | Clean Water Act |
| dB | Decibel |
| dBA | A-weighted decibel |
| DEIS | Draft Environmental Impact Statement |
| DENR | Department of Environment and Natural Resources |
| DOE | U.S. Department of Energy |
| DR | Department Regulation |
| EIA | Energy Information Administration |
| EIS | Environmental Impact Statement |
| EMF | Electric and magnetic fields |
| EPA | U.S. Environmental Protection Agency |
| ESA | Endangered Species Act |
| FAA | Federal Aviation Administration |
| FEIS | Final Environmental Impact Statement |
| FEMA | Federal Emergency Management Agency |
| FERC | Federal Energy Regulatory Commission |
| FIRM | Flood insurance rate map |
| FPPA | Farmland Protection Policy Act |
| FR | *Federal Register* |

| | |
|---|---|
| FSA | Farm Service Agency |
| G | Gauss |
| Gal | Gallon |
| GHG | Greenhouse Gas |
| GIS | Geographic Information System |
| GPA | Game Production Areas |
| Hz | Hertz |
| I | Interstate |
| IEC | International Electrotechnical Commission |
| IPCC | Intergovernmental Panel on Climate Change |
| Intertribal COUP | Intertribal Council on Utility Policy |
| K | Soil erodibility factor |
| KOP | Key Observation Point |
| kV | Kilovolt |
| kWh | Kilowatt Hour |
| LCIC | Lewis and Clark Interpretive Center |
| $L_{dn}$ | Day-night average sound level |
| $L_{eq(1\text{-}h)}$ | The sound equivalency over 1 hour |
| L | Liter |
| LGIA | Large Generator Interconnection Agreement |
| LGIP | Large Generator Interconnection Procedures |
| MBTA | Migratory Bird Treaty Act |
| mG | Milligauss |
| MISO | Midwest Independent Transmission System Operator |
| MOA | Memorandum of Agreement |
| mph | Miles per hour |
| μT | Microtesla |
| MW | Megawatt |
| MWh | Megawatt-hours |
| NAAQS | National Ambient Air Quality Standards |
| NAGPRA | Native American Graves Protection and Repatriation Act |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act |
| NHT | Lewis and Clark National Historic Trail |
| NOAA Fisheries | National Oceanic and Atmospheric Administration Fisheries |
| $NO_2$ | Nitrogen dioxide |
| NOA | Notice of Availability |
| NOI | Notice of Intent |
| NPDES | National Pollutant Discharge Elimination System |
| NPS | National Park Service |
| NRCS | Natural Resources Conservation Service |
| NREL | National Renewable Energy Laboratory |
| NRHP | National Register of Historic Places |
| NWI | National Wetlands Inventory |
| $O_3$ | Ozone |
| O&M | Operation and maintenance |

| | |
|---|---|
| OSHA | Occupational Safety and Health Administration |
| OMP | Operations and Monitoring Plan |
| Pb | Lead |
| PII | Potential Impact Index |
| $PM_{2.5}$ | Particulate matter less than 2.5 microns in diameter |
| $PM_{10}$ | Particulate matter less than 10 microns in diameter |
| PPR | Prairie Pothole Region |
| PrairieWinds | PrairieWinds SD1, Incorporated |
| Proposed Project | Proposed South Dakota PrairieWinds Project |
| PSA | Power Supply Analysis |
| PSC | Public Service Commission |
| PUC | Public Utilities Commission |
| RE Act | Rural Electrification Act |
| REOs | Renewable Energy Objectives |
| ROD | Record of Decision |
| ROI | Region of Influence |
| RPS | Renewable Portfolio Standards |
| RSA | Rotor Sweep Area |
| RUS | Rural Utilities Service |
| SCADA | Supervisory control and data acquisition |
| SDAAQS | South Dakota Ambient Air Quality Standards |
| SDCL | South Dakota Codified Laws |
| SDDL | South Dakota Department of Labor |
| SDDOT | South Dakota Department of Transportation |
| SDDPR | South Dakota Division of Parks and Recreation |
| SDGFP | South Dakota Game, Fish and Parks |
| SDGOED | South Dakota Governor's Office of Economic Development |
| SDGS | South Dakota Geological Survey |
| SDNHP | South Dakota Natural Heritage Program |
| SDOC | South Dakota Office of Climate |
| SDPUC | South Dakota Public Utilities Commission |
| $SF_6$ | Sulfur hexafluoride |
| SGIA | Small Generator Interconnection Agreement |
| SGIP | Small Generator Interconnection Procedures |
| SHPO | State Historic Preservation Office |
| sle | Super long extreme |
| $SO_2$ | Sulfur dioxide |
| SPCC | Spill Prevention Control and Countermeasures Plan |
| SR | State Route |
| SSURGO | Soil Survey Geographic Database |
| SUP | Special Use Permit |
| SWPPP | Storm Water Pollution Prevention Plan |
| T | Tesla |
| Tariff | Open Access Transmission Tariff |
| TCP | Traditional Cultural Properties |
| Transmission SIS | Transmission System Impact Study |

| | |
|---|---|
| TSS | Total suspended solids |
| USACE | U.S. Army Corps of Engineers |
| U.S.C. | U.S. Code |
| USDA | U.S. Department of Agriculture |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| US | U.S. Highway |
| V/m | Volts per meter |
| WEST | Western EcoSystems Technology, Inc. |
| Western | Western Area Power Administration |
| Wind Partners | South Dakota Wind Partners, LLC |
| WMD | Wetland Management District |
| WPA | Waterfowl Production Areas |
| WRAN | Wind Resource Assessment Network |
| WUS | Waters of the U.S. |

# Metric Conversions

## Metric Prefixes

| Prefix | Symbol | Multiplication Factor |
|---|---|---|
| mega- | M | 1 000 000 = $10^{6}$ |
| kilo- | k | 1 000 = $10^{3}$ |
| deci- | d | 0.1 = $10^{-1}$ |
| milli- | m | 0.001 = $10^{-3}$ |
| micro- | μ | 0.000 001 = $10^{-6}$ |

## Conversion Chart

| If You Know | To Convert into Metric, Multiply By | To Get | If You Know | To Convert into English, Multiply By | To Get |
|---|---|---|---|---|---|
| Length | | | | | |
| inch | 2.54 | centimeter | centimeter | 0.3937 | inch |
| feet | 30.48 | centimeter | centimeter | 0.0328 | feet |
| feet | 0.3048 | meter | meter | 3.281 | feet |
| yard | 0.9144 | meter | meter | 1.0936 | yard |
| mile | 1.60934 | kilometer | kilometer | 0.62414 | mile |
| Area | | | | | |
| acre | 0.40469 | hectare | hectare | 2.471 | acre |
| square mile | 2.58999 | square kilometer | square kilometer | 0.3861 | square mile |
| Volume | | | | | |
| gallon | 3.7854 | liter | liter | 0.26417 | gallon |
| gallon | 0.0039 | cubic meter | cubic meter | 256.14 | gallon |
| cubic yard | 0.76455 | cubic meter | cubic meter | 1.308 | cubic yard |
| Temperature | | | | | |
| Fahrenheit | subtract 32, then multiply by 5/9 | Celsius | Celsius | multiply by 9/5, then add 32 | Fahrenheit |

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# Executive Summary

This executive summary is included in the beginning of the Final Environmental Impact Statement (FEIS) for the South Dakota PrairieWinds Project (Proposed Project) and is also intended to serve as a stand-alone document to provide a summary of the information contained within the full text version of the FEIS. For additional information on the topics contained within this summary please see the FEIS.

# S.1 INTRODUCTION

Basin Electric Power Cooperative (Basin Electric) is a regional wholesale electric generation and transmission cooperative owned and controlled by its member cooperatives. Basin Electric serves approximately 2.8 million customers covering 540,000 square miles in portions of nine States. PrairieWinds SD1, Incorporated (PrairieWinds) is a wholly owned subsidiary of Basin Electric and proposes to construct, own, operate, and maintain the Proposed Project. Basin Electric has requested to interconnect the Proposed Project with the transmission system owned and operated by Western Area Power Administration (Western), an agency within the U.S. Department of Energy (DOE). Basin Electric has requested financing for the Proposed Project from the Rural Utilities Service (RUS), an agency within the U.S. Department of Agriculture (USDA). Western and RUS are collectively termed the "Agencies."

Basin Electric's generation interconnection request and financing request trigger a National Environmental Policy Act (NEPA) review process of the Proposed Project by Western and RUS, respectively. The Agencies have determined that an environmental impact statement (EIS) is required and are joint lead Federal Agencies for preparation of the document.

The Proposed Project would include a 151.5-megawatt (MW) nameplate capacity wind-powered energy generation facility that would feature 101 wind turbine generators, operations and maintenance 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. Two alternative locations in South Dakota are being evaluated for the Proposed Project. These locations and Proposed Project facilities are further described in **Section S.6 Alternatives**.

In January 2010, South Dakota Wind Partners, LLC (Wind Partners), a South Dakota Limited Liability Company, and Basin Electric began discussions about adding seven turbines within the alternative site near Wessington Springs. Wind Partners would finance and own these turbines. Through an agreement between Basin Electric and Wind Partners, Basin Electric would construct, operate, and maintain the Wind Partners' proposed development. Basin Electric submitted a request to interconnect these additional wind turbines with the transmission system owned and operated by Western.

# S.2 AGENCIES' PURPOSE AND NEED

Western and RUS have prepared the FEIS to analyze the impacts of their respective Federal actions, the Proposed Project and Wind Partners' proposed development in accordance with NEPA, as amended; DOE NEPA Implementing Procedures (Title 10 Code of Federal Regulations [CFR] Part 1021); the Council on Environmental Quality (CEQ) regulations for implementing NEPA (Title 40 CFR Parts 1500-1508); and RUS Environmental Policies and Procedures (Title 7 CFR Part 1794). The U.S. Fish and Wildlife Service (USFWS) is participating as a Cooperating Agency for the EIS process. Western, RUS, and USFWS Federal actions are discussed below.

Additionally, the Proposed Project and Wind Partners' proposed development are subject to the jurisdiction of the South Dakota Public Utilities Commission (SDPUC), which has regulatory authority for siting wind generation facilities and transmission lines within the State. The SDPUC approved a Wind Energy Facility Permit for the Proposed Project and Wind Partners' proposed development on June 15, 2010.

### *Western Area Power Administration*

Western has received two interconnection requests from Basin Electric. As addressed in the DEIS, the first request was to interconnect the Proposed Project with either Western's Winner or Wessington Springs Substation. The first interconnection request was for 150 MW. Data from the same model of turbine in operation at other locations indicates that, under ideal conditions, these turbines are occasionally capable of generating slightly more than the nameplate rating of 1.5 MW each. Following issuance of the DEIS, to account for the Wind Partners' proposed development and the potential increase in turbine performance from the Proposed Project and Wind Partners' proposed development, Basin Electric submitted a second request to interconnect an additional 34 MW at the existing Wessington Springs Substation.

Western's purpose and need is to respond to the interconnection requests in accordance with Section 211 of the Federal Power Act and Western's Open Access Transmission Service Tariff (Tariff). Section 211 of the Federal Power Act requires that transmission service be provided upon request, if transmission capacity is available. The Wind Partners' proposed development is dependent upon the Proposed Project; therefore, Western is performing studies combining the interconnection requests. Thus, Western is examining the potential impacts of an 184-MW interconnection request at Wessington Springs. If Western either denies Basin Electric's request for an interconnection for Basin Electric's Proposed Project or approves the request for the interconnection at the Winner substation and not the Wessington Springs substation, the Wind Partners' proposed development could not proceed. Western could grant an interconnection for the original request which would allow the Proposed Project to be built, and deny the second interconnection request in which case, the Wind Partners' proposed development would not be constructed and the Proposed Project would be operated at its nameplate capacity of 151.5 MW.

Western's Tariff provides open access to its transmission system. If there is available capacity on the transmission system, Western provides transmission services through an interconnection. This interconnection request requires Federal action which triggers NEPA review. When responding to the need for agency action, and subject to its NEPA review, Western is bound by the following:

- Providing Transmission Service – under Western's Tariff, Western offers capacity on its transmission system to deliver electricity when capacity is available. The Tariff complies with the Federal Energy Regulatory Commission's (FERC) Final Orders which are intended to ensure non-discriminatory transmission system access. Western submitted revisions to its non-jurisdictional Tariff in January 2005 as to certain terms and for inclusion of the Large Generator Interconnection Procedures (LGIP) and a Large Generator Interconnection Agreement (LGIA). Both interconnection requests would be addressed under Western's LGIP. In March 2007, Western submitted another revision for certain terms and to incorporate the Small Generator Interconnection Procedures (SGIP) and a Small Generator Interconnection Agreement (SGIA). Final approval for these filings was received from FERC in September 2007. In September 2009 Western submitted yet another set of revisions to address FERC Order 890 requirements along with revisions to existing terms.
- Protecting Transmission System Reliability and Service to Existing Customers – Western must ensure that existing reliability and service is not degraded. Western's LGIP and SGIP provide for transmission and system studies to ensure that system reliability and service to existing customers are not adversely affected by new interconnections. These studies also identify system upgrades or additions necessary to accommodate the Proposed Project and ensure that they are in the project scope.

### *Rural Utilities Service*

RUS is authorized to make loans and loan guarantees that finance the construction of electric distribution, transmission and generation facilities, including system improvements and replacements required to furnish and improve electric service in rural areas, as well as demand side management, energy conservation programs, and on-grid and off-grid renewable energy systems.

Basin Electric has requested financial assistance for the Proposed Project from RUS. RUS's proposed Federal action is to decide whether to provide financial assistance; accordingly, completing the NEPA review process is one requirement, along with other technical and financial considerations in processing Basin Electric's application. No financial assistance has been requested from RUS for the Wind Partners' proposed development.

The Rural Electrification Act of 1936, as amended, (7 U.S. Code [U.S.C.] 901 *et seq.*) (RE Act) generally authorizes the Secretary of Agriculture to make rural electrification and telephone loans, including specifying eligible borrowers, preferences, purposes, terms and conditions, security and self-liquidation requirements. The RE Act also authorizes the Secretary of Agriculture to assist borrowers that implement conservation and renewable energy programs.

RUS's agency action involves:

- Provide engineering reviews of the purpose and need, engineering feasibility and cost of the Proposed Project

- Ensure that the Proposed Project meets the borrower's requirements and prudent utility practices
- Evaluate the financial ability of the borrower to repay its potential financial obligation to RUS
- Review and study the alternatives to mitigate and improve transmission reliability issues
- Ensure that adequate transmission service and capacity are available to meet the Proposed Project needs
- Ensure that NEPA and other requirements and RUS Environmental Policies and Procedures are satisfied prior to taking a Federal action

### *U.S. Fish and Wildlife Service*

The site alternatives are located within two USFWS Wetland Management District (WMD) administrative boundaries. The Huron WMD and Lake Andes WMD are responsible for administering and managing lands on which the USFWS has acquired a property interest. Both the Huron and Lake Andes WMDs are responsible for addressing the potential impacts to USFWS lands within the site alternative areas. Additionally, the USFWS works with agencies and other partners to conserve wetlands, migratory birds, and Federally listed threatened/ endangered wildlife by administering the Fish and Wildlife Coordination Act, Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712), Bald and Golden Eagle Protection Act of 1940 (BGEPA) (16 U.S.C. 668-668d, 54 Stat. 250), and the Endangered Species Act (ESA) (7 U.S.C. 136; 16 U.S.C. 460 *et seq.).*

# S.3 BASIN ELECTRIC'S PURPOSE AND NEED

Public policy regarding the electric industry has increasingly focused on the carbon intensity of the resources commonly used to generate electricity. As a result, incentives and regulations to encourage or require the generation of power from renewable or low-environmental-impact resources are being actively considered and/or implemented within the Basin Electric member service areas. At the same time, a number of proposals for national Renewable Portfolio Standards (RPS) are pending in Congress. With members in nine States, Basin Electric recognizes the need for additional renewable energy capacity to service forecasted member load-growth demands and to meet State mandated RPS. A 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.

Basin Electric membership passed a resolution at their 2005 annual meeting that established a goal to "obtain renewable or environmentally benign resources equal to 10 percent of the MW capacity needed to meet its member demand by 2010." This Proposed Project would provide an opportunity for Basin Electric to meet that goal.

# S.4 WIND PARTNERS' PURPOSE AND NEED

The concept underlying the Wind Partners' proposed development is to enable local community involvement and investment in wind projects. The proposed development would also help meet the State of South Dakota's voluntary Renewable Energy Objectives (REOs) of 10 percent by 2015.

# S.5 PUBLIC PARTICIPATION

Western and RUS employed various methods to provide information to the public and solicit input. The Agencies invited Federal, State, local and tribal governments; Basin Electric; and other interested persons and groups to participate in defining the scope of the EIS. Venues for participation included two scoping meetings and one interagency meeting. In addition to receiving comments at meetings, the Agencies invited interested individuals to submit written comments via mail, fax, e-mail and/or the project website.

### *Notice of Intent*

The “Notice of Intent to Prepare an Environmental Impact Statement and to Conduct Scoping Meetings; Notice of Floodplain and Wetlands Involvement” was published in the *Federal Register* ([FR] 74 FR 15718) on April 7, 2009. The Notice of Intent (NOI) included information on the Proposed Project, agency actions, times and locations for the April 28 and April 29, 2009 scoping meetings, and contact information for questions pertaining to the Proposed Project.

Paid advertisements announcing the public scoping meetings were published in *Indian Country Today*, *Mitchell Daily Republic*, *Plankinton South Dakota Mail*, and the *Winner Advocate*. *Indian Country Today* is a national, Native American interest publication, while the others are local newspapers.

In addition, Western and RUS mailed post card scoping notices and letters in April, 2009 to over 4,000 potentially interested persons. The mailing list included Federal, State and local agencies; elected officials; Native American tribes; members of the public; and addresses within seven miles of the Proposed Project alternatives.

### *Scoping Meetings*

Two scoping meetings were hosted by Western and RUS during the public scoping process. The scoping meetings were held using an open-house format to allow for an informal one-on-one exchange of information. Scoping meeting handouts included a copy of the FR NOI, project fact sheet, scoping process information sheet, comment form and a DOE NEPA brochure. Large-scale aerial photographs illustrating the Proposed Project alternatives were presented to facilitate identification of issues and alternatives. Additional large-scale poster boards included: a South Dakota wind resource map; an EIS process and timeline graphic; the agencies’ Federal Action boards; and turbine and transmission line siting parameters. A station was set up at the meetings with a looping PowerPoint presentation to provide an opportunity for individuals to sit and view Proposed Project information and follow along with a print out of the presentation slides. The same information was available at each meeting. All information presented at the meetings is available on the project website: http://www.wapa.gov/transmission/sdprairiewinds.htm. **Table S.1** lists the scoping meeting locations, dates, times and attendance.

**Table S.1 Public Scoping Meetings**

| Location | Date | Time | Attendance |
|---|---|---|---|
| Winner, SD | April 28, 2009 | 4 - 7 p.m. | 88 |
| Plankinton, SD | April 29, 2009 | 4 - 7 p.m. | 81 |
| Total | | | 169 |

### *Interagency Meeting*

On April 28, 2009, Western and RUS hosted an interagency meeting at the Best Western Ramkota Hotel, in Pierre, South Dakota, from 9 a.m. to 11 a.m. to encourage Federal, State and local agencies to participate in defining the scope of the EIS. Proposed Project-specific information was presented at the meeting followed by a group discussion. Fourteen agencies attended the meeting.

### *Scoping Comments*

Comments were used to define the scope of the EIS. Comments received during scoping are summarized in **Appendix A** of the FEIS.

### *Notice of Availability*

The "Environmental Impact Statements, Notice of Availability" was published in the *Federal Register* (75 FR 2540) on January15, 2010. The Notice of Availability (NOA) provided information on the Proposed Project, locations, and point of contact for the Proposed Project.

Paid advertisements announcing information on the Proposed Project; agency actions; times and locations for the February 11, 2010, open house and public hearing; locations for public review of the DEIS; and contact information for questions pertaining to the Proposed Project were published in *Indian Country Today*, *Mitchell Daily Republic*, *Plankinton South Dakota Mail*, and the *Winner Advocate*.

In addition, Western and RUS mailed open house /public hearing notice post cards, DEIS request forms, and letters in January 2010 to over 7,000 potentially interested persons. The mailing list included Federal, State and local agencies; elected officials; Native American tribes; members of the public; and addresses within seven miles of the Proposed Project alternatives.

### *Open House and Public Hearing*

Western and RUS hosted an open house and public hearing on February 11, 2010, at Cozard Memorial Library, in Chamberlain, South Dakota. The open-house was held from 4 p.m. to 5 p.m. and allowed for an informal one-on-one exchange of information. Open house handouts included a fact sheet for the Wind Partners' proposed development and a comment form. Large-scale poster boards included: a map depicting the site alternatives, a South Dakota wind resource map; an EIS process and timeline graphic; the agencies' Federal Action boards; and turbine and transmission line siting parameters. Additionally, copies of the DEIS and the executive summary were available. The public hearing was held from 5 p.m. to 7 p.m. During the public hearing, information on the Proposed Project, the Wind Partners' proposed development and Agency actions was provided. In addition, a court reporter was available and members of the public were given an opportunity to provide feedback on the draft environmental findings and alternatives for inclusion in the EIS. Fifteen individuals attended the open house and public hearing; the court reporter transcribed comments from three individuals.

### *DEIS Interagency Meeting*

On February 11, 2010, Western and RUS hosted an interagency meeting at the Rawlins Municipal Library, in Pierre, South Dakota; from 10 a.m. to 12 p.m. to encourage Federal, State and local agencies to discuss project components and provide feedback on the draft environmental findings and alternatives. Proposed Project-specific information was presented at the meeting followed by a group discussion. Thirteen representatives from seven different agencies attended the meeting.

### *DEIS Comments*

The public review period of the DEIS commenced on January 15, 2010, and closed on March 1, 2010. The Agencies received 33 comment letters (via public hearing, fax, mail and e-mail) on the DEIS. Substantive, factual, and editorial comments were incorporated and addressed in the FEIS; other comments not affecting the substance of the document have been noted. A guide for comment and response location, the comment and response tracking table, copies of written comments and hearing transcripts are included in **Appendix F** of the FEIS.

# S.6 ALTERNATIVES

Prior to submitting the interconnection request and financing request for the Proposed Project, Basin Electric 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. As a result of Basin Electric's screening process, two alternatives, Crow Lake and Winner, appeared favorable for development of a wind-powered generation facility (see **Figure S.1** for general location). The alternative sites were presented at scoping meetings and the interagency meeting to provide a basis for discussing the scope of the EIS. No additional alternatives were identified in response to public issues or concerns. The alternatives under evaluation in the EIS include the Crow Lake Alternative, Winner Alternative, and No Action Alternative.

Regardless of location, the Proposed Project would include wind turbine generators, an operations and maintenance 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, temporary batch plant, crane walks, and new and/or upgraded service roads to access the facilities.

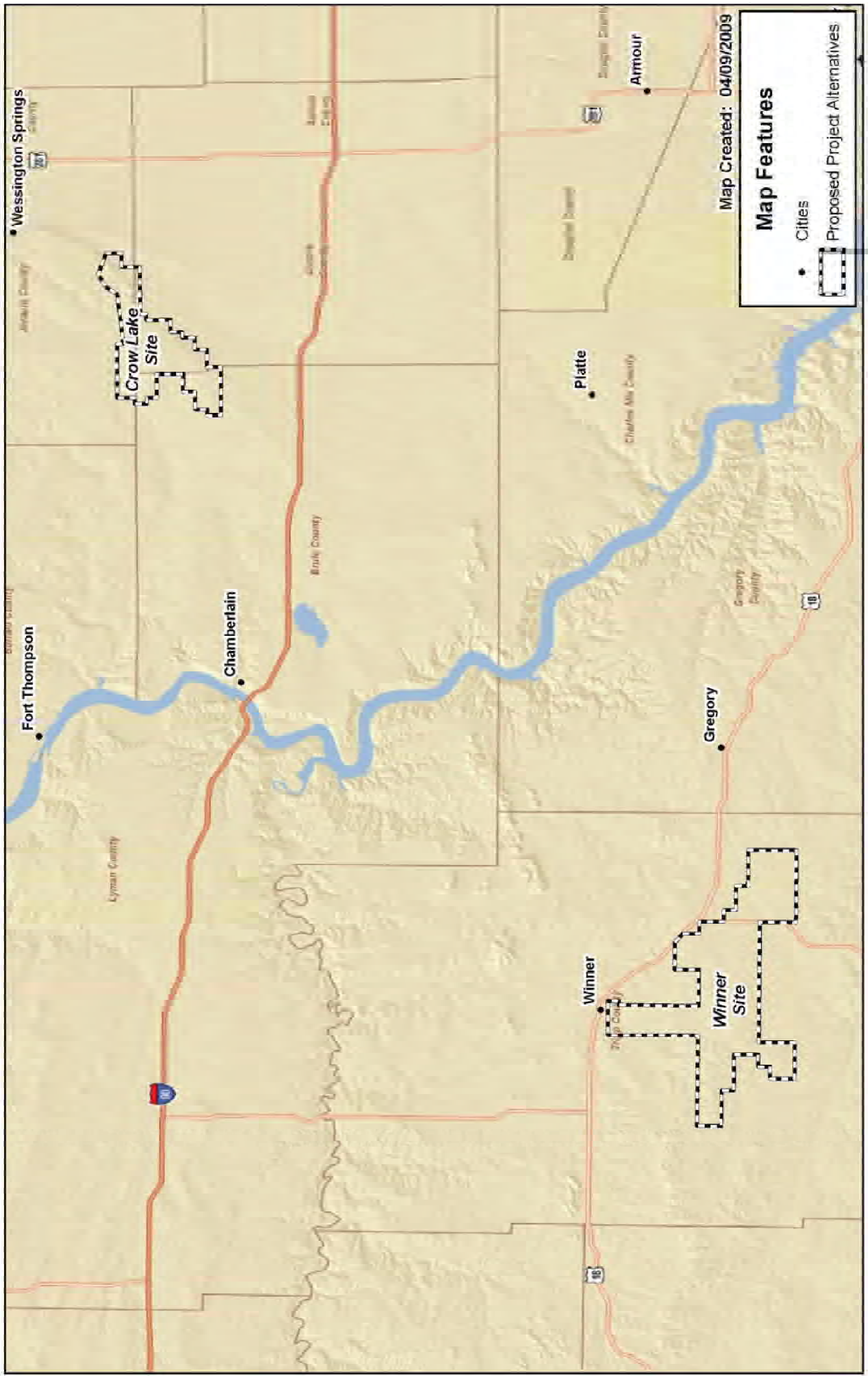


**Figure S.1 Proposed Project Alternatives**

The Proposed Project would involve the installation and operation of a 151.5-MW nameplate capacity wind-powered energy generation facility that would feature 101 wind turbine generators. Each turbine would have a hub height of 262 feet and a rotor diameter of 252 feet. The total height of each wind turbine would be 389 feet with a blade in the vertical position. The towers would be constructed of tubular steel, approximately 15 feet in diameter at the base, with internal joint flanges. The color of the towers and rotors would be standard white or off-white. During construction, a work/staging area at each turbine would include the crane pad and rotor assembly area, temporarily disturbing an area of approximately 500 feet by 500 feet; and permanently disturbing a 25-foot radius around each turbine.

Ten additional turbine locations were identified and analyzed in the DEIS. These turbines were initially analyzed as contingent turbine locations for the Proposed Project in case specific turbine locations were eliminated as a result of additional resource surveys and engineering siting; or to be installed within the selected site at a later date, pending future load, transmission availability, and renewable production standard requirements. At this time, for the Crow Lake Alternative only, seven of these contingent turbine locations are proposed by the Wind Partners. The Wind Partners' proposed development would have a nameplate capacity of 10.5 MW.

Each wind turbine would be connected by a service road for access and a 34.5-kilovolt (kV) underground electrical collection system that would ultimately route the power from each turbine to a collector substation, where voltage would be increased for interconnection to Western's transmission system. New access roads would be built to facilitate both constructing and maintaining the turbines. Existing roads would be used and, where appropriate, improved. The communication system would be located within the same trenches as the underground collector system. The underground collector system, collector substation, transmission line, and access roads are further described within each alternative discussion below.

### *Crow Lake Alternative*

The proposed Crow Lake Alternative would involve installing wind turbines on 131 acres within an approximately 36,000-acre area. This Proposed Project area is approximately 15 miles north of White Lake, and 17 miles southwest of Wessington Springs, South Dakota, within Brule, Aurora, and Jerauld counties. For this alternative, the requested interconnection to Western's electric transmission system is at the Wessington Springs Substation, in Jerauld County, South Dakota.

Each wind turbine would be interconnected with underground power and communication cables, called the collector system. The Crow Lake Alternative would require approximately 64 miles of underground collector system, one 34.5-kV to 230-kV collector substation, as well as a 230-kV transmission line to interconnect to a new 230-kV interconnection point at Western's existing Wessington Springs Substation. The Wessington Springs Substation is located a straight-line distance of approximately 9 miles from the proposed collector substation; the transmission line length would be approximately 11 miles. The proposed transmission line would be built using steel single-pole structures. The structures would be between 75 to 85 feet high with a span of about 800 feet. In addition, this alternative would require approximately 44 miles of new wind turbine access roads to be built and 37 miles of existing roads would be used and, where appropriate, improved.

For the Crow Lake Alternative only, eight of the 64 miles of underground collector system would be required to interconnect the Wind Partners' proposed development to the collector substation. In addition, four of the 44 miles of new wind turbine access roads would be required for the Wind Partners' proposed development.

The Wind Partners' proposed development applies only to the Crow Lake Alternative. The Wind Partners' proposed development is dependent upon Basin Electric's Proposed Project. If Western denies Basin Electric's request for an interconnection for Basin Electric's Proposed Project, the Wind Partners' proposed development could not proceed. Western could grant an interconnection for the Proposed Project and deny the interconnection request for the Wind Partners' proposed development.

### *Winner Alternative*

The Winner Alternative would involve installing wind turbines on 261 acres within an area of approximately 83,000 acres. This proposed project area is within Tripp County, approximately eight miles south of Winner, South Dakota. For this alternative, the requested interconnection to Western's electric transmission system is at the Winner Substation, in Tripp County.

The Winner Alternative would require approximately 108 miles of underground collector system, one 34.5-kV to 115-kV collector substation, as well as a 115-kV transmission line to interconnect to a new 115-kV interconnection point at Western's existing Winner Substation. The Winner Substation is approximately 9 miles from the proposed collector substation. Depending on route, the proposed transmission line would be approximately 10 to 11 miles long. The proposed transmission line would be built using steel single-pole structures. The structures would be between 85 and 95 feet high with a span of about 800 feet. In addition, this alternative would require approximately 46 miles of new wind turbine access roads to be built and 71 miles of existing roads would be used and where appropriate, improved.

### *No Action Alternative*

Under the No Action Alternative, Western would not approve an interconnection request(s) and/or RUS would not approve financing for the Proposed Project. For the purpose of impact analysis and comparison in this FEIS, it is assumed that the Proposed Project (and Wind Partners' proposed development as it pertains to the Crow Lake Alternative) would not be built and that the environmental impacts associated with construction and operation of the Proposed Project would not occur.

# S.7 IMPACTS

**Table S.2** presents a summary of the impacts for each of the alternatives discussed in the FEIS. Where impacts for each of the alternatives would be the same, the impact discussions within the table have been combined and the summary information has been stated once; differences in impacts between the alternatives are provided in a side-by-side comparison. Significance criteria were only developed for potential impacts identified as issues during the EIS scoping process and were based on scientific information, statute, or in response to public concern. Additional potential impacts are also addressed as described in **Table S.2**.

The term "Applicants" refers to Basin Electric and, for the Crow Lake Alternative, includes Wind Partners. 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, Wind Partners' proposed development and 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 (see **Table 2.2** and **Table 2.3** for a summary of these measures).

Critical Elements of the Human Environment, as defined and specified in statutes and Executive Orders that could be impacted by the Proposed Project, Wind Partners' proposed development and proposed Federal actions include:

- Geology and soils
- Water resources
- Climate change and air quality
- Biological resources
- Cultural resources
- Land use
- Transportation
- Visual resources
- Noise
- Socioeconomics
- Environmental justice
- Health and safety

Critical Elements of the Human Environment that would not be affected are listed below, followed by the justification for dismissal of these elements from further discussion.

**Paleontology –** Investigations of publicly available maps and local geology did not identify paleontological resource sites in the Proposed Project area. The glacial till and outwash deposits that compose the majority of the surface soils in the area are unlikely to contain fossils.

**Wild and Scenic Rivers –** Review of the U.S. Department of Interior, National Park Service (NPS) Website indicates that there are no Federally-designated Wild and Scenic Rivers in South Dakota (NPS 2004).

**Wilderness –** There are no Federally-designated wilderness areas near the Proposed Project alternatives.

The original analysis in the DEIS was conservative and included the evaluation of 10 contingent turbines and associated facilities. At this time, seven of the contingent turbine locations for the Crow Lake Alternative represent the Wind Partners' proposed development (see **Section 2.3.1 and Table 2.4**); therefore, the Wind Partners' proposed development was addressed in the DEIS analysis. As such, the Wind Partners' proposed development represents an increment of the impact described for the Crow Lake Alternative for all resources.

The Wind Partners' proposed development would be constructed within the boundaries of the Crow Lake Alternative and share many of the components described for the Proposed Project. For the Crow Lake Alternative, the term "Proposed Project Components" includes the Wind Partners' proposed development.

# S.8 PREFERRED ALTERNATIVE

**Table S.2** provides a summary of the impacts by resource type. **FEIS Table 2.4** summarizes the anticipated estimated surface disturbance areas (both temporary and permanent) associated with the Proposed Project Components for each of the action alternatives (note that the No Action Alternative would not result in surface disturbances). **FEIS Chapter 4** provides the detailed impact analysis for each alternative.

**Western's Preferred Alternative**: Western's Tariff provides open access to its transmission system. If there is available capacity in the transmission system, Western provides transmission services through an interconnection. Transmission studies completed for the Crow Lake Alternative demonstrate that transmission capacity is available for the Proposed Project through an interconnection at Western's existing Wessington Springs Substation without the need to expand the substation. Facility expansion may be required at Western's Winner Substation to accommodate interconnecting the Winner Alternative. Since transmission capacity is available for the Crow Lake Alternative and transmission studies have demonstrated that system reliability and service to existing customers would not be jeopardized, and taking into account the environmental impacts, the interconnection at Western's Wessington Springs Substation is Western's preferred alternative.

**RUS's Preferred Alternative**: The RE Act authorizes the Secretary of Agriculture to make loans to eligible rural electric and telephone borrowers for electric and telecommunications infrastructure as well as assisting borrowers that implement conservation and renewable energy programs. RUS has reviewed the Proposed Project, alternatives and their anticipated impacts in relation to Basin Electric's renewable portfolio and prudent utility practices. Based on the analyses, the construction of wind generation at the Crow Lake Alternative would result in fewer environmental impacts than the Winner Alternative and would meet Basin Electric's purpose and need. Therefore, RUS's preferred alternative is the construction of a wind farm at the Crow Lake Alternative.

## Table S.2 Impact Summary by Alternative

<table>
<tr><th>Resource</th><th>Crow Lake Alternative</th><th>Winner Alternative</th><th>No Action Alternative</th></tr>
<tr><td rowspan="2">Geology and soils</td><td>Soils – Crow Lake Alternative<br>Temporary impact: 1,006 acres<br>Permanent impact: 190 acres<br>Soils in the Crow Lake Alternative are considered by Natural Resources Conservation Service (NRCS) to have a slight to moderate risk of erosion.</td><td>Soils – Winner Alternative<br>Temporary impact: 3,188 acres<br>Permanent impact: 261 acres<br>Soils in the Winner Alternative are considered by NRCS to have a slight risk of erosion.</td><td rowspan="2">No impact.</td></tr>
<tr><td colspan="2">For either site alternative, during construction, existing vegetation would be removed in the areas associated with the Proposed Project Components, potentially increasing the risk of erosion. Once vegetation is removed in the vicinity of the construction areas, soils would be excavated to achieve necessary grades and put into stockpiles. Construction would be conducted in compliance with the Applicants' and Agencies' included BMPs, the APMs and a Storm Water Pollution Prevention Plan (SWPPP) to minimize potential impacts to soils from erosion. Geotechnical investigations would identify the stability of the soils and underlying geology to assist with turbine placement, design of foundations and specification of drainage controls.<br>For either site alternative, staging and construction activities would require sand and gravel resources. Sand and gravel resources are located in the vicinity. For the Proposed Project, each turbine base would use approximately 320 cubic yards of concrete, encompassing approximately 33,000 cubic yards total, and would require approximately 46,200 tons of sand and gravel. This amount is less than half of one percent of the sand and gravel annually generated within South Dakota. There could also be potential for additional gravel to be used for road improvements. Use of these resources for the construction activities would not deplete the availability and supply of sand and gravel.<br>For the aforementioned reasons, regardless of which transmission line alternative would be selected, the Proposed Project Components would result in minimal erosion and would not cause long-term impacts to geology, soils, or water resources; thus, the impacts would be less than significant.<br>Western's system modifications would be short-term in duration and confined to a previously disturbed and graded area. Impacts to soils would be less than significant.</td></tr>
</table>

## Table S.2 Impact Summary by Alternative

| Resource | Crow Lake Alternative | Winner Alternative | No Action Alternative |
|---|---|---|---|
| **Water resources** | A wetland delineation has been conducted for the preferred alternative (the Crow Lake Alternative, Proposed Project only), in accordance with USACE standard protocols. A wetland delineation would be conducted for the Wind Partners' proposed development, prior to the start of construction, in accordance with USACE standard protocols to identify wetlands. Construction activities would avoid wetlands such that there would be no direct impacts from Proposed Project Components. If final engineering results in layout modifications, then additional delineations would be performed within the final impact areas to identify wetlands that would require minor re-routes such that wetlands would be avoided. Although not anticipated, if impacts to wetlands (including jurisdictional WUS [collectively termed "wetlands"]) are unavoidable, then the Applicants would obtain a section 404 Permit through the USACE. Wetland delineations were not completed for the Winner Alternative because this alternative was not chosen as the preferred alternative; however, if the Federal actions are approved for the Winner Alternative, delineations would be completed after final design. As detailed in the included BMPs and APMs, further coordination would occur between the Applicants and the USACE to avoid and minimize potential impacts to wetlands. As necessary, the Applicants would obtain the necessary permit(s) under Section 404 of the CWA prior to construction; permits may not be acquired before the completion of the EIS. Potential permanent impacts to wetlands would be less than significant in accordance with USACE requirements for each of the alternatives.<br><br>Wetlands within USFWS easements on private property are under USFWS jurisdiction. As detailed in the included BMPs and APMs, the Applicants would locate the Proposed Project Components to avoid wetlands; if wetlands cannot be avoided, the Applicants would work with the USFWS and/or USACE to obtain permits and minimize impacts. Therefore, impacts to wetlands would be less than significant.<br><br>The majority of both temporary and permanent disturbances would be on land currently used for rangeland and agriculture and on soils with low representative slopes. However, the excavation and exposure of soil during construction of the Proposed Project Components could cause sediment runoff during rain events. Implementation of the included BMPs and APMs would ensure that potential impacts to surface water flows, drainage patterns, stream channel morphology, quantity and quality are less than significant during construction, operation and decommissioning activities.<br><br>On-site or off-site flooding would not result from construction, operation or decommissioning of the Proposed Project. Flood hazard zones have not been identified in the Proposed Project areas; as needed, the final engineering design would evaluate site conditions, and the included BMPs and APMs would be implemented to address potential flooding. Thus, development of the Proposed Project would result in less than significant impacts to floodplains.<br><br>If shallow groundwater is encountered during construction or decommissioning, the Applicants would acquire a Dewatering Permit from the Department of Environment and Natural Resources (DENR). Water extraction during potential dewatering operations would be conducted in a manner to protect water quality, and would be of minimal volume. Potential effects on groundwater would be isolated and small-scale, resulting in short-term, localized water table depressions that would not remain following construction or decommissioning. Thus, development of the Proposed Project would result in less than significant impacts to water supplies.<br><br>Development of the Western system modifications at either of the existing Western substations (Wessington Springs or Winner) would not result in any impacts to water resources since drainage from the sites are controlled by the sites' SWPPPs and BMPs. Because Western's substations are already in operation, groundwater is not expected to be encountered during foundation excavation activities. If groundwater is encountered, Western would address this in accordance with the included BMPs and other regulatory requirements. | | No impact. |

**Table S.2 Impact Summary by Alternative**

<table>
<tr><th>Resource</th><th>Crow Lake Alternative</th><th>Winner Alternative</th><th>No Action Alternative</th></tr>
<tr><td>Climate change and air quality</td><td colspan="2">The Proposed Project and Wind Partners’ proposed development would offset emission sources when compared to similarly-sized electric generating facilities using carbon-based fuel sources. It is estimated that the Proposed Project Components would avoid 726,600 metric tons of $CO_2$ emissions per year compared to fossil-fueled generating stations employed in South Dakota. Wind power generates electricity without air emissions, including carbon dioxide.<br>For either site alternative, fugitive dust from construction and vehicle emissions would be generated during construction, decommissioning, and maintenance of the Proposed Project Components and proposed Federal actions.<br>Applicants would use the included BMPs and APMs during construction to minimize impacts. Developing the Proposed Project Components would not result in a violation of any local, State, or Federal air quality standard. Impacts would be temporary, minor, and would not affect long-term air quality; and would therefore result in less than significant impacts.<br>$SF_6$ breakers would be installed at Western’s Wessington Springs Substation or Winner Substation to accommodate the interconnection. During operation of the new substation additions, authorized Western personnel would conduct periodic inspections and service equipment as needed; including storage and replacement of $SF_6$ to minimize any releases to the environment. Western’s system modifications would incorporate dust abatement measures and other BMPs, and APMs; therefore, impacts to air quality from fugitive dust would be less than significant.</td><td>No impact.</td></tr>
<tr><td>Biological resources</td><td colspan="2">Note: The impacts presented in the biological resources sub-sections have been identified regardless of which transmission line alternative would be selected. Also, see the land use discussion in this table for grassland and wetland easement impact summary.<br>Vegetation<br><table>
<tr><th>Vegetation Type</th><th>Crow Lake Alternative Total Temporary Disturbance (acres)</th><th>Crow Lake Alternative Total Permanent Disturbance (acres)</th><th>Winner Alternative Total Temporary Disturbance (acres)</th><th>Winner Alternative Total Permanent Disturbance (acres)</th></tr>
<tr><td>Mixed-grass prairie</td><td>691</td><td>141</td><td>2,314</td><td>184</td></tr>
<tr><td>Cropland</td><td>306</td><td>46</td><td>741</td><td>62</td></tr>
<tr><td>Wetlands</td><td>0</td><td>0</td><td>16</td><td>1.8</td></tr>
<tr><td>Farmstead</td><td>2</td><td>1</td><td>63</td><td>8.2</td></tr>
<tr><td>Shelterbelt</td><td>3</td><td>1</td><td>31</td><td>3.6</td></tr>
<tr><td>Deciduous forest</td><td>2</td><td>1</td><td>22</td><td>0.9</td></tr>
<tr><td>Total area</td><td>1,006</td><td>190</td><td>3,187</td><td>261</td></tr>
</table>
Note: Discrepancy in total values is due to exclusion of mine/quarry land use and rounding.<br>The area of impact for the Winner Alternative would be nearly double that for the Crow Lake Alternative, mainly due to the need for more access roads, longer underground collection lines, and more crane walks. However, because the footprint of the Proposed Project Components is relatively small compared with the overall size of both of the Proposed</td><td>No impact.</td></tr>
</table>

**Table S.2 Impact Summary by Alternative**

| Resource | Crow Lake Alternative | Winner Alternative | No Action Alternative |
|---|---|---|---|
| **Biological resources** *(continued)* | Project areas and much of the area is tilled annually for agricultural production, direct impacts to vegetation would be minimal and would not affect the biological viability of a local, regional or national population of plant species. Wetland delineations would be completed and facilities would be moved based on the results of the delineations such that wetland impacts are minimized or avoided. If the Applicants cannot avoid wetland impacts, a Section 404 permit under the CWA would be obtained through the USACE. State law requires that listed weeds be controlled by the landowner, and the Applicants would comply with local and State requirements for noxious weed control during Proposed Project Components construction. For these reasons, impacts to vegetation resources would be less than significant.<br>**Wildlife**<br>*Mammals (excluding bats)*<br>Noise, excavation and other forms of disturbance during construction would likely temporarily displace wildlife species within or adjacent to the disturbed areas. The risk for direct mortality of species resulting from construction activities or vehicle collision is limited. Upon completion of construction, many wildlife species would become accustomed to operation and maintenance activities and would be expected to resume use of either alternative (refer to impact analysis in Chapter 4).<br>The spacing of turbines and access roads would contribute to habitat fragmentation in the Proposed Project area and may be higher at the Winner Alternative because of the need for more access roads; though, the Winner Alternative mixed-grass prairie ecosystem is currently relatively fragmented, mainly due to the presence of cropland and roads, although it is more intact than the Crow Lake Alternative. The Winner Alterative would result in a greater number of acres of habitat disturbed than the Crow Lake Alternative; however, the acres of habitat permanently disturbed for either alternative represent a relatively small amount of habitat available regionally. This small loss of habitat would not disrupt breeding, rearing or wintering behavior and would not influence the viability of local populations. Permanent vegetation loss would destroy small mammal habitat, but population level effects would be negligible (refer to impact analysis in Chapter 4).<br>For the reasons described above, impacts would not affect the biological viability of a local, regional, or national population of wildlife species. The Proposed Project and proposed Federal actions would not violate Federal or State wildlife conservation policy. Therefore impacts to mammals would be less than significant.<br>*Bats*<br>Bat mortality from collisions with turbines would likely occur. However, some researchers have concluded that observed mortality rates do not have population-level effects, and no significant difference has been noted in mortality rates at lit and unlit turbines. Preliminary data from bat call studies in 2009 indicate low bat activity in the Crow Lake Alternative and Winner Alternative; therefore, the frequency of collisions may be low based on recently collected bat data. For these reasons, impacts would not affect the biological viability of a local, regional, or national population of bat species. The Proposed Project and proposed Federal actions would not violate Federal or State wildlife conservation policy. Therefore impacts to bats would be less than significant.<br>*Reptiles/Amphibians*<br>Impacts to reptiles and amphibians would be similar to those described for mammals, although they are not as mobile as many mammals. Activities associated with construction, operation and decommissioning could result in the direct mortality of reptiles and amphibians if they are not able to move away from equipment and other vehicles. These impacts | | |

**Table S.2 Impact Summary by Alternative**

| Resource | Crow Lake Alternative | Winner Alternative | No Action Alternative |
|---|---|---|---|
| **Biological resources** *(continued)* | would be less than significant based on the small amount of habitat that would be temporarily and permanently removed and the low likelihood for direct mortality of individuals. For these reasons, impacts would not affect the biological viability of a local, regional, or national population of reptile or amphibian species (refer to impact analysis in Chapter 4). The Proposed Project and proposed Federal actions would not violate Federal or State wildlife law. Therefore impacts to reptiles and amphibians would be less than significant.<br>*Birds*<br>Baseline migratory and breeding bird surveys have been initiated to assess pre-construction avian abundance and habitat use in the Crow Lake Alternative and Winner Alternative. The results of these surveys were included in the impact assessment for determining possible impacts to avian species.<br>Construction impacts common to all avian species include direct mortality, habitat alteration (fragmentation) or loss, and disturbance related to noise and increased human presence resulting in displacement of individual birds. Construction noise and associated human activity could temporarily disturb or displace individual birds, and may interfere with migrating, foraging, breeding, and nesting. Studies have suggested that noise from construction and human activities disturb upland bird species, displacing birds from traditional habitats, reducing use of leks, and causing nest abandonment. Disturbance would be limited to the duration of construction activities. Construction-related disturbance would be limited to a single migratory (both spring and fall) and breeding-nesting season; however, survival and reproductive success would be temporally reduced. With the included BMPs and APMs, construction impacts would not affect the biological viability of a local, regional, or national population of bird species. The Proposed Project and proposed Federal actions would violate the Federal MBTA but would not violate State wildlife laws. With the included BMPs, APMs, Operations and Monitoring Plan (OMP), and habitat offsets, construction impacts to birds would be less than significant.<br>The types of impacts to birds associated with operation and maintenance of the Proposed Project are similar to those described for construction activities, although several mechanisms are different. Bird fatalities resulting from collisions with turbines have been documented at most operational wind farms and have involved a variety of bird species, including passerines, raptors, waterfowl, and shorebirds. Data indicate bird vulnerability to collisions with turbines is species-specific, habitat-specific, and facility-specific, with morality rates being related to the number of turbines. Other factors that influence avian mortality include the arrangement of turbines (*i.e.*, end turbines have higher collision rates), proximity to migration corridors and rim edges, structure type (*e.g.*, lattice structures provide perches within the Rotor Sweep Area), tower height (*i.e.*, blades are closer to the ground on shorter turbines), conditions that reduce visibility (*i.e.*, fog), and attractants such as abundant prey resources and certain Federal Aviation Administration (FAA) marker lights.<br>While Proposed Project design would reduce fatalities, avian mortality would occur as a result of the Proposed Project. With the included BMPs, APMs, OMP, and habitat offsets, operation and maintenance impacts would not affect the biological viability of a local, regional, or national population of bird species. The MBTA would be violated; however, based on the anticipated low level of mortality, impacts to birds would be less than significant. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the project, bird fatalities are expected to be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations (refer to impact analysis in Chapter 4). | | |

**Table S.2 Impact Summary by Alternative**

| Resource | Crow Lake Alternative | Winner Alternative | No Action Alternative |
|---|---|---|---|
| **Biological resources** <br> *(continued)* | **Special Status Species – Crow Lake Alternative** <br> *Federal-listed Species* <br> Suitable habitat for the whooping crane in the Crow Lake Alternative includes stop over, roosting and foraging habitats. The Crow Lake Alternative is within the Aransas-Wood Buffalo Population migration corridor. The Biological Assessment (BA) determined that implementation of this alternative "may affect, is likely to adversely affect" whooping crane. Western and RUS will follow USFWS conditions provided in the Biological Opinion issued by USFWS. <br> Direct impacts on the Topeka shiner would not occur because turbines would be placed in upland areas. With adherence to the included BMPs and APMs, the Proposed Project would not result in a long-term loss of habitat resulting in jeopardizing the continued existence of the Topeka shiner, would not violate the ESA, and would not result in take of a protected species. The BA determined that implementation of this alternative would have "no effect" on Topeka shiner. For these reasons, impacts to Topeka shiners would be less than significant. <br> Based on the low likelihood for occurrence of piping plovers and the lack of suitable habitat, the Proposed Project would not result in a long-term loss of habitat resulting in jeopardizing its continued existence, would not violate the ESA, and would not result in take of the species. The BA determined that implementation of this alternative "may affect, is not likely to adversely affect" piping plover. Therefore, impacts to piping plovers would be less than significant. <br> *State-listed Species* <br> The bald eagle may occur in the Crow Lake Alternative during winter months as a transient resident. With the included BMPs and APMs, impacts would be less than significant. If an eagle take occurs, the BGEPA and MBTA would be violated. In that case, consultation and mitigation of take with the USFWS would be required; however, impacts to bald eagle would be less than | **Special Status Species – Winner Alternative** <br> *Federal-listed Species* <br> Suitable habitat for the whooping crane in the Winner Alternative includes stop over, roosting, and foraging habitats. The Winner Alternative is within the Aransas-Wood Buffalo Population migration corridor. Impacts to whooping cranes would be similar to those described for the Crow Lake Alternative. If the Federal actions for the Winner Alternative are approved, Section 7 consultation would be reinitiated in order to further analyze impacts to this species. <br> Suitable habitat for the American burying beetle occurs within most of the Winner Alternative and the beetle has been documented in the area. Population level impacts could occur with implementation of the Winner Alternative. If the Federal actions for the Winner Alternative are approved, Section 7 consultation would be reinitiated in order to further analyze impacts to this species. <br> *State-listed Species* <br> The bald eagle occurs in the Winner Alternative during winter months as a transient resident. With the included BMPs and APMs, impacts would be less than significant. If an eagle take occurs, the BGEPA and MBTA would be violated. In that case, consultation and mitigation of take with the USFWS would be required; however, impacts to bald eagle would be less than significant based on the anticipated low level of mortality. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the BGEPA and MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Winner Alternative, bald eagle fatalities are not expected or would be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations. <br> The peregrine falcon occurs in the Winner Alternative during winter months as a transient resident. With the included BMPs and APMs, the new transmission line would be marked with line marking devices. Impacts would be less than | |

## Table S.2 Impact Summary by Alternative

| Resource | Crow Lake Alternative | Winner Alternative | No Action Alternative |
|---|---|---|---|
| **Biological resources** *(continued)* | significant based on the anticipated low level of mortality. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the BGEPA and MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Crow Lake Alternative, bald eagle fatalities are not expected or would be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations.<br>*State and Federal Species of Concern*<br>Potential impacts to bird species would be similar as described above in the **Wildlife**, *Birds* section of the table and would be reduced through implementation of the included BMPs and APMs, OMP (WEST 2010), and habitat offsets for protection of grassland habitat (Plank 2010). The MBTA would be violated; however, based on the anticipated low level of mortality, impacts to grassland birds would be less than significant. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Crow Lake Alternative, bird fatalities are expected to be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations.<br>Impacts to invertebrates would be less than significant because the Proposed Project would not affect the biological viability of a local, regional, or national population of invertebrate species resulting in the increase in severity of listing status. | significant. If a falcon take occurs, the MBTA would be violated; however, impacts to peregrine falcons would be less than significant based on the anticipated low level of mortality. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Winner Alternative, peregrine falcon fatalities are not expected or would be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations.<br>Direct impacts on fish species would be unlikely because turbines would be placed in upland areas. With adherence to the included BMPs and APMs, the Proposed Project would not result in a long-term loss of habitat resulting in the listing or jeopardizing the continued existence of a fish species and would not violate SDCL 34A-8. For these reasons, impacts to fish species would be less than significant.<br>*State and Federal Species of Concern*<br>Potential impacts to bird species would be similar as described above in the **Wildlife**, *Birds* section of the table. and would be reduced through implementation of the included BMPs and APMs, OMP (WEST 2010), and habitat offsets for protection of grassland habitat (Plank 2010). The MBTA would be violated; however, based on the anticipated low level of mortality, impacts to grassland birds would be less than significant. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Crow Lake Alternative, bird fatalities are expected to be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations.<br>Potential impacts to mammal species would be similar as described above in the **Wildlife**, *Mammals* section of the table. Potential impacts to reptile and amphibian species would be similar as described above in the **Wildlife**, | |

**Table S.2 Impact Summary by Alternative**

| Resource | Crow Lake Alternative | Winner Alternative | No Action Alternative |
|---|---|---|---|
| **Biological resources** *(continued)* | | *Reptiles/Amphibians* section of the table. Impacts to mammals, fish, amphibians, reptiles, and invertebrates would be less than significant because the Proposed Project would not affect the biological viability of a local, regional, or national population of mammal, fish, amphibian, reptile, or invertebrate species resulting in the increase in severity of listing status. | |
| **Cultural resources** | A qualitative approach has been developed that incorporated factors that are strong predictors of cultural resources, including climatic zone, slope, access, and water sources to predict site types and densities. Areas within the alternatives are rated as high, moderate or low sensitivity. Agricultural lands are rated low to moderate for site sensitivity and potential to encounter sites. Prairie lands are rated high for site sensitivity and potential to encounter sites. A portion of the Crow Lake Alternative and the majority of the Winner Alternative would be located on rangeland and agricultural lands, where site sensitivity and potential to encounter sites would be low to moderate as surface cultural resources may have already been disturbed. Earthmoving activities, such as grading and digging, have the highest potential for disturbing or destroying substantial cultural resources; however, pedestrian, animal, and vehicular traffic and indirect impacts of earthmoving activities, such as soil erosion, could also have an effect. The construction and decommissioning of the infrastructure necessary for wind-powered facilities has the greatest potential to impact subsurface cultural resources because of the increased ground disturbance during these phases.<br><br>Potential impacts to cultural resources, such as prehistoric properties, historic properties, and cultural landscapes, were identified in the results of the Class III Survey, survey of historic architectural properties within the Proposed Project Components viewshed, and Traditional Cultural Properties (TCP) Survey that were completed for the preferred alternative (Crow Lake Alternative). Agreements are being developed to ensure avoidance and/or mitigation of adverse effects to historic properties. These agreements are being developed among Western, RUS, South Dakota State Historic Preservation Office, affected Federal agencies, Applicants, and all interested Native American Tribes. The preferred treatment of any potential TCPs and archaeological sites that are eligible for listing or remain unevaluated for the NRHP is to avoid these identified sites. Avoidance and monitoring protocol during construction would be included in an agreement. Viewshed impacts may occur on historic architectural or structural properties. Such viewshed impacts would be mitigated through a MOA in accordance with 36 CFR 800.6. | | No impact. |
| **Land use** | For either site alternative, the Proposed Project Components would not conflict with applicable policy or regulation of an agency with jurisdiction in the area. The majority of the area is currently used for rangeland and agriculture. Current land uses would continue, even though some land would be converted to industrial use. Additionally, the Applicants have coordinated with landowners and are establishing lease agreements. The Proposed Project Components would result in less than significant impacts to land use.<br><br>People engaging in casual hiking, birding and hunting within the Proposed Project alternative areas could be temporarily affected during the construction and decommissioning activities due to limited access.<br><br>Western's system modifications would be confined to the boundary of their existing substation; therefore, there would be no impact to land use from the proposed Federal action(s). | | Local landowners would not receive lease payments from the Applicants and could sign leases with another wind power developer. No impact. |

**Table S.2 Impact Summary by Alternative**

| Resource | Crow Lake Alternative | Winner Alternative | No Action Alternative |
|---|---|---|---|
| **Land use** *(continued)* | **Grassland easements – Crow Lake Alternative**<br>Temporary/ permanent impact: 68/ 15 acres<br>**Wetland easements – Crow Lake Alternative**<br>Temporary/ permanent impact: 120/ 22 acres<br>The Applicants would work with the USFWS to obtain permits for the impact. The Proposed Project would not conflict with current USFWS land uses and policies for wetland and grassland easements. | **Grassland easements – Winner Alternative**<br>Temporary/ permanent impact: 0/ 0 acres<br>**Wetland easements – Winner Alternative**<br>Temporary/ permanent impact: 0/ 0 acres<br>The Winner Alternative would not result in temporary or permanent disturbance within USFWS grassland or wetland easements. | |
| | **Prime farmlands – Crow Lake Alternative**<br>Temporary/ permanent impact: 11/ 1.5 acres<br>**Farmland of Statewide importance – Crow Lake Alternative**<br>Temporary/ permanent impact: 566/ 99 acres | **Prime farmlands – Winner Alternative**<br>Temporary/ permanent impact: 2.1/ 0.2 acres<br>**Farmland of Statewide importance – Winner Alternative**<br>Temporary/ permanent impact: 509/ 59 acres | |
| | **Farmland**<br>For either site alternative, temporary impacts due to constructing the Proposed Project Components would be revegetated with crops matching the surrounding agriculture landscape. Permanent impacts account for less than 0.4 percent of available farmland within either alternative site boundary. In addition, a small amount of prime farmland, if irrigated, would be impacted by the Proposed Project Components; however, the land is not currently used for agricultural purposes and therefore the Proposed Project Components would not result in a reduction in active agriculture.<br>The Proposed Project Components would not substantially alter the use of farmland in areas designated for turbine and access road installations. The Farmland Protection Policy Act (FPPA) does not authorize the Federal government to affect the property rights of private landowners or regulate the use of private land, so conversion of some prime farmland and farmland of Statewide importance to different uses would not conflict with FPPA policy. | | |
| | **Residences – Crow Lake Alternative**<br>During construction and decommissioning, noise, dust, traffic and the presence of a construction force would temporarily affect the rural to primitive character of the area. No residences are within 1,000 feet of the proposed turbine locations, in accordance with the Applicants' siting parameters. Further, the nearest residence to the centerlines of the transmission line right-of-way is at least 1,900 feet away, so residential use would not be affected. | **Residences – Winner Alternative**<br>During construction and decommissioning, noise, dust, traffic and the presence of a construction force would temporarily affect the rural to primitive character of the area. One residence is located within approximately 800 feet from a proposed turbine location. It is anticipated that this turbine location would be eliminated from further consideration, because it does not meet the Applicants' siting criteria. The second nearest residence for the proposed turbine locations is 1,050 feet away, and meets the Applicants' siting criteria.<br>The closest residence to the centerline of the alternative 1 transmission line corridor is approximately 100 feet away, | |

**Table S.2 Impact Summary by Alternative**

| Resource | Crow Lake Alternative | Winner Alternative | No Action Alternative |
|---|---|---|---|
| **Land use** *(continued)* | | and due to this proximity, does not meet the Applicants' line siting criteria. It is anticipated that the alternative 1 transmission line corridor would be eliminated from further consideration. The closest residence to centerline of the alternative 2 transmission line corridor is at least 900 feet away, and meets the Applicants' siting criteria. Impacts associated with the short-term construction of the transmission corridor would be minimized through the implementation of the included BMPs and APMs. | |
| **Transportation** | Transportation activities during operations would be minimal, similar to those currently occurring, and would not be expected to cause noticeable impacts to local road networks; therefore, operational impacts would be less than significant.<br>The heavy equipment and materials needed for site access, site preparation, and foundation construction are typical of heavy construction projects and do not pose unique transportation considerations.<br>Heavy equipment and cranes would be required for turbine and tower dismantlement, breaking up tower foundations, and regrading and recontouring the site to the original grade. With the possible exception of a main crane, oversized and/or overweight shipments are not expected during decommissioning activities because the major turbine components could be disassembled, segmented or size-reduced prior to shipment. Thus, potential disruptions to local traffic during decommissioning would likely be fewer than those during original construction activities; therefore, decommissioning impacts would be less than significant.<br>Short-term traffic congestion may exist when construction delivery vehicles are on the road, and localized increases in road wear and maintenance may occur. However, the construction, operation and decommissioning of the Proposed Project Components would result in less than significant impacts to permanent, regional and local traffic and transportation infrastructure through the implementation of traffic control measures and other standard construction practices.<br>**Aviation**<br>The Applicants have provided preliminary information to the FAA regarding the Proposed Project Components. Prior to construction, the Applicants would notify the FAA regarding exact facility heights and latitude and longitude coordinates. Prior to construction, the Applicants would consult with the FAA to identify applicable lighting requirements. The Proposed Project Components would not impact an FAA-designated air safety zone, nor would it result in a change in air traffic patterns, an increase in traffic levels or a change in location that results in substantial safety risks. Therefore, the construction, operation and decommissioning of the Proposed Project Components with included BMPs and APMs incorporated would result in less than significant impacts to aviation. | | No impact. |

**Table S.2 Impact Summary by Alternative**

| Resource | Crow Lake Alternative | Winner Alternative | No Action Alternative |
|---|---|---|---|
| **Visual** | The regional landscape is generally uniform, does not contain highly distinctive or important landscape features, is not densely populated or used, and the local residents' sensitivity to visual changes associated with the Proposed Project Components and proposed Federal actions is low; therefore, the visual impacts within either of the alternative boundaries from development of the Proposed Project Components and proposed Federal actions would be less than significant.<br>Developing the Proposed Project Components would not substantially alter or degrade scenic resources and would not substantially degrade the visual quality of either of the site alternatives as viewed from the Lewis and Clark National Historic Trail auto tour route or Lewis and Clark Interpretive Center; therefore, impacts to visual resources would be less than significant. | | No impact. |
| **Noise** | **Construction and Decommissioning** *(estimated levels of short-term/temporary noise increases are provided)*<br>Nearest residence to turbine: 1,270 feet<br>Estimated noise level: 57-59 dBA<br>Nearest residence to proposed transmission line corridor: 1,900 feet<br>Estimated noise level: 52-54 dBA<br>Nearest residence to proposed collector substation: 6,700 feet<br>Estimated noise level: 41-43 dBA<br>Nearest residence to existing Wessington Springs Substation: 1,500 feet<br>Estimated noise level: 56-58 dBA<br>**Operation**<br>Anticipated noise levels would be between 50-45 dBA at a distance between 660 feet and 1,320 feet from the wind turbine; therefore, noise levels associated with the wind turbines at the nearest residence would be near or below 45 dBA, and would likely be between 3 dB and 5 dB greater than existing ambient noise levels. Impacts from operational noise would be less than significant. Additionally, operation of the transmission line would not result in any noise-related impacts.<br>Developing Western's system modifications at the existing Wessington Springs Substation would similarly be expected to result in less than significant noise impacts. | **Construction and Decommissioning** *(estimated levels of short-term/temporary noise increases are provided)*<br>Nearest residence to turbine: 800 feet (eliminated from further consideration)<br>Second nearest residence to turbine: 1,050 feet<br>Estimated noise level: 57-59 dBA<br>Nearest residence to alternative 1 transmission line corridor: 100 feet (eliminated from further consideration)<br>Nearest residence to alternative 2 transmission line corridor: 900 feet<br>Estimated noise level: 59-61 dBA<br>Nearest residence to proposed collector substation: 1,400 feet<br>Estimated noise level: 56-58 dBA<br>Nearest residence to existing Winner Substation: 300 feet<br>Estimated noise level: 69-71 dBA<br>**Operation**<br>At the nearest residence to a wind turbine, operational noise associated with the Proposed Project would be closer to 50 dBA. The increase would likely be between 5 dB and 10 dB greater than existing ambient noise levels; however, it is anticipated that the nearest turbine location would be eliminated from further consideration, because it does not meet the Applicants' siting criteria. With this consideration, impacts from operational noise would be less than significant. Additionally, operation of the transmission line would not result in any noise-related impacts (considering the alternative 1 transmission does not meet the Applicants' line siting | No impact. |

**Table S.2 Impact Summary by Alternative**

| Resource | Crow Lake Alternative | Winner Alternative | No Action Alternative |
|---|---|---|---|
| **Noise** *(continued)* | | criteria and is anticipated to be eliminated from further consideration).<br>Developing Western's system modifications at the existing Winner Substation would similarly be expected to result in less than significant noise impacts. | |
| **Socioeconomics** | Minor employment or population changes are anticipated as a direct result of constructing the Proposed Project Components and Federal actions. Any increase in population would be for the duration of the construction period, and would be small relative to the total population. Most of the non-local construction workforce would likely reside within a 60-mile commuting distance of the site alternative, so there would be very little demand for additional temporary or permanent housing near either of the alternatives; there would be no impact to the available supply of housing in the local counties. In the event that construction workers are hired from outside the 60-mile radius of the standard commuting distance from the site alternative area, there would likely be sufficient capacity in the existing motel rooms in the local counties. Therefore, less than significant impacts are likely to occur from the influx of the construction workforce.<br>Given the short-term duration of construction activities and the small operations workforce, no significant increase in permanent population to local communities would be expected as a result of constructing and operating the Proposed Project Components and Federal actions. The Proposed Project Components and Federal actions would not result in significant increased needs for public services, including fire protection. In addition, there would be no discernible impact on local utilities, government, or community services from the construction workforce associated with the Proposed Project Components and Federal actions.<br>Impacts to economic resources would be primarily short-term beneficial effects to the local economy. Indirect economic benefits would accrue to businesses in the area from construction workers purchasing goods and services, such as hotels, restaurants, gas stations and grocery stores. There would also be economic benefits for the counties from added taxes paid on real estate properties on leased lands. Increased tax revenues collected as a result of the Proposed Project Component operation could be used to benefit or improve local government or community services. | | No impact. Local landowners would not receive lease payments from the Applicants and could sign leases with another wind power developer. |
| **Environmental justice** | Disproportionately high and significant effects to minority populations are unlikely based on three factors: a lower percentage of minority populations in the Crow Lake Alternative area (approximately one to five percent) compared with South Dakota as a whole (approximately 11 percent), a low population density within the site alternative area, and overall low expected impacts from constructing, operating, and decommissioning the Proposed Project Components. Potential impacts to minority residents, like any other resident, are expected to be less than significant.<br>Income for 13.2 percent of the population of South Dakota is considered below the poverty level, whereas the percentage of the population below the poverty level | The Winner Alternative is characterized as approximately 84 percent White and 15 percent American Indian and Alaskan Natives. The Winner Alternative would be located in an area with a higher percentage of minority populations compared to the Crow Lake Alternative; however, disproportionately high and significant effects to minority populations are unlikely given that the low population density within the site alternative area and overall low expected impacts from constructing, operating, and decommissioning the Proposed Project. Potential impacts to minority residents, like any other resident, are expected to be less than significant.<br>The percentage of the population below the poverty level ranges between approximately 19 to 21 percent in the vicinity of the Winner Alternative. The Proposed Project may generate | No impact. |

**Table S.2 Impact Summary by Alternative**

| Resource | Crow Lake Alternative | Winner Alternative | No Action Alternative |
|---|---|---|---|
| **Environmental justice** *(continued)* | ranges between approximately 11 to 21 percent in the vicinity of the Crow Lake Alternative. The Proposed Project Components may generate positive economic benefits to the local economy, including opportunities for lease agreements, employment, and earning potential for local individuals; therefore, the impacts to low-income populations would be less than significant.<br>Developing Western's system modifications at Wessington Springs Substation would not be expected to disproportionately affect a minority, Native American, or low income subsistence population. | positive economic benefits to the local economy, including opportunities for lease agreements, employment, and earning potential for local individuals; therefore, the impacts to low-income populations would be less than significant.<br>Developing Western's system modifications at Winner Substation would not be expected to disproportionately affect a minority, Native American, or low income subsistence population. | |
| **Health and safety** | The health and safety risks to area residents and the general public associated with the Proposed Project Components would be restricted to short periods during construction, operation and decommissioning at small, individual sites. The included BMPs and APMs would be employed during all ground disturbing activities. Due to the low voltage at which turbines and overhead and underground collector lines operate, and the setback distances from roads and residences, the potential impacts associated with exposure to electric and magnetic fields (EMF) would be minimal. Magnetic field exposure from the facilities would be minimal in close proximity, and both electric and magnetic fields would dissipate from the facility corridors. Further, the development of the Proposed Project Components would comply with applicable local, State and Federal regulations regarding handling, transport or containment of hazardous materials. For these reasons, impacts to human health and safety would result in less than significant impacts. | | No impact. |
| 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. At this time, for the Crow Lake Alternative only, seven of these turbines would be for the Wind Partners' proposed development. | | | |

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# 1 Introduction

This chapter briefly describes the proposed South Dakota PrairieWinds Project (Proposed Project), the South Dakota Wind Partners, LLC's (Wind Partners') proposed development, the purpose and need for Federal agency action, the projects' purposes and objectives, and summarizes the scoping process. This final environmental impact statement (FEIS) informs decision-makers and the public of the potential environmental impacts that could result from the Proposed Project and Wind Partners' proposed development. The FEIS was prepared under the direction of the U.S. Department of Energy's (DOE) Western Area Power Administration (Western) and the U.S. Department of Agriculture's (USDA) Rural Utilities Service (RUS). Western and RUS are collectively termed the "Agencies." The U.S. Fish and Wildlife Service (USFWS) is a Cooperating Agency for the EIS. The FEIS will be used by the responsible Federal officials to make an informed decision on the proposed Federal actions.

PrairieWinds SD1, Incorporated (PrairieWinds), a subsidiary of Basin Electric Power Cooperative (Basin Electric), has proposed to develop a wind-powered generating facility in south-central South Dakota, either near the Town of Wessington Springs or near the City of Winner. Basin Electric has requested to interconnect the Proposed Project with the transmission system owned and operated by Western. Basin Electric has also requested financing for the Proposed Project from RUS. PrairieWinds and Basin Electric are collectively termed the "Applicants."

In January 2010, Wind Partners, a South Dakota Limited Liability Company, and Basin Electric began discussions about including seven additional turbines within the alternative site near Wessington Springs. In response, Basin Electric submitted a request to Western to interconnect these additional wind turbines with the transmission system owned and operated by Western. Wind Partners would finance and own these turbines. Through an agreement between Basin Electric and Wind Partners, Basin Electric would construct, operate, and maintain the Wind Partners' proposed development. For only the alternative site near Wessington Springs, the term "Applicants" includes Wind Partners.

Basin Electric's generator interconnection requests and financing request trigger a National Environmental Policy Act (NEPA) review process of the Proposed Project and Wind Partners' proposed development by Western and RUS, respectively. The Agencies have determined that an environmental impact statement (EIS) is required and are serving as joint lead Federal Agencies for preparation of the document. RUS is the lead Federal agency for consultation with the USFWS under Section 7 of the Endangered Species Act (ESA). The Agencies must consider impacts to cultural resources under NEPA. Western is the lead Federal agency for Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), which include the identification, management and treatment of cultural resources, as well as the Government-to-Government consultation process.

Native American tribes and agencies with jurisdiction or special expertise were invited to be cooperating agencies. The USFWS has accepted to participate as a Cooperating Agency for preparation of the EIS.

Western and RUS prepared this FEIS in compliance with NEPA. The EIS analyzes the impacts of the proposed Federal actions, Proposed Project and Wind Partners' proposed development in accordance with NEPA, as amended, DOE NEPA Implementing Procedures (Title 10 Code of Federal Regulations [CFR] Part 1021), the Council on Environmental Quality (CEQ) regulations for implementing NEPA (Title 40 CFR Parts 1500–1508) and RUS Environmental Policies and Procedures (Title 7 CFR Part 1794).

# 1.1 PROJECT OVERVIEW AND DESCRIPTION

**Figure 1.1** depicts the wind resource potential in South Dakota (NREL 2009). **Figure 1.2** depicts the Proposed Project alternatives. Two alternative sites, Crow Lake and Winner, are under consideration for the wind-powered generation facility. The Crow Lake Alternative would be located on approximately 36,000 acres and is approximately 15 miles north of White Lake, and 17 miles southwest of Wessington Springs, South Dakota, within Brule, Aurora and Jerauld counties. The Winner Alternative would be located on approximately 83,000 acres entirely within Tripp County, and is approximately 8 miles south of Winner, South Dakota. Individual maps of each of the site alternatives are included as Crow Lake Alternative in **Figure 1.3** and Winner Alternative in **Figure 1.4**.

The Proposed Project would involve the installation and operation of a 151.5 megawatt (MW) nameplate capacity wind energy facility that would feature 101 wind turbine generators. Ten additional turbine locations were identified for each site alternative (within the site boundaries) and analyzed in the DEIS. These turbines were initially analyzed as contingent turbine locations for the Proposed Project in case 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. At this time, for only the Crow Lake Alternative, seven of these contingent turbines would be those proposed by the Wind Partners (depicted on **Figure 1.3**). The Wind Partners' proposed development, which would be sited within areas previously analyzed in the DEIS, would have a total nameplate capacity of 10.5 MW. For only the Crow Lake Alternative, the term "Applicants" includes Wind Partners.

Each turbine would have a hub height of 262 feet and a rotor diameter of 252 feet. The total height of each wind turbine would be 389 feet with a blade in the vertical position. The towers would be constructed of tubular steel, approximately 15 feet in diameter at the base, with internal joint flanges. The color of the towers and rotors would be standard white or off-white. During construction, a work/staging area at each turbine would include the crane pad and rotor assembly area, temporarily disturbing an area of approximately 500 feet by 500 feet; and permanently disturbing a 25-foot radius around each turbine.

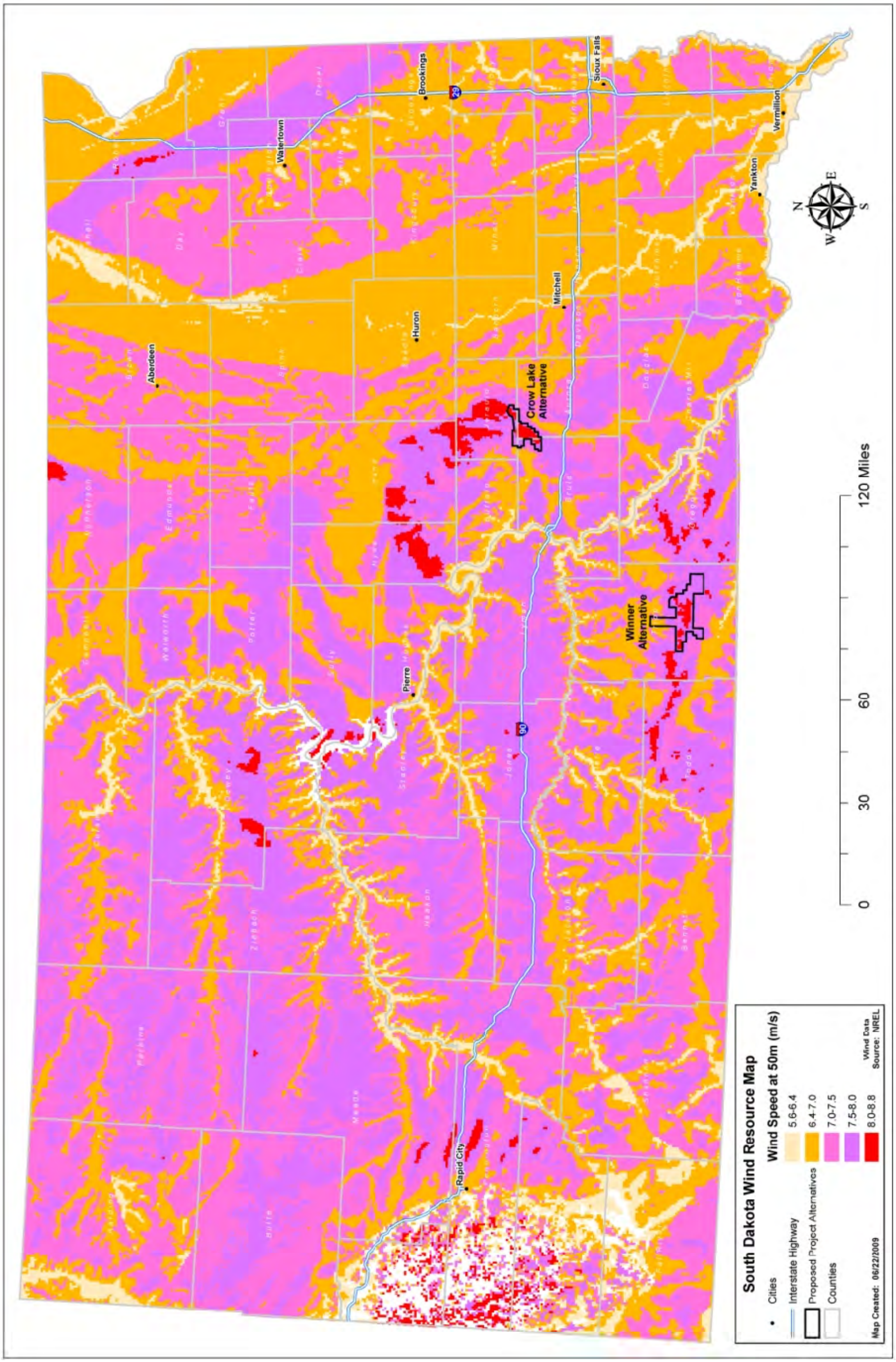



**Figure 1.1 South Dakota Wind Resource Map**

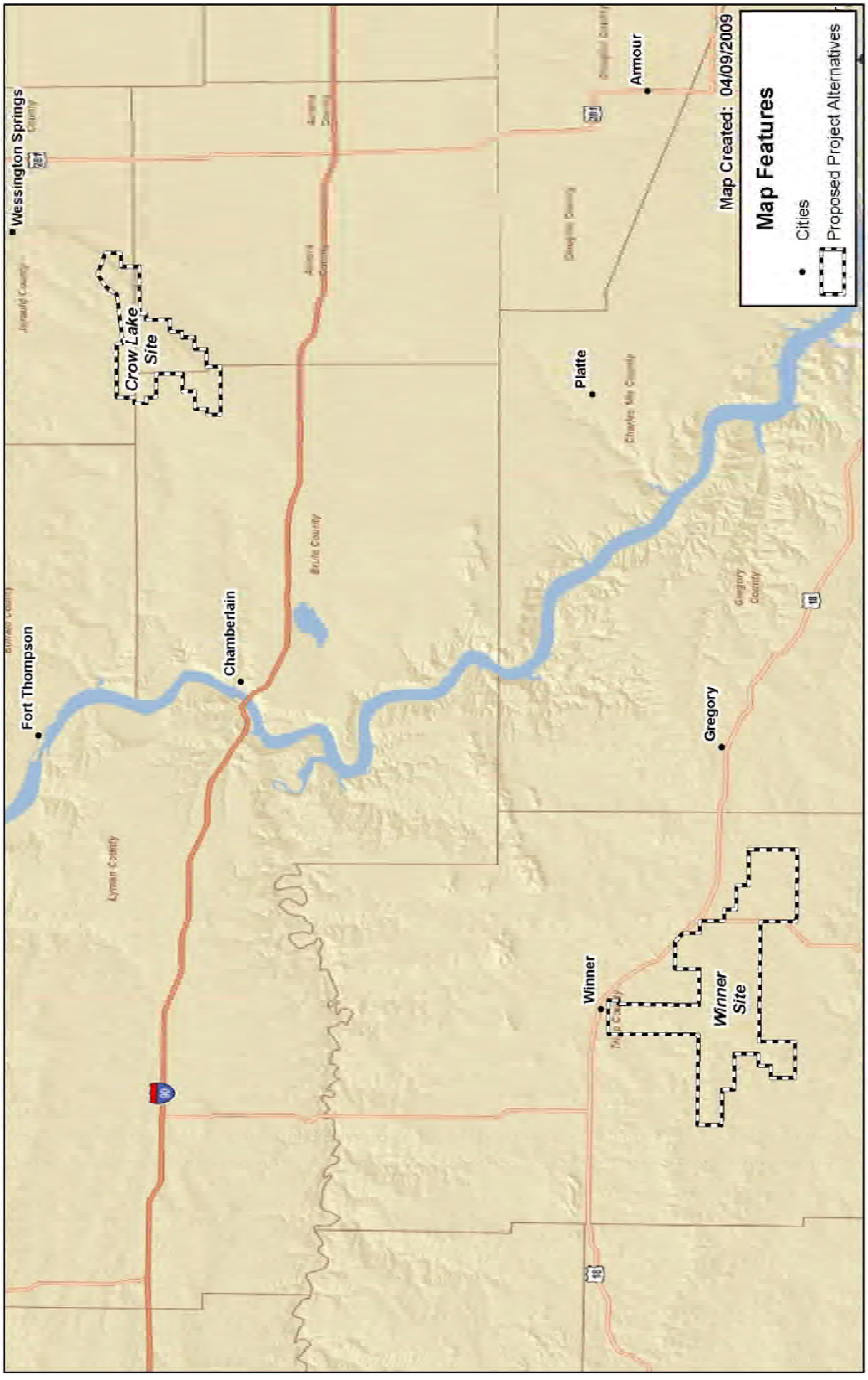
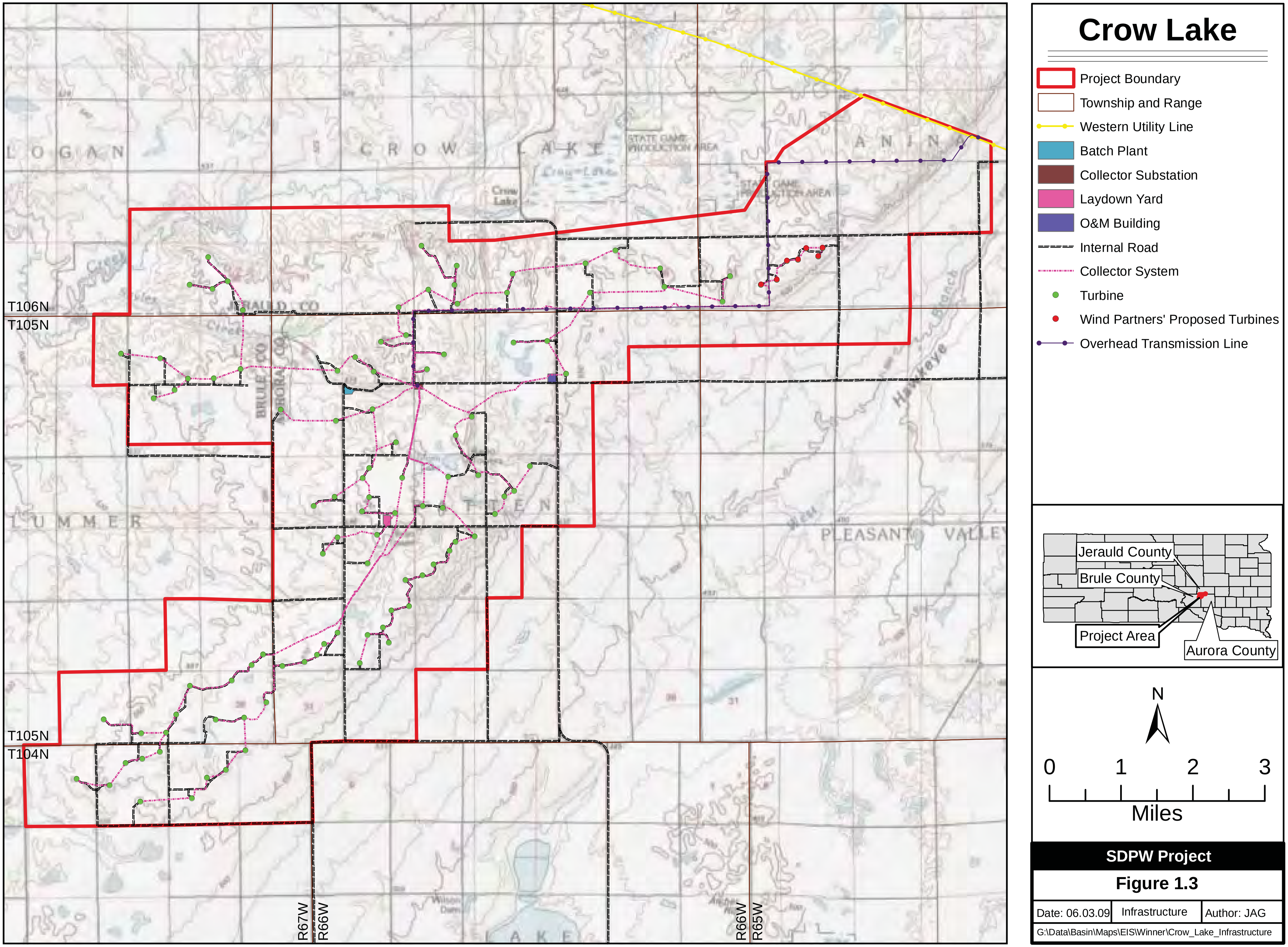



**Figure 1.2 Proposed Project Alternatives**


Crow Lake
Project Boundary
Township and Range
Western Utility Line
Batch Plant
Collector Substation
Laydown Yard
O&M Building
Internal Road
Collector System
Turbine
Wind Partners' Proposed Turbines
Overhead Transmission Line
Jerauld County
Brule County
Project Area
Aurora County
N
0
1
2
3
Miles
T106N
T105N
T104N
R67W
R66W
R65W
SDPW Project
Figure 1.3
Date: 06.03.09
Infrastructure
Author: JAG
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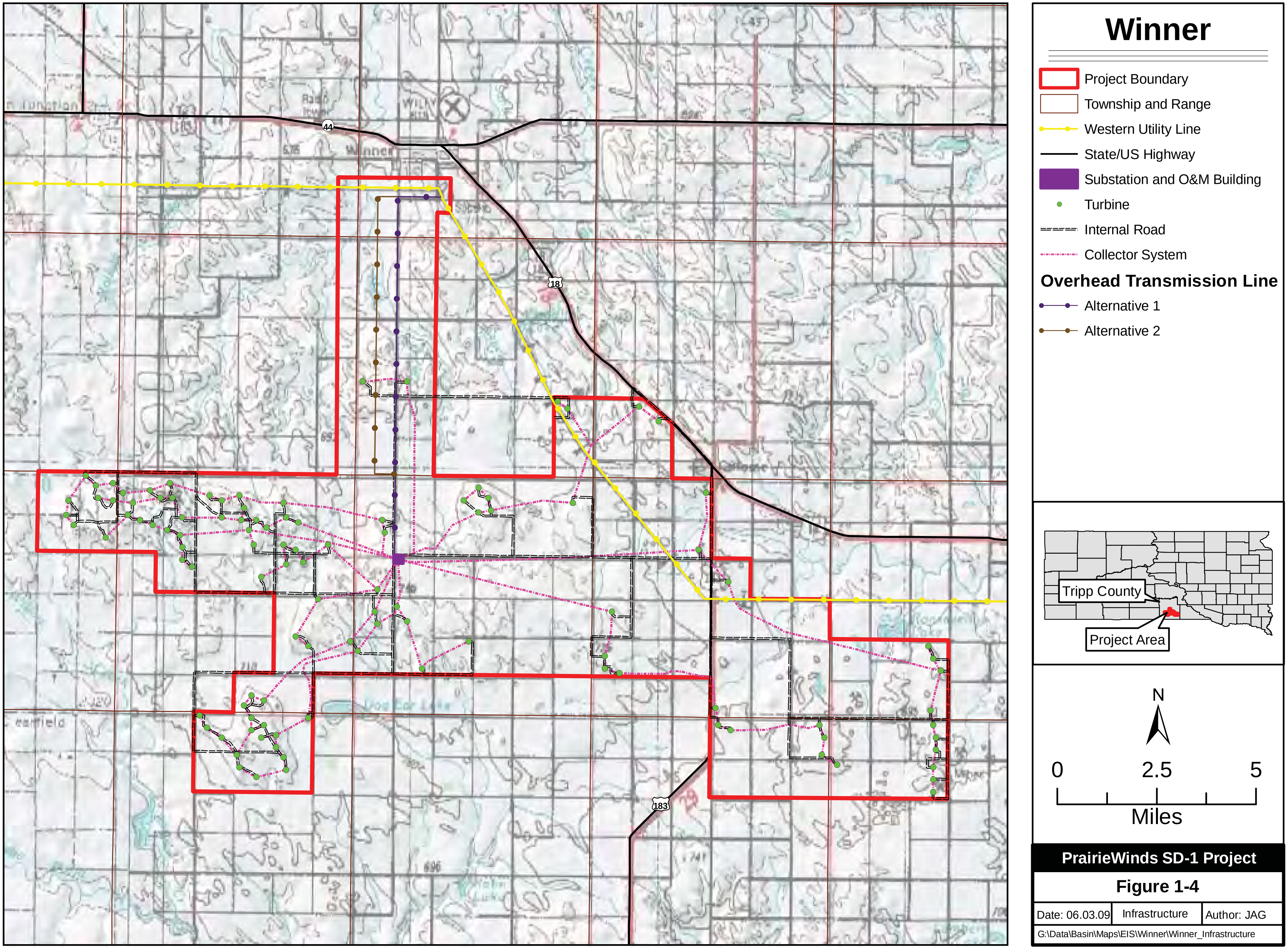

Winner
Project Boundary
Township and Range
Western Utility Line
State/US Highway
Substation and O&M Building
Turbine
Internal Road
Collector System
Overhead Transmission Line
Alternative 1
Alternative 2
Tripp County
Project Area
N
0
2.5
5
Miles
PrairieWinds SD-1 Project
Figure 1-4
Date: 06.03.09
Infrastructure
Author: JAG
G:\Data\Basin\Maps\EIS\Winner\Winner_Infrastructure

Each wind turbine would be connected by a service road for access and a 34.5-kilovolt (kV) underground electrical collection system that would ultimately route the power from each turbine to one central collector substation, where voltage would be increased for interconnection to Western's transmission system. The communication system would be located within the same trenches as the underground collector system.

The Crow Lake Alternative would require a new 34.5-kV to 230-kV collector substation as well as a 230-kV transmission line to interconnect to a new 230-kV interconnection point at Western's existing Wessington Springs Substation, in Jerauld County. The Wessington Springs Substation is a straight-line distance of approximately nine miles from the proposed collector substation; the transmission line length would be approximately 11 miles. The proposed transmission line would be built using steel single-pole structures. The structures would be between 85 and 95 feet high with a span of about 800 feet.

For the Crow Lake Alternative, approximately 44 miles of new access roads (four miles of which would be used for the Wind Partners' proposed development) would be built to facilitate construction and maintenance of the turbines and approximately 37 miles of existing roads would be used and, where appropriate, improved. For the Crow Lake Alternative, the underground collector system trench would be approximately 64 miles long (of which, eight miles would be used to interconnect the Wind Partners' proposed development with the Proposed Project collector substation).

The Winner Alternative would require one new 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, in Tripp County. The Winner Substation is a straight-line distance of approximately nine miles from the proposed collector substation. Depending on route, the proposed transmission line would be approximately 10 to 11 miles long. The proposed transmission line structures necessary for this site would be similar to those described for the Crow Lake Alternative.

For the Winner Alternative, approximately 46 miles of new access roads would be built to facilitate construction and maintenance of the turbines and approximately 71 miles of existing roads would be used and, where appropriate, improved. For the Winner Alternative, the underground collector system trench would be approximately 108 miles long.

# 1.2 PURPOSE AND NEED

This section describes the Federal agency actions as well as the purpose and need for the Proposed Project and Wind Partners' proposed development. The Proposed Project is subject to the jurisdiction of the South Dakota Public Utilities Commission (SDPUC), which has regulatory authority for siting wind generation facilities and transmission lines within the State. The SDPUC approved a Wind Energy Facility Permit for the Proposed Project and Wind Partners' proposed development on June 15, 2010.

## 1.2.1 WESTERN INTERCONNECTION

Western has received two interconnection requests from Basin Electric. As addressed in the DEIS, the first request was to interconnect the Proposed Project with either Western's Winner or

Wessington Springs Substation. The first interconnection request was for 150 MW. Data from the same model of turbine in operation at other locations indicates that, under ideal conditions, these turbines are occasionally capable of generating slightly more than the nameplate rating of 1.5 MW each. Following issuance of the DEIS, to account for the Wind Partners' proposed development and the potential increase in turbine performance from the Proposed Project and Wind Partners' proposed development, Basin Electric submitted a second request to interconnect an additional 34 MW at the existing Wessington Springs Substation.

Western's purpose and need is to respond to the interconnection requests in accordance with Section 211 of the Federal Power Act and Western's Open Access Transmission Service Tariff (Tariff). Section 211 of the Federal Power Act requires that transmission service be provided upon request, if transmission capacity is available. The Wind Partners' proposed development is dependent upon the Proposed Project; therefore, Western is performing studies combining the interconnection requests. Thus, Western is examining the potential impacts of an 184-MW interconnection request at Wessington Springs. If Western either denies Basin Electric's request for an interconnection for Basin Electric's Proposed Project or approves the request for the interconnection at the Winner substation and not the Wessington Springs substation, the Wind Partners' proposed development could not proceed. Western could grant an interconnection for the original request which would allow the Proposed Project to be built, and deny the second interconnection request in which case, the Wind Partners' proposed development would not be constructed and the Proposed Project would be operated at its nameplate capacity of 151.5 MW.

Western's Tariff provides open access to its transmission system. If there is available capacity on the transmission system, Western provides transmission services through an interconnection. This interconnection request requires Federal action which triggers NEPA review. When responding to the need for agency action, and subject to its NEPA review, Western is bound by the following:

- Providing Transmission Service – under Western's Tariff, Western offers capacity on its transmission system to deliver electricity when capacity is available. The Tariff complies with the Federal Energy Regulatory Commission's (FERC) Final Orders which are intended to ensure non-discriminatory transmission system access. Western submitted revisions to its non-jurisdictional Tariff in January 2005 as to certain terms and for inclusion of the Large Generator Interconnection Procedures (LGIP) and a Large Generator Interconnection Agreement (LGIA). Both interconnection requests would be addressed under Western's LGIP. In March 2007, Western submitted another revision for certain terms and to incorporate the Small Generator Interconnection Procedures (SGIP) and a Small Generator Interconnection Agreement (SGIA). Final approval for these filings was received from FERC in September 2007. In September 2009 Western submitted yet another set of revisions to address FERC Order 890 requirements along with revisions to existing terms.
- Protecting Transmission System Reliability and Service to Existing Customers – Western must ensure that existing reliability and service is not degraded. Western's LGIP and SGIP provide for transmission and system studies to ensure that system reliability and service to existing customers are not adversely affected by new interconnections. These studies also identify system upgrades or additions necessary to accommodate the Proposed Project and ensure that they are in the project scope.

### 1.2.2 RUS FINANCING

RUS is authorized to make loans and loan guarantees that finance the construction of electric distribution, transmission and generation facilities, including system improvements and replacements required to furnish and improve electric service in rural areas, as well as demand side management, energy conservation programs, and on-grid and off-grid renewable energy systems.

Basin Electric has requested financial assistance for the Proposed Project from RUS. RUS's proposed Federal action is to decide whether to provide financial assistance; accordingly, completing the NEPA review process is one requirement, along with other technical and financial considerations in processing Basin Electric's application. No financial assistance has been requested from RUS for the Wind Partners' proposed development.

The Rural Electrification Act of 1936, as amended, (7 U.S. Code [U.S.C.] 901 *et seq*.) (RE Act) generally authorizes the Secretary of Agriculture to make rural electrification and telephone loans, including specifying eligible borrowers, preferences, purposes, terms and conditions, security and self-liquidation requirements. The RE Act also authorizes the Secretary of Agriculture to assist borrowers that implement conservation and renewable energy programs.

RUS's agency action involves:

- Provide engineering reviews of the purpose and need, engineering feasibility and cost of the Proposed Project
- Ensure that the Proposed Project meets the borrower's requirements and prudent utility practices
- Evaluate the financial ability of the borrower to repay its potential financial obligation to RUS
- Review and study the alternatives to mitigate and improve transmission reliability issues
- Ensure that adequate transmission service and capacity are available to meet the Proposed Project needs
- Ensure that NEPA and other requirements and RUS Environmental Policies and Procedures are satisfied prior to taking a Federal action

### 1.2.3 COOPERATING AGENCIES

Two agencies, Wessington Springs Area Development Corporation and USFWS, expressed interest in participating as cooperating agencies. Wessington Springs Area Development Corporation is a non-profit non-governmental organization and will participate as an interested party, as prescribed in the CEQ Memorandum for the Heads of Federal Agencies (CEQ 2002), and will be engaged in the NEPA process and on distribution lists for review and comment on the NEPA documents. As of May 13, 2009, the USFWS formally accepted to participate as a Cooperating Agency. All agencies, regardless of cooperating agency status, were kept informed of the Proposed Project and received updates as they became available.

The USFWS is a Federal agency whose primary responsibility is working with others to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people. The proposed development sites are located within two USFWS Wetland Management District (WMD) administrative boundaries. The Huron and Lake Andes WMDs are responsible for addressing the potential impacts to USFWS lands within the Proposed Project area.

Additionally, the USFWS works with agencies and other partners to conserve wetlands, migratory birds and Federally-listed threatened/endangered wildlife by administering the Fish and Wildlife Coordination Act, Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712), Bald and Golden Eagle Protection Act of 1940 (BGEPA) (16 U.S.C. 668-668d, 54 Stat. 250), and the ESA (7 U.S.C. 136; 16 U.S.C. 460 *et seq.*).

The leased private land within the proposed wind farm sites could include lands encumbered by perpetual easements administered by the USFWS. These conservation easements are minimally restrictive instruments that grant the USFWS the ability to protect the grassland and wetland habitat on these properties. Easements are acquired as an alternative to fee-title acquisition and are administered as part of the National Wildlife Refuge System to perpetually protect grasslands and wetlands to benefit migratory birds and other wildlife. While easements are particular areas of concern, potential long-term impacts to wildlife and habitat resources can occur on any lands. Thus, the USFWS will be actively involved in the review of the proposed wind turbine sites to identify and offset impacts to USFWS interests and trust resources throughout the project area. When the final location is chosen, and micro-siting of facilities begins, additional coordination will be pursued with the USFWS.

### 1.2.4 BASIN ELECTRIC'S PURPOSE AND NEED

PrairieWinds is a wholly-owned subsidiary of Basin Electric. PrairieWinds proposes to construct, own, operate and maintain the Proposed Project.

#### *Project Purpose*

Basin Electric is a consumer-owned, regional cooperative headquartered in Bismarck, North Dakota, which services more than 120 member rural electric systems in nine States: Colorado, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota and Wyoming. These member systems, in turn, distribute electricity to more than 2.8 million customers.

Public policy regarding the electric industry has increasingly focused on the carbon intensity of the resources commonly used to generate electricity. As a result, incentives and regulations to encourage or require the generation of power from renewable resources are being actively considered and/or implemented within the Basin Electric member service areas. At the same time, a number of proposals for national Renewable Portfolio Standards (RPS) are pending in Congress. With members in nine States, Basin Electric recognizes the need for additional renewable energy capacity to service forecasted member load growth demands and to meet State-mandated RPS.

Basin Electric membership passed a resolution at their 2005 annual meeting that established a goal to "obtain renewable or environmentally benign resources equal to 10 percent of the MW capacity needed to meet its member demand by 2010." This project would provide an opportunity for them to meet that goal.

### *State Renewable Energy Objectives*

Several States within Basin Electric's service territory, including Colorado, Minnesota, Montana, North Dakota and South Dakota, have adopted Renewable Energy Objectives (REOs) that require renewable generation to meet a certain percentage of retail sales. The REOs adopted in the various States include both mandatory and voluntary goals that range from 10 to 25 percent of energy production to be generated or procured from an eligible energy technology by a specified deadline. Deadlines for compliance range from 2015 to 2025.

The State of South Dakota has a voluntary 10 percent by 2015 REO. An assumption of 1.25 percent by 2008, 2.5 percent by 2009, 3.75 percent by 2010, 5 percent by 2011, 6.25 percent by 2012, 7.5 percent by 2013, 8.75 percent by 2014 and 10 percent by 2015 was used to meet the REO. Basin Electric serves member cooperatives including East River, Grand, Rosebud and Rushmore.

### *Basin Electric's Renewable Energy Sources*

Basin Electric captures approximately 22 MW of recovered energy generation (heat recovery from pipeline compressors) from four sites. Four additional sites, another 22 MW of electricity, are expected to be available by late 2009. The total wind generation owned by Basin Electric is projected to be 125.2 MW by late 2009; and the wind energy purchased is 131 MW, making the total wind generation (owned and purchased) available to Basin Electric's members 256.2 MW by late 2009.

Basin Electric would need a total of 272 MW of renewable capacity, which is 10 percent of the 2,721 MW of forecasted member load for the year 2010, to meet its goal. With the addition of 151.5 MW for the Proposed Project, they will be able to meet the REO requirements for those States that currently have such requirements through the year 2016. **Figure 1.5** compares the needed renewable generation to the existing and proposed renewable generation.

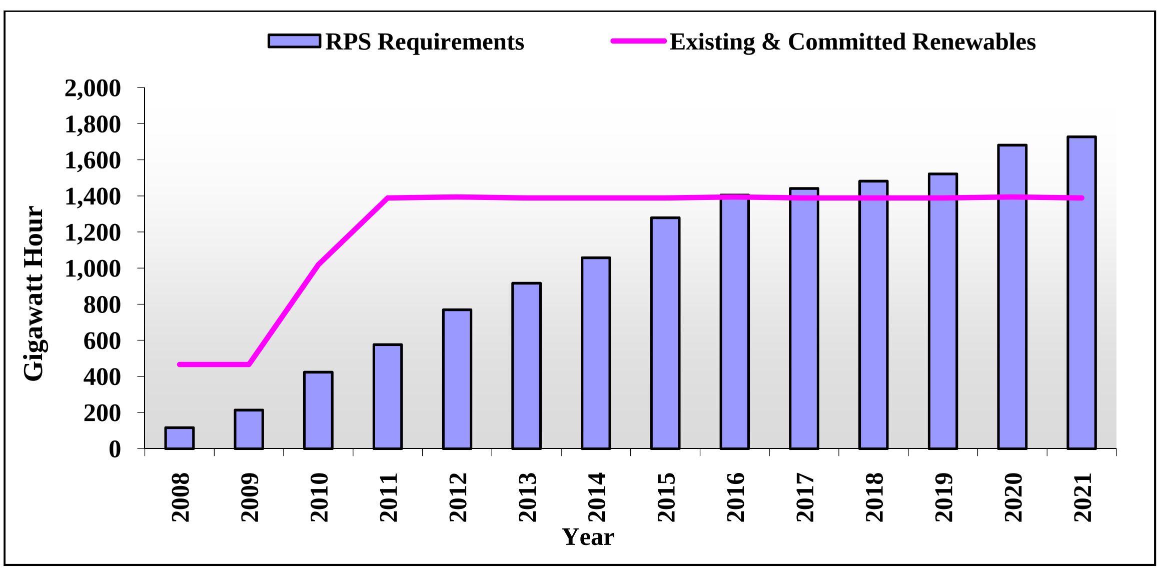


**Figure 1.5 RPS Requirements and Existing/Proposed Renewable Energy Sources**

## *Existing Resources*

According to its 2007 Power Supply Analysis (PSA), Basin Electric operates a total of 3,518 MW of electric generating capacity and has a total of 136 MW of wind energy resources in the form of owned projects and power purchase agreements; additionally, Basin Electric has 22 MW of recovered energy generation through power purchase agreements. Basin Electric also manages and maintains 2,424 miles of high-voltage transmission lines, 40 switchyards and substations, and 58 microwave installations used for communications and system protection.

## *Projected Energy Requirements*

Between 1999 and 2006, Basin Electric's system peak demand increased 752 MW, from 1,195 MW to 1,947 MW, which is approximately 107 MW per year. Their system energy sales increased 5.3 million megawatt-hours (MWh), from 6.5 million MWh to 11.8 million MWh, or approximately 760,000 MWh per year. Basin Electric forecasts peak demand on its system to grow by 1,834 MW from 2006 through 2021. This will be a growth of approximately 122 MW per year. The load growth is driven mainly by commercial sector growth, which includes energy related development in the form of coal, oil and gas development. There are also increased loads in the residential sector mainly located on the outskirts of larger cities within the service territory. This is depicted in **Figure 1.6**.

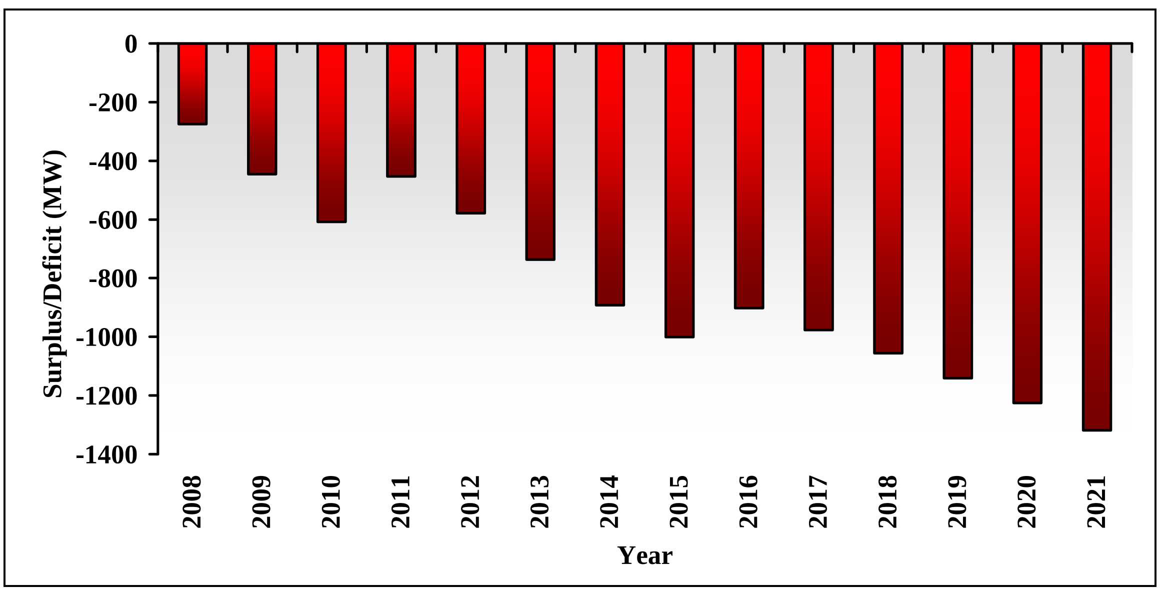


**Figure 1.6 Total System Load and Capability**

Basin Electric's total system deficit was anticipated to be 275 MW in 2008 and is forecasted to increase steadily over time. As **Figure 1.6** depicts, the deficit is anticipated to decrease in 2011 from 2010 levels when the new Dry Fork Station in Wyoming is expected to go commercial; the deficit is also anticipated to decline slightly in 2016 when Basin Electric's long-term power supply obligation ends.

### *Project Need*

The need has been established for additional renewable energy capacity in the PSA to serve forecasted member load growth demands, to meet Basin Electric's renewable energy goal set forth in 2005, and to meet State mandated RPS. Solar resources in the region are limited. While solar economics are improving, costs are still not competitive with wind. Geothermal and bio-based resources are, in some cases, cost effective but are restricted to limited or distant locations, available only in small quantities, or present other environmental concerns. In contrast, potential wind resources in the Basin Electric member service territory are generally recognized as excellent, and limited mainly by land use and transmission. The proposed wind project was determined to be the best available, least-cost renewable resource option to satisfy future load and RPS requirements.

### 1.2.5 WIND PARTNERS' PURPOSE AND NEED

The concept underlying the Wind Partners' proposed wind development is to enable local community involvement and investment in wind projects. The proposed development would also help meet the State of South Dakota's voluntary REO of 10 percent by 2015.

## 1.3 REGULATORY FRAMEWORK AND LAND STATUS

The Proposed Project must comply with Federal, State and local laws requiring permits or approvals. **Table 1.1** lists agencies and their respective permit/authorizing responsibilities with respect to the Proposed Project.

In addition to complying with Federal, State and local laws requiring permits or approvals, the Applicants also coordinated with private land owners for lease agreements. All lands considered for the Proposed Projects are privately owned parcels. This could include lands encumbered by perpetual easements administered by the USFWS, which are acquired as an alternative to fee-title acquisition and are administered as part of the National Wildlife Refuge System. The Applicants have entered into up-to 50-year lease agreements for placement of the wind turbine generators and associated infrastructure with private landowners within the Proposed Project areas. The Applicants would negotiate in good faith to enter into a new lease agreement upon commercially reasonable terms and conditions to replace the lease agreement at the end of the 50-year agreement. The decision to renew the leases versus decommissioning the facility would be made at that time based on market conditions. Depending on current wind turbine technology, at the end of the lease period, the wind turbine generators may be updated with more efficient components, thereby, extending the wind turbine generator service life.

## 1.4 PUBLIC INVOLVEMENT / SCOPING

As part of the NEPA process, public participation is a way to inform the public about activities that involve a Federal action and solicit input regarding the proposed project. Western and RUS utilized input identified through public participation to assist with the development of the scope, content and alternatives analysis for the EIS. By incorporating public participation into the development of the EIS, Western, RUS and USFWS will be able to make a more informed decision on their respective proposed actions.

## Table 1.1 Regulatory Compliance, Potential Permits and Approvals for the Construction and Operation of the Proposed Project

| Agency | Regulatory Compliance/ Type of Approval | Description |
|---|---|---|
| **Federal Approvals** | | |
| U.S. Environmental Protection Agency (EPA) | Spill Prevention Control and Countermeasures (SPCC) Plan | SPCC Plans are required for non-transportation facilities that have a total above-ground oil storage capacity of 1,320-gallons. |
| Federal Aviation Administration (FAA) | Form 7460-1. Notice of Proposed Construction | Notice and approval are required for structures over 200 feet in height. FAA approval of lighting and marking of turbines is required. |
| U.S. Army Corp of Engineers (USACE) | Section 404 Clean Water Act (CWA) Permit | If wetlands would be impacted, a permit for placement of fill would be required. |
| USFWS | MBTA, Section 7 of ESA, BGEPA | Special status species protection. |
| USFWS | Special Use Permit (SUP), Right-of-Way Permit, Compatibility Analysis of Disturbed Easements | If constructing in wetland or grassland easements, then a permit or analysis is required for temporary disturbance. |
| Western, RUS, State Historic Preservation Office (SHPO), and Tribal Nations | Section 106 of NHPA | Cultural resources protection. |
| Western, RUS | Native American Graves Protection and Repatriation Act (NAGPRA) | Cultural resources protection. |
| **State of South Dakota** | | |
| Department of Environment and Natural Resources (DENR) | Section 401, CWA | State requirement for Water Quality Certification. |
| DENR | National Pollutant Discharge Elimination System (NPDES), General Construction Storm Water Water Rights Permit | Required for disturbance of over 1 acre of land. Must prepare a Storm Water Pollution Prevention Plan (SWPPP). |
| South Dakota Game, Fish and Parks (SDGFP) | State Threatened and Endangered Species List | Special status species protection. |
| SDPUC | Energy Facility Site Permit | Required for construction of generation facility. |
| South Dakota Department of Transportation (SDDOT) | Oversize/Overweight Permit | Permit required for hauling construction equipment and materials on State highways. |
| SDDOT | Road Approach/Access Permit | Permits required for construction to of access roads to connect to a State highways. |
| SDDOT | Utility Crossing Permit | Permit required for utility crossings on State highway right-of-way. |
| SDDOT | Aeronautical Hazard Permit | Permit lighting plan determined with FAA coordination. |
| **Local Permits** | | |
| Brule, Aurora, Jerauld and Tripp Counties | Zoning, conditional use authorization and related building permits | Permits required for project construction. |
| Brule, Aurora, Jerauld and Tripp Counties | Road Approach/Access permits | Permits required for project construction. |
| Brule, Aurora, Jerauld and Tripp Counties | Soil Erosion and Sediment Control Plan | Permits required for project construction. |

The CEQ, DOE and RUS NEPA regulations define scoping as an early and open process for determining the scope of issues to be addressed in an EIS and for identifying input related to the proposed project. Western and RUS invited Federal, State, local and tribal governments, the Applicants, and other interested persons and groups to participate in defining the scope of the EIS. The public participation process also satisfies the requirements under Section 106 for government-to-government consultation. Western and RUS invited the tribes to participate in reviews conducted under NEPA and Section 106 of the NHPA.

Western and RUS employed various methods to provide information to the public and solicit input regarding the Proposed Project. Information was included in direct mailings that were sent to over 4,000 potentially interested persons in and near the project area, including addresses within seven miles of each of the alternative sites. Venues for participation included two scoping meetings and one interagency meeting. In addition to receiving comments at meetings, the Agencies invited interested individuals to submit written comments via mail, fax, e-mail and/or the project website. Information on additional public participation opportunities to review and comment on the DEIS is provided in **Section 1.5**. The information in the following sections summarizes the input that was received on the Proposed Project through the scoping process. Copies of the notices and meeting materials are included in **Appendix A** of this report.

Western received the interconnection request for the Wind Partners' proposed development following issuance of the DEIS. Since the the Wind Partners' proposed development would be located within an area analyzed under the DEIS, Western and RUS determined that a separate scoping effort was not needed for the Wind Partners' proposed development. The turbines that would be installed for the Wind Partners' proposed development would not constitute a substantial change to the Proposed Project, or present significant new circumstances or information relevant to environmental concerns on the Proposed Project or its impacts, as discussed in 40 CFR 1502.9(c)(1). Therefore, Western and RUS determined that a Supplemental DEIS was not required for the Wind Partners' proposed development.

## 1.4.1 NOTICE OF INTENT

The "Notice of Intent to Prepare an Environmental Impact Statement and to Conduct Scoping Meetings; Notice of Floodplains and Wetland Involvement" was published in the *Federal Register* (FR) (74 FR 15718) on April 7, 2009. The Notice of Intent (NOI) included information on the Proposed Project, agency actions, times and locations for the April 28 and April 29, 2009, scoping meetings and contact information for questions pertaining to the Proposed Project.

## 1.4.2 NEWSPAPER NOTICES

Notices announcing the public scoping meetings were published in *Indian Country Today*, *Mitchell Daily Republic*, *Plankinton South Dakota Mail* and the *Winner Advocate*. *Indian Country Today* is a national, Native American interest publication, while the others are local newspapers. Advertisement publications in each newspaper provided information on the proposed project, scoping meeting information and contact information for questions pertaining to the proposed project. The second notice publication in *Indian Country Today*, *Mitchell Daily Republic* and *Winner Advocate*, provided the same information as the initial announcements.

The scoping meeting notice was published as follows:

- *Indian Country Today* – April 8 and 22, 2009
- *Mitchell Daily Republic* – April 8 and 22, 2009
- Plankinton South Dakota Mail – April 23, 2009
- *Winner Advocate* – April 8 and 22, 2009

### 1.4.3 DIRECT MAILINGS

In addition to the NOI, Western and RUS mailed postcard scoping notices and letters, which included the scoping meeting information, to over 4,000 potentially interested persons. The mailing list included Federal, State and local agencies; elected officials; Native American tribes; members of the public; and addresses within seven miles of the Proposed Project alternatives.

The postcard scoping notice was mailed on April 6, 2009. This postcard mailing provided information on the Proposed Project; details for the April 28 and April 29, 2009 scoping meetings; and contact information for questions pertaining to the Proposed Project and/or the NEPA process.

In addition to the postcard scoping mailings, a letter was sent to more than 15 Native American tribes (tribes, communities and representative councils) on April 13, 2009, providing information on the Proposed Project, EIS scoping meeting details and contact information for questions pertaining to the Proposed Project. The letter also served to initiate government-to-government consultation and invited the tribes to participate in the reviews conducted under NEPA and Section 106 of the NHPA.

### 1.4.4 SCOPING MEETINGS

Two scoping meetings were hosted by Western and RUS during the public scoping process. The scoping meetings were held using an open-house format to allow for an informal one-on-one exchange of information. Scoping meeting handouts included a copy of the NOI, project fact sheet, scoping process information sheet, comment form and a DOE NEPA brochure. Large-scale aerial photographs illustrating the Proposed Project alternatives were available to help facilitate identification of issues and alternatives. Additional large-scale poster boards included: a South Dakota wind resource map, an EIS process and timeline graphic, the agencies' Federal Action boards, and turbine and transmission line siting parameters. A station was set up at the meetings with a looping PowerPoint presentation to provide an opportunity for individuals to sit and view Proposed Project information and follow along with a print out of the presentation slides. The same information was available at each meeting. Copies of the meeting materials are included in **Appendix A**. **Table 1.2** lists the scoping meeting locations, dates, times and attendance.

**Table 1.2 Public Scoping Meetings**

| Location | Date | Time | Attendance |
|---|---|---|---|
| Winner, SD | April 28, 2009 | 4 - 7 p.m. | 88 |
| Plankinton, SD | April 29, 2009 | 4 - 7 p.m. | 81 |
| **Total** | | | **169** |

### 1.4.5 INTERAGENCY MEETING

A letter was sent on April 9, 2009, to invite Federal, State and local agencies to participate in an interagency meeting for the EIS. In addition, agencies with jurisdiction or special expertise were requested to be a cooperating agency for the Proposed Project.

On April 28, 2009, Western and RUS hosted an interagency meeting at the Best Western Ramkota Hotel, in Pierre, South Dakota, from 9 a.m. to 11 a.m. Proposed Project-specific information was presented at the meeting. The following list summarizes the agencies represented at the interagency meeting (in alphabetical order):

- Aurora County Weed Supervisor
- Bureau of Indian Affairs (BIA)
- Intertribal Council on Utility Policy (Intertribal COUP)
- Mayor of Wessington Springs, South Dakota
- South Dakota Aeronautics Commission
- South Dakota DENR
- SDGFP
- South Dakota Governor's Office
- SDPUC
- SHPO
- South Dakota State Land Department
- USACE
- USFWS
- Wessington Springs Area Development Corporation

### 1.4.6 SCOPING COMMENT SUMMARY

Overall, 16 comment forms were received during the scoping and interagency meetings, 46 comment forms/letters were mailed in, 14 comments were e-mailed to the project e-mail address, and one faxed comment was received. A summary of the written comments received and issues identified through May 15, 2009, are included in **Appendix A**.

## 1.5 PUBLIC INVOLVEMENT / DEIS

Subsequent to preparation of the DEIS, the Agencies requested comments on the project details, draft environmental findings and alternatives evaluated in the DEIS. Western and RUS employed various methods to provide information to the public and solicit input regarding the DEIS. Information was included in direct mailings that were sent to over 4,000 potentially interested persons in and near the project area, including Federal, State, local and tribal governments, the Applicants, other interested persons and groups, and addresses within seven miles of each of the alternative sites. Venues for participation included one open house meeting, one public hearing and one interagency meeting. In addition to receiving comments at meetings, the Agencies invited interested individuals to submit written comments via mail, fax, e-mail and/or the project website. The information in the following sections summarizes the process that was implemented to invite comments on the DEIS and the method for responding to comments. Copies of the

DEIS Executive Summary were available at the interagency meeting, open house, and public hearing. Copies of the notices and meeting materials (excluding Executive Summary) are included in **Appendix E** of this report.

### 1.5.1 NOTICE OF AVAILABILITY

The “Environmental Impact Statements, Notice of Availability” was published in the *Federal Register* (75 FR 2540) on January15, 2010. The Notice of Availability (NOA) provided information on the Proposed Project, locations, and point of contact for the Proposed Project.

Paid advertisements announcing information on the Proposed Project; agency actions; times and locations for the February 11, 2010, open house and public hearing; locations for public review of the DEIS; and contact information for questions pertaining to the Proposed Project were published in *Indian Country Today*, *Mitchell Daily Republic*, *Plankinton South Dakota Mail*, and the *Winner Advocate*.

In addition, Western and RUS mailed open house /public hearing notice post cards, DEIS request forms, and letters in January 2010 to over 7,000 potentially interested persons. The mailing list included Federal, State and local agencies; elected officials; Native American tribes; members of the public; and addresses within seven miles of the Proposed Project alternatives.

### 1.5.2 OPEN HOUSE AND PUBLIC HEARING

Western and RUS hosted an open house and public hearing on February 11, 2010, at Cozard Memorial Library, in Chamberlain, South Dakota. The open-house was held from 4 p.m. to 5 p.m. and allowed for an informal one-on-one exchange of information. Open house handouts included a fact sheet for theWind Partners’ proposed development and a comment form. Large-scale poster boards included: a map depicting the site alternatives, a South Dakota wind resource map; an EIS process and timeline graphic; the Agencies’ Federal Action boards; and turbine and transmission line siting parameters. Additionally, copies of the DEIS and the executive summary were available. The public hearing was held from 5 p.m. to 7 p.m. During the public hearing, information on the Proposed Project, theWind Partners’ proposed development and Agency actions was provided. In addition, a court reporter was available and members of the public were given an opportunity to provide feedback on the draft environmental findings and alternatives for inclusion in the EIS. Fifteen individuals attended the open house and public hearing; the court reporter transcribed comments from three individuals.

### 1.5.3 INTERAGENCY MEETING

On February 11, 2010, Western and RUS hosted an interagency meeting at the Rawlins Municipal Library, in Pierre, South Dakota from 10 a.m. to 12 p.m. to encourage Federal, State and local agencies to discuss project components and provide feedback on the draft environmental findings and alternatives. Proposed Project-specific information was presented at the meeting followed by a group discussion. Thirteen representatives from seven different agencies attended the meeting.

### 1.5.4 DEIS COMMENTS

The public review period of the DEIS commenced on January 15, 2010, and closed on March 1, 2010. The Agencies received 33 comment letters (via public hearing, fax, mail and e-mail) on the DEIS. Substantive, factual, and editorial comments were incorporated and addressed in the FEIS; other comments not affecting the substance of the document have been noted. A guide for comment and response location, the comment and response tracking table, copies of written comments and hearing transcripts are included in **Appendix F**.

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# 2 Alternatives and Proposed Federal Actions

This chapter describes the Proposed Project, Wind Partners' proposed development, proposed Federal actions, and 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, provides a summary of impacts by alternative, and identifies the preferred 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 first proposed action is to approve Basin Electric's interconnection to Western's transmission system at either the Wessington Springs Substation or the Winner Substation (see **Section 1.2.1**), an action which may require Western to complete modifications to one of these substations to support the interconnection.

**Western:** Western's second proposed action is to approve Basin Electric's interconnection to Western's transmission system at Wessington Springs Substation for the Wind Partners' proposed development (see **Section 1.2.1**). The action may require Western to complete modifications of the substation to support the interconnection.

**RUS:** Basin Electric has requested financial assistance for the Proposed Project from RUS. RUS's Federal action is based on providing financial assistance (see **Section 1.2.2**); completing the EIS is one requirement, along with other technical and financial considerations in processing Basin Electric's application.

<u>Western System Modifications</u>

Western proposes to modify its transmission system based on a preliminary review of the interconnection requests. Western would need to add electrical equipment at the Wessington Springs Substation for the Crow Lake Alternative and Wind Partners' proposed development or the Winner Substation for the Winner Alternative. Depending on additional transmission and interconnection studies and electrical design work, the additional electrical equipment would, at a minimum, include installing new concrete foundations, substation bus work, cable trenches, and installing new equipment and/or conductors to accommodate the interconnection. Pending study and approval from Western, the Winner Alternative may require expansion of the Winner Substation for the transmission interconnection. Western would design, construct, own, 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.

Currently, all the transmission system planning 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 planning studies. These studies may identify additional upgrades required to accommodate the proposed interconnection, including modifications at other existing Western facilities that could include installing new control buildings; 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. At this point in time, the footprint of the Wessington Springs Substation would not require expansion to accommodate the interconnection request(s).

The initial Transmission System Impact Study (Transmission SIS) evaluated the transmission system impacts for the delivery of 150 MW. The Transmission SIS, completed in March 2010, determined that no network improvements would be required. Initial thoughts are that increasing the capacity by 34 MW to a total of 184 MW would not significantly change the results found in the Transmission SIS. Once the final Interconnection System Impact Study is completed, Western would know about any impacts to the transmission system as a result of the proposed interconnection request(s). Future potential upgrades normally would not incur significant environmental impacts. In the event that more extensive work is needed (e.g., the final Interconnection System Impact Study shows that construction of a new transmission line is needed), an appropriate review in accordance with regulatory requirements would be initiated by Western and RUS.

## 2.1 APPLICANTS' SITE SELECTION AND SCREENING ANALYSIS

Prior to submitting the interconnection request for the Proposed Project 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 study and how the proposed wind project 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 alternative project locations and conducted a screening process to determine which project locations 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 (USFWS 2003a). 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 (see **Appendix G**), 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. **Figure 2-1** depicts the general locations sites considered in the screening analysis.

**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 | + | + | + | + |

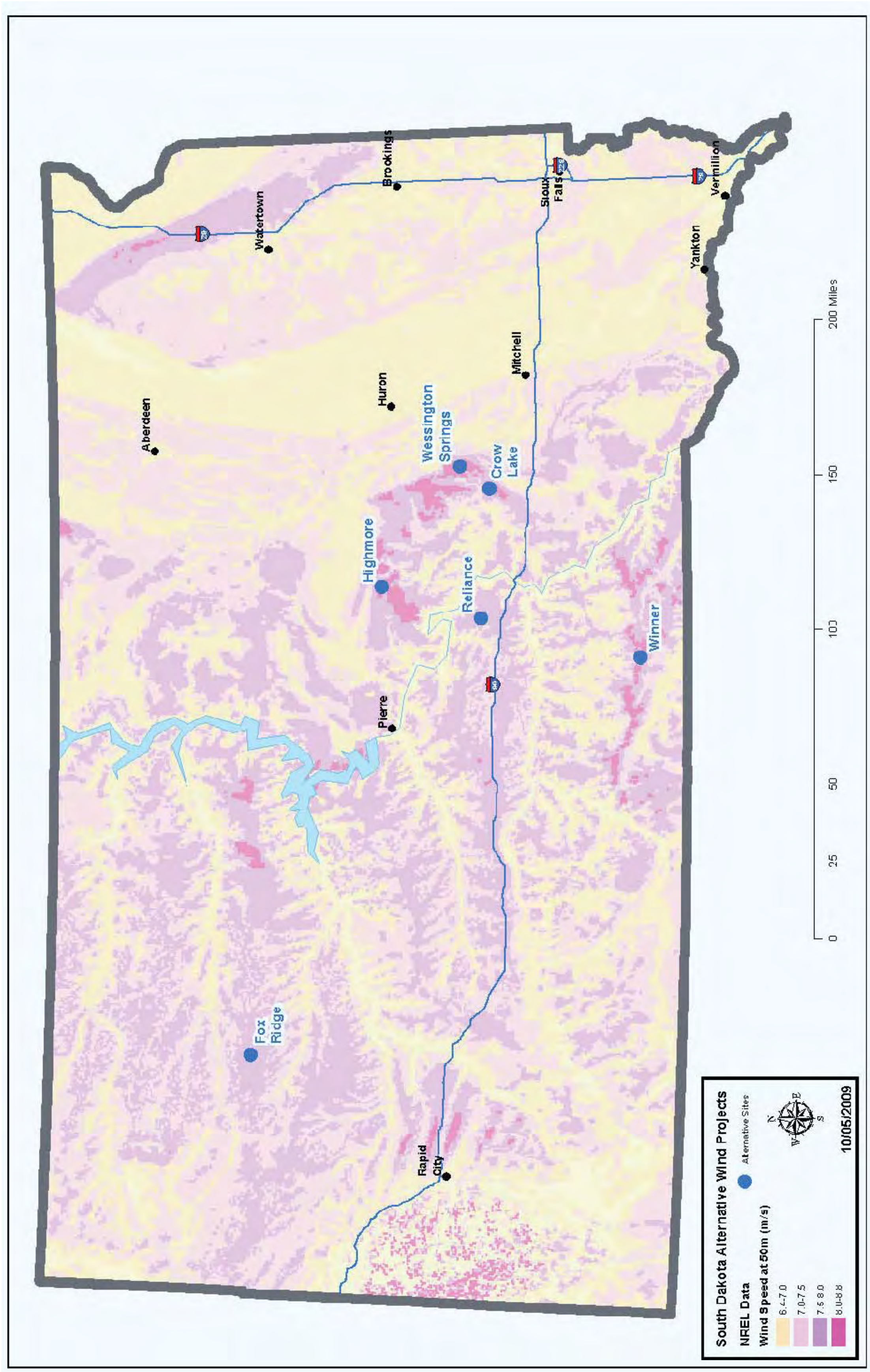


**Figure 2.1 Locations of Sites Considered in Screening Assessment**

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.

### 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 V or better wind resource as defined by the U.S. DOE NREL.

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); these measurements confirm the site is a Class V or better wind resource as defined by the NREL.

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
- Identify turbine locations considering 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

Following issuance of the DEIS, the turbine locations, collector system, access roads, transmission line, and project boundary have been slightly modified due to additional engineering and as a result of environmental surveys (*e.g.*, wetland delineations, cultural resource surveys, etc.) conducted for the Crow Lake Alternative. Crow Lake Alternative figures and impact analyses have been revised accordingly in the FEIS.

The proposed Crow Lake Alternative includes the Proposed Project and Wind Partners' proposed development. The Proposed Project 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 (within the site boundaries), and analyzed in the DEIS. These turbines were initially analyzed as contingent turbine locations for the Proposed Project in case specific turbine locations are eliminated as a result of additional resource surveys and engineering siting; or they may be installed within the site at a later date, pending future load, transmission availability, and renewable production standard requirements. Seven of these contingent turbine locations are those proposed by the Wind Partners as described below.

In January 2010, Wind Partners and Basin Electric began discussions about including seven additional turbines within the Crow Lake Alternative. In response, Basin Electric submitted a request to Western to interconnect these additional wind turbines with the transmission system owned and operated by Western. Wind Partners would finance and own these turbines. Through an agreement between Basin Electric and Wind Partners, Basin Electric would construct, operate, and maintain the Wind Partners' proposed development.

The Wind Partners' proposed development, which would be sited within areas previously analyzed in the DEIS, would have a total nameplate capacity of 10.5 MW. The combined nameplate capacity of the Proposed Project (151.5 MW) and the Wind Partners proposed development (10.5 MW) would be 162 MW. Data from the same model of turbine in operation at other locations indicates that, under ideal conditions, these turbines are occasionally capable of generating slightly more than the nameplate rating of 1.5 MW each. Following issuance of the DEIS, to account for the Wind Partners' proposed development and the potential increase in turbine performance from the Proposed Project and Wind Partners' proposed development, Basin Electric submitted a second request to interconnect an additional 34 MW at the existing Wessington Springs Substation. Two requests totaling 184 MW have been submitted for interconnection with Western's Wessington Springs Substation to accommodate the Proposed Project, Wind Partners' proposed development, and increased output from both projects.

The Wind Partners' proposed development is dependent upon the Proposed Project. If Western denies Basin Electric's request for an interconnection for the Proposed Project, the Wind

Partners' proposed development could not proceed. Western could grant an interconnection for the Proposed Project and deny the interconnection request for the Wind Partners' proposed development and additional capacity; under this scenario, Basin Electric would ensure that the Proposed Project would be operated at its nameplate capacity of 151.5 MW.

The Crow Lake Alternative is located on approximately 36,000 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, temporary batch plant, crane walks, and new and/or upgraded service roads to access the facilities, (collectively termed the Proposed Project Components). The Wind Partners' proposed development would also be constructed within the boundaries of the site and share many of the components described for the Proposed Project. For the Crow Lake Alternative, the term "Proposed Project Components" includes the Wind Partners' proposed development. 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.

Wind Partners propose to develop seven of the contingent turbine locations using General Electric 1.5sle model wind turbines within the Crow Lake Alternative. The turbines would be the same as those described above for the Proposed Project and the combined nameplate capacity for both projects would be 162 MW. Under this scenario, three contingent turbine locations would remain for the Crow Lake Alternative.

**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 64 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 6 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.

To accommodate Basin Electric's interconnection of the Wind Partners' proposed development, eight of the 64 miles of underground collector line would connect the Wind Partners' turbines to the Proposed Project's collector substation. This proposed development would also use the collector system described above.

**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.

The Wind Partners' proposed development would involve the installation and operation of fiber optic communication lines in the same manner as those described for the Proposed Project.

**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 10 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.

The Wind Partners' proposed development would use the same O&M building described for the Proposed Project.

**Roads:** New access roads would be built to facilitate construction and maintenance of the wind turbines. This road network would include approximately 81 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 44 miles of new wind turbine access roads would be built and 37 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.

Four of the 44 miles of new wind turbine roads would be required for the Wind Partners' proposed development. These roads would be built and maintained in the same manner as those described for the Proposed Project.

**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.

The Wind Partners' proposed development would include crane walks to facilitate the construction of the wind turbines. These crane walks would be utilized and reclaimed in the same manner as those described for the Proposed Project.

**Lay Down Areas:** The temporary staging area would be developed on approximately 10 acres, primarily consisting of cropland to minimize grading. 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.

The Wind Partners' proposed development would use the same temporary staging area described for the Proposed Project.

**Batch Plant:** Construction of the wind turbine foundations would require an eight-acre, temporary on-site concrete batch plant during the construction period. To prepare the temporary batch plant, 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.

The Wind Partners' proposed development would use the same temporary batch plant described for the Proposed Project.

**Transmission:** For the Crow Lake Alternative, a new approximately 11-mile long 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 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-foot 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.

Through the interconnection with the collector substation, the Wind Partners' proposed development would use the same transmission line described for the Proposed Project.

### 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 been identified and/or completed.

- A Biological Assessment (BA) has been prepared for consultation with the USFWS, in accordance with Section 7 of the ESA, for the preferred alternative (the Crow Lake Alternative, see **Section 2.8**), including the Proposed Project and Wind Partners' proposed development. The BA was submitted to the USFWS by RUS on February 22, 2010, with a determination that the Proposed Project Components could adversely affect the whooping crane. Based on USFWS reply to the BA, on March 16, 2010, RUS and USFWS entered formal consultation on the Proposed Project and the Wind Partners' proposed development. Upon completion of formal consultation, the USFWS will issue a Biological Opinion (BO). The results of the BO will be addressed in Western's and RUS's Records of Decision (RODs)
- Avian and bat use surveys have been 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
- A wetland delineation has been conducted for the preferred alternative (Proposed Project only), in accordance with USACE standard protocols to identify any wetland potentially affected

- A wetland delineation would be conducted for the Wind Partners' proposed development, prior to the start of construction, in accordance with USACE standard protocols to identify any wetland potentially affected
- To determine what type(s) of concrete foundations would be needed for each wind turbine generator, geotechnical investigations for the Proposed Project Components have been conducted to identify subsurface soil conditions, rock types and strength properties; a Class III archaeological survey was conducted prior to the geotechnical field investigation, in consultation with the South Dakota SHPO
- Geotechnical investigations for the Wind Partners' proposed development would be conducted to identify subsurface soil conditions, rock types and strength properties
- A Class I cultural resources inventory has been completed. For each site alternative, the inventory included a review of existing cultural resources documentation on file in State repositories, a field vehicular windshield survey of the preliminary architectural history, and a review of 19th century Public Land Survey maps
- On-the-ground Class III field surveys were conducted along the areas of future ground disturbance associated with the Proposed Project Components. Additional Class III field surveys would be conducted as needed to evaluate additional areas of disturbance that may be identified as a result of final engineering for the Proposed Project and the Wind Partners' proposed development
- The Proposed Project and Wind Partners' proposed development 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 beginning of 2011 for the Proposed Project and the Wind Partners' proposed development. 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.

The Wind Partners' proposed development would take approximately 1 month to construct; the construction activities, construction management, and construction tasks would be similar to those described for the Proposed Project.

### 2.3.4 OPERATION AND MAINTENANCE

Each wind turbine would communicate directly with Basin Electric's 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.

The Wind Partners' proposed development would be operated and maintained by the Applicants, with the same SCADA system, in a manner similar to that described for the Proposed Project.

### 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.

Decommissioning and restoration of the Wind Partners' proposed development would be similar to that described for the Proposed Project.

### 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, Wind Partners' proposed development 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:<br>• 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.<br>• 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:<br>• Wetland delineations were performed for the Proposed Project Components analyzed in this FEIS; construction activities would avoid wetlands such that there would be no direct impacts from Proposed Project Components (refer to impact analysis in **Chapter 4**). If final engineering results in layout modifications, then additional delineations would be performed within the final impact areas to identify wetlands that would require minor re-routes such that wetlands would be avoided. Although not anticipated, 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.<br>• 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.<br>Western identified:<br>• 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:<br>• 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.<br>• Complaints regarding fugitive dust emissions would be addressed in an efficient and effective manner. |
| **Threatened, Endangered and Other Protected Species** | Applicants, RUS and Western identified:<br>• Special status species or other species of particular concern would continue to be considered during post-EIS development phases 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. |

### Table 2.2 Applicants' and Agencies' Included BMPs

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| **Vegetation Resources** | <u>Western identified:</u><br>• 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.<br>• 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. |
| **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><br>• 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.<br><u>Western identified:</u><br>• 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.<br>• 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

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| **Health and Safety** | Applicants identified:<br>Electric and Magnetic Fields (EMF):<br>• 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.<br>Hazardous Material and/or Hazardous Waste:<br>• 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.<br>Safety and Security:<br>• 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.<br>• 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.<br>Western identified:<br>• 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** | <u>Applicants identified:</u><br>• Wetland delineations were performed for the Proposed Project Components analyzed in this FEIS; construction activities would avoid wetlands such that there would be no direct impacts from Proposed Project Components (refer to impact analysis in **Chapter 4**). If final engineering results in layout modifications, then additional delineations would be performed within the final impact areas to identify wetlands that would require minor re-routes such that wetlands would be avoided. Although not anticipated, 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.<br>• 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. In addition, the Applicants would work with USFWS through the "Partial Term Relinquishment and Release of Waterfowl Habitat Protection Easement in the United States" process regarding wetland and grassland easements. |
| **Air Quality** | <u>Applicants and Agencies' identified:</u><br>• 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.<br>• 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, Endangered and Other Protected Species** | <u>Applicants and Agencies' identified:</u><br>• Whooping Crane Monitoring Plan/Sightings: The Applicants developed an Operations and Monitoring Plan (OMP), and additional whooping crane monitoring, bird and bat fatality monitoring, avian use monitoring and line marking measures that are included in the BA (Appendix G) as part of the Section 7 consultation process in coordination with the USFWS. The plan includes 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; transmission line marking; and adaptive management practices (turbine operation curtailment). |
| **Fish and Wildlife Resources** | <u>Applicants identified:</u><br>• The Applicant would attempt to limit construction activities outside of the breeding season, where feasible. Prior to surface-disturbing activities during the avian breeding season (April through July), 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. |

**Table 2.3 APMs**

| | |
|---|---|
| **Fish and Wildlife Resources** *continued* | Applicants identified (*continued*):<br>• If construction were to occur during the breeding season for raptors (April through July), 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 would be submitted to USFWS and SDGFP.<br>• Habitat impacts to migratory birds, due to both direct (project footprint) and indirect (avoidance effects) impacts would continue to be evaluated and quantified for three years post-construction. Additionally, habitat offsets will be provided to preserve habitat at the USFWS' discretion (Plank 2010). These were developed in coordination with the USFWS.<br>• 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.<br>• Towers would be lit according to current USFWS guidance regarding reduction of avian mortality associated with turbine tower lights; the FAA would ultimately determine lighting requirements.<br>• An OMP was developed (WEST 2010b) in coordination with the USFWS and SDGFP. It includes construction requirements; post-construction avian and bat survey and reporting requirements; and avian and bat mortality monitoring.<br>• The entire length of new transmission line would be permanently marked with transmission line marking devices to reduce avian collision risk. |
| **Vegetation Resources** | Applicants identified:<br>• 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.<br>• Annual post-construction monitoring and treatment would occur as determined through coordination with the SDPUC, Western, and RUS.<br>• 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 allow for impacts and create required mitigation. Crane walks or additional impacts to grassland vegetation other than as-built surveyed roads to install towers would not be constructed on USFWS grassland easements. In addition, the Applicants would work with USFWS through the "Partial Term Relinquishment and Release of Waterfowl Habitat Protection Easement in the United States" process regarding grassland and wetland easements.<br>• 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.<br>• Noxious weeds would be controlled using appropriate weed control measures.<br>• 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:<br>The following measures would be implemented to address impacts to the area of potential effects (APE):<br>• 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.<br>The following APMs would also be implemented to address impacts:<br>• Tribes that are in the consultation process would be contacted if archaeological resources or other properties of tribal interest are identified during construction.<br>• 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.<br>• 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.<br>• 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.<br>• Cultural resources would continue to be considered during post-EIS phases of project development. Agreements are being developed to ensure avoidance and/or mitigation of adverse effects to historic properties. These agreements are being developed among Western, RUS, SHPO, affected Federal agencies, Applicants, and all interested Native American Tribes. Avoidance and monitoring protocol during construction would be included in an agreement. Viewshed impacts may occur on historic architectural or structural properties. Such viewshed impacts would be mitigated through a MOA in accordance with 36 CFR 800.6. Measures to mitigate identified adverse impacts may include project modifications to avoid adverse impacts, monitoring of construction activities, and data recovery studies. Native American Tribes would be involved in these consultations to determine whether there are effective or practical ways of addressing impacts on TCPs. |
| **Transportation** | Applicants and Agencies' identified:<br>Air Traffic:<br>• The Applicants are coordinating with FAA on layout and lighting and would seek design approval from FAA.<br>• 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:<br>• 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.<br>• 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.<br>• 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. A map depicting the Winner Alternative is included in **Chapter 1** as **Figure 1-4**. Ten additional turbine locations were identified (within the site boundaries), and analyzed in the DEIS, with the intent that 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. However, it is important to note that the proposed development of Wind Partners' seven additional turbines is being considered for the Crow Lake Alternative only. The facilities for the Winner Alternative would be similar to those described for the Proposed Project within the Crow Lake Alternative (**Section 2.3.1**) with the following differences.

**Collector System:** The estimated trench length, including parallel trenches, is approximately 108 miles (compared to the 64miles for the Proposed Project within the Crow Lake Alternative). The central collector substation would increase the electrical voltage from 34.5 kV to 115 kV (compared to the 230-kV components described for the Proposed Project within the Crow Lake Alternative).

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**.

**Roads:** Approximately 46 miles of new wind turbine access roads would be built and 71 miles of existing roads would be used and, where appropriate, improved (compared to 44 miles and 49 miles, respectively, for the Proposed Project within the Crow Lake Alternative).

**Transmission:** The Winner Alternative would require a 115-kV transmission line to interconnect the proposed Winner Alternative collector substation to Western's existing115-kV Winner Substation. The Winner Substation is 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.

## 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(s) and RUS would not provide financial assistance for the Proposed Project. For the purpose of impact analysis and comparison in this EIS, it assumed that the Applicants' Proposed Project and Wind Partners' proposed development, as it pertains to the Crow Lake Alternative, 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. At this time, seven of these contingent turbine locations (within the Crow Lake Alternative only) are those proposed by the Wind Partners. If the Federal actions are approved, the Applicants would determine the exact locations for their 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 S.2** provides a summary of the impacts by resource type. **Table 2.4** summarizes the anticipated estimated surface disturbance areas (both temporary and permanent) associated with the Proposed Project Components for each of the action alternatives (note that the No Action Alternative would not result in surface disturbances). **Chapter 4** provides the detailed impact analysis for each alternative.

# 2.8 PREFERRED ALTERNATIVE

**Western's Preferred Alternative**: Western's Tariff provides open access to its transmission system. If there is available capacity in the transmission system, Western provides transmission services through an interconnection. Transmission studies completed for the Crow Lake Alternative demonstrate that transmission capacity is available for the Proposed Project through an interconnection at Western's existing Wessington Springs Substation without the need to expand the substation. Facility expansion may be required at Western's Winner Substation to accommodate interconnecting the Winner Alternative. Since transmission capacity is available for the Crow Lake Alternative and transmission studies have demonstrated that system reliability and service to existing customers would not be jeopardized, and taking into account the environmental impacts, the interconnection at Western's Wessington Springs Substation is Western's preferred alternative.

**RUS's Preferred Alternative**: The RE Act authorizes the Secretary of Agriculture to make loans to eligible rural electric and telephone borrowers for electric and telecommunications infrastructure as well as assisting borrowers that implement conservation and renewable energy programs. RUS has reviewed the Proposed Project, alternatives and their anticipated impacts in relation to Basin Electric's renewable portfolio and prudent utility practices. Based on the analyses, the construction of wind generation at the Crow Lake Alternative would result in fewer environmental impacts than the Winner Alternative and would meet Basin Electric's purpose and need. Therefore, RUS's preferred alternative is the construction of a wind farm at the Crow Lake Alternative.

**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 | | 131.2 | 12.6 | 637 | 5.0 |
| Crane Walks | | 254.6 | N/A | 530 | N/A |
| Electrical Collections Lines (Underground) | | 117 | N/A | 198 | N/A |
| Electrical Transmission Lines (Overhead) | Alternative 1 | 122.1 | 16.2 | 42 | 0.12 |
| | Alternative 2 | NA | NA | 56 | 0.18 |
| Access Roads | | 347.7 | 159.4 | 1,710 | 254 |
| Collection Substation | | 6 | 1.8 | 10 | 1.8 |
| O &M Building | | 10 | 0.15 | 20 | 0.15 |
| Batch Plant | | 8 | 0 | NA | NA |
| Temporary Lay Down Area | | 10 | NA | 40 | NA |
| Total Project Impacts (Max Preferred) | | 1,006 | 190 | 3,187 | 261 |
| Total Alternative Area (acres within boundary) | | 36,000 | | 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. At this time, seven of these contingent turbine locations (within the Crow Lake Alternative only) are those proposed by the Wind Partners.

# 3 Affected Environment

This chapter describes the baseline condition of the area that could be affected by the Proposed Project and Wind Partners' proposed development. The affected environment, or region of influence (ROI), is the physical area that bounds the environmental, sociological, economic, or cultural feature of interest that could be impacted by construction and operation of the Proposed Project, Wind Partners' proposed development and the proposed Federal actions. The boundaries of the ROI may vary depending on the resource being analyzed. The baseline condition serves as a reference point for the evaluation of impacts presented in **Chapter 4**, Environmental Consequences. For ease of understanding the evaluation of impacts and correlating **Chapters 3 and 4**, the document has been prepared so that a resource described in **Chapter 3**, Affected Environment, has the same section number in **Chapter 4**, Environmental Consequences (*e.g.*, **Section 3.2** Water Resources, **Section 4.2** Water Resources).

The affected environment descriptions are presented for the Crow Lake  and Winner alternatives. Instances are noted where the affected environment descriptions for the proposed Federal actions differ from those of the site alternatives. As stated in **Section 2.8**, the Crow Lake Alternative is the preferred alternative.

Critical Elements of the Human Environment, as defined and specified in statutes and Executive Orders, that could be impacted by the site alternatives include:

- Geology and soils
- Water resources
- Climate change and air quality
- Biological resources
- Cultural resources
- Land use
- Transportation
- Visual resources
- Noise
- Socioeconomics
- Environmental justice
- Health and safety

Critical elements of the human environment that would not be affected are listed below, followed by the justification for dismissal of these elements from further discussion.

**Paleontology –** Investigations of publicly available maps and local geology did not identify paleontological resource sites in the site alternative areas. The glacial till and outwash deposits that comprise the majority of the surface soils in the area are unlikely to contain fossils.

**Wild and Scenic Rivers –** Review of the U.S. Department of Interior, National Park Service (NPS) website indicates that there are no Federally-designated Wild and Scenic Rivers in South Dakota (NPS 2004).

**Wilderness –** There are no federally-designated wilderness areas near the site alternatives.

# 3.1 GEOLOGY AND SOILS

The ROI for geology and soils includes areas of immediate disturbance associated with implementation of the Proposed Project Components and proposed Federal actions. Because existing data on geologic resources is not available for the specific sites, the geology in the vicinity of the alternatives is summarized.

## 3.1.1 GEOLOGY

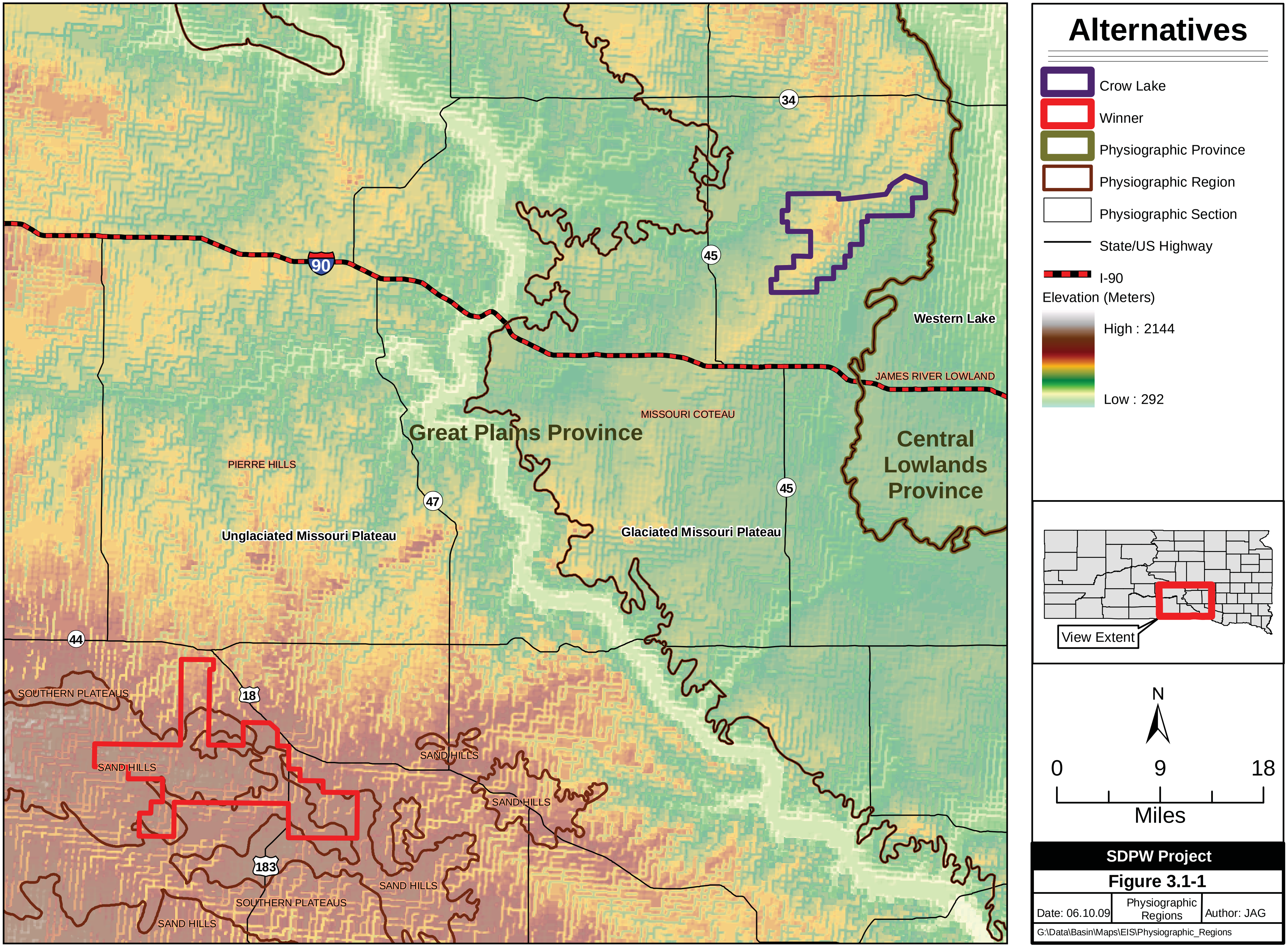
### 3.1.1.1 Crow Lake Alternative

Information and data for the compilation of this section is from *Bulletin 32 – Geology of Aurora and Jerauld Counties, South Dakota* (Hedges 2001), *Aquifer Materials Map 21 – First Occurrence of Aquifer Materials in Aurora County, South Dakota* (Jensen 2004), *Aquifer Materials Map 21 – First Occurrence of Aquifer Materials in Jerauld County, South Dakota* (Jensen 2005), and *Compilation of Resource Technical Memorandums – Crow Lake Project, Portions of Jerauld, Aurora, and Brule Counties, South Dakota* (Terracon 2009a).

The topography of the Crow Lake Alternative is characterized by gently rolling hills with low to moderate relief. Elevation for the site ranges from approximately 1,500 to 1,900 feet above mean sea level (AMSL). The Crow Lake Alternative is located within the Glaciated Missouri Plateau (also known as the Coteau du Missouri Section) of the Great Plains physiographic province, which is characterized by low hummocky, undulating hills and large undrained areas containing prairie potholes, lakes and sloughs (see **Figure 3.1-1**). Strata for this highland area are characterized by glacial deposits which are underlain by the Upper Cretaceous Pierre Shale and older formations. A northeast-southwest trending axis in the site topography marks a steep escarpment corresponding with a ridge in the bedrock underlying the site. The escarpment rises 300 to 400 feet above the James River Basin east of the site.

In general, geomorphology of the region consists of physiographic features formed by glacial advancement and retreat during the Pleistocene epoch. Surficial deposits on the site consist of glacial till, moraine deposits and outwash from the Late Wisconsin period of the Quaternary age.

The strata of the region include formations from the Precambrian age, dated to 2.5 billion years ago, to the Holocene epoch. Formations include Precambrian granite and quartzite rocks; Mesozoic shales and sandstones of late Cretaceous age; and Cenozoic nonmarine silts and sandstones of Tertiary age. The Quaternary strata include the Pleistocene nonglacial and glacial sediments, and Holocene sediments (Hedges 2001).




SDPW Project

Figure 3.1-1

| Date: 06.10.09 | Physiographic Regions | Author: JAG |
|---|---|---|

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The Pierre Shale of the late Cretaceous age underlies the site and creates the base of the northeast-southeast axis in elevation of the Crow Lake Alternative. The Pierre Shale also occurs as isolated surface outcrops at elevations as high as 1,900 feet AMSL within the site.

Quaternary sediments in the region consist of Pleistocene western-derived nonglacial alluvium, glacial deposits, loess and Holocene alluvium and colluvium. Pleistocene tills comprise the bulk of the Quaternary deposits in the region, although Pleistocene outwash or lake deposits may be substantial. The Quaternary deposits may also include Plio-Pleistocene western-derived fluvial sand and gravel deposits and Holocene alluvium and colluvium. Collectively, these sediments can exceed 500 feet in thickness in the region and comprise the large majority of the surficial sediments (Hedges 2001).

Within the Crow Lake Alternative boundary, the composite thickness of the Upper Wisconsin till may be up to 300 feet. Quaternary sediments occurring at the surface of the site include:

- Undifferentiated glacial outwash – consists of heterogeneous sand and gravel with minor clay and silt. Of glaciofluvial origin, this formation includes outwash plains, kames, kame terraces and other undifferentiated deposits, and is expected to be up to 30 feet thick.
- Stagnation moraine till – includes a compact, silty, clay-rich matrix with sand- to boulder-sized clasts. This glacial, geomorphic feature is characterized by hummocky terrain with abundant sloughs resulting from the stagnation of ice sheets.
- Ground moraine till – also consists of a compact, silty, clay-rich matrix with sand- to boulder-sized clasts. The geomorphic feature is characterized by smooth, rolling terrain formed by glaciers.
- Terrace outwash – occurs at the extreme northwest corner of site represented by heterogeneous clay to gravel of glaciofluvial origin. This formation is expected to be up to 60 feet thick.
- Alluvial deposits are found within the present-day drainage of East Smith Creek.

### 3.1.1.2 Winner Alternative

Information and data for the compilation of this section is from *Ground Water Supply for City of the Winner, South Dakota* (Barari 1966), *Groundwater Investigation for the City of Colome, South Dakota* (Barari 1969), *Hydrogeologic Assessment of the High Plains Aquifer in Tripp and Gregory Counties, South Dakota* (Filipovic 2004), and *Compilation of Resource Technical Memorandums - Winner Project Site, Tripp County, South Dakota* (Terracon 2009b).

The Winner Alternative lies within the Great Plains physiographic province. The majority of the site is in the Unglaciated Missouri Plateau Section, which is also described as Tertiary Table Lands or Sand Hills (see **Figure 3.1-1**). The northeastern-most fringe of the site near the City of Colome is also in the Unglaciated Missouri Plateau Section, but is also described as a part of the Pierre Hills. Areas of the south-central portion of the site are in the Southern Plateaus, which are associated with the High Plains Section of the Great Plains physiographic province.

The vicinity of the Winner Alternative is characterized by rolling plains of relatively low relief, developed on the marine rocks of the Pierre Shale. To the south, elevations rise into butte and mesa topography, typical of the Tertiary tablelands. The stratigraphy of the region includes formations from Precambrian, dated to 2.5 billion years ago, to Quaternary age. Similar to the Crow Lake Alternative, formations include Precambrian granite; Cambrian and Ordovician sands; Paleozoic sediments; Cretaceous age shales and sandstones; Cenozoic nonmarine silts; sandstones of Tertiary age; and Quaternary alluvium and eolian sediments.

## 3.1.2 SOILS

Geographic Information System (GIS) data depicting soil types within and adjacent to the site alternatives were obtained from the Natural Resources Conservation Service (NRCS 2009). Soils within the site alternatives were overlain on a GIS map of the Proposed Project Components to identify soils within the affected environment.

### 3.1.2.1 Crow Lake Alternative

A total of nine soil unit associations are mapped in the Crow Lake Alternative area, as listed in **Table 3.1-1** and depicted in **Figure 3.1-2**. Soils within the Crow Lake Alternative are generally consistent, dominated by silty drift over loamy till. This includes soils of the Mobridge-Java-Highmore, Houdek-Ethan, Ethan-Clarno-Betts and Highmore-Ethan-Eakin soil unit associations, accounting for roughly 93 percent of the area. Along the northeastern most corner of the site, soils of the Dudley-Bon-Beadle soil unit association become more clayey. Other soil units within the area account for less than 1 percent of the area.

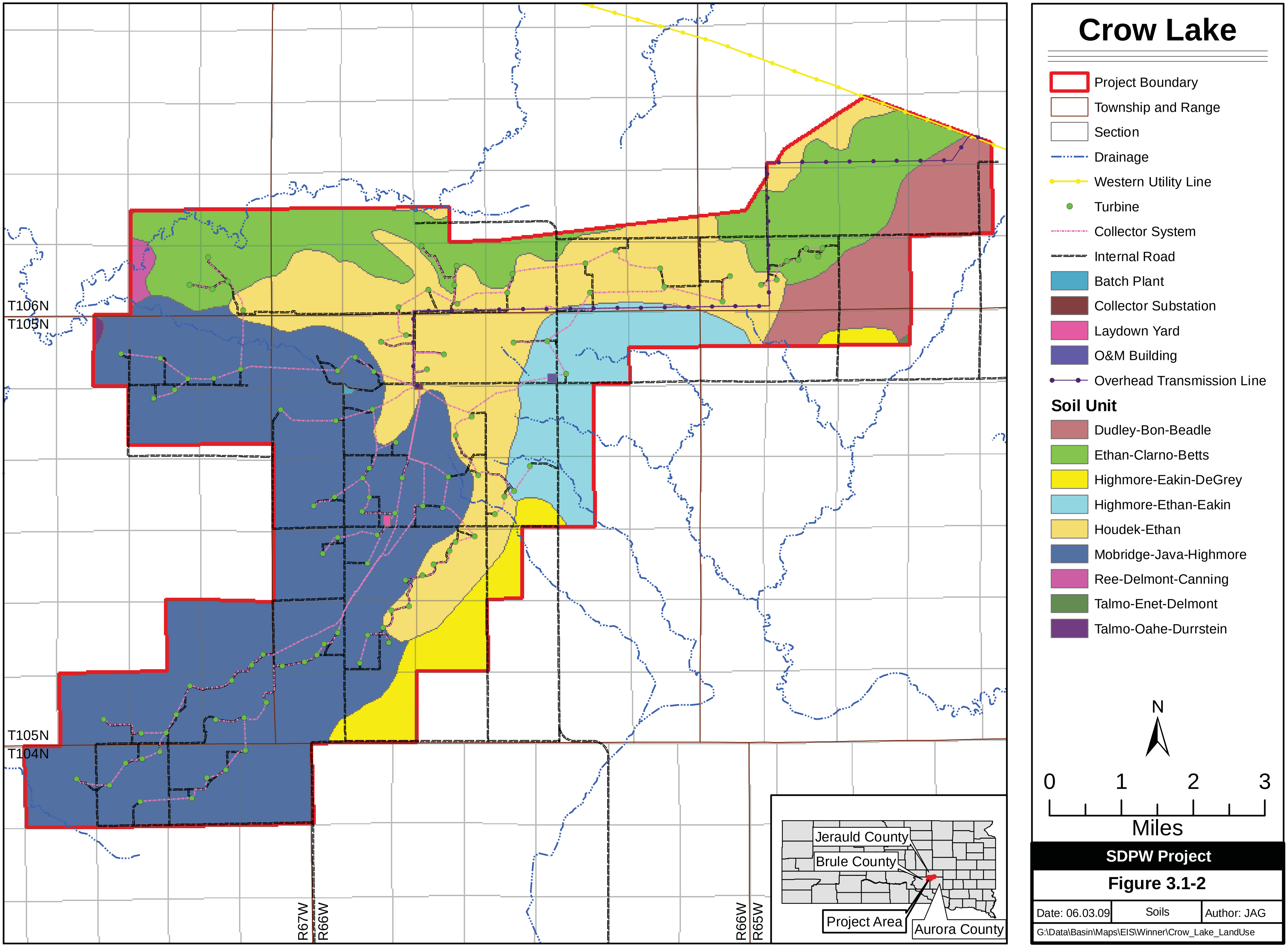
The soil erodibility factors (K), representing both susceptibility of soil to erosion and the rate of runoff, for site soils generally range from 0.28 to 0.32. This slight to moderate potential for erosion is typical for silt loam soils. Silty soils can be susceptible to detachment and produce moderate runoff, but the erosion potential is tempered by the loamy, organic content which lowers the susceptibility to detachment and increases infiltration (reducing runoff).

The predominant construction considerations for the site soils are the potential for shrink/swell and slopes in localized areas.

**Table 3.1-1 Soils of the Crow Lake Alternative**

| Name | Predominant Soils | Flooding Frequency | Representative Slope | K Factor | Percentage of Area |
|---|---|---|---|---|---|
| Mobridge-Java-Highmore | Silty drift over loamy till and loamy till | None | 4% | 0.32 | 42.9% |
| Houdek-Ethan | Loamy till and silty drift over loamy till | None | 4% | 0.28 | 22.8% |
| Ethan-Clarno-Betts | Loamy till | None | 5% | 0.28 | 15.2% |
| Highmore-Ethan-Eakin | Silty drift over loamy till and loamy till | None | 4% | 0.32 | 7.61% |
| Dudley-Bon-Beadle | Clayey till and loamy till | None | 2% | 0.28 | 6.40% |
| Highmore-Eakin-DeGrey | Silty drift over loamy till and loamy till | None | 1% | 0.32 | 4.48% |
| Ree-Delmont-Canning | Loamy alluvium and loamy alluvium over outwash | None | 2% | 0.28 | 0.44% |
| Talmo-Oahe-Durrstein | Loamy till and outwash | None | 1% | 0.28 | 0.083% |
| Talmo-Enet-Delmont | Clayey till and silty drift | None | 6% | 0.28 | 0.030% |

Source: NRCS 2009


Crow Lake
Project Boundary
Township and Range
Section
Drainage
Western Utility Line
Turbine
Collector System
Internal Road
Batch Plant
Collector Substation
Laydown Yard
O&M Building
Overhead Transmission Line
Soil Unit
Dudley-Bon-Beadle
Ethan-Clarno-Betts
Highmore-Eakin-DeGrey
Highmore-Ethan-Eakin
Houdek-Ethan
Mobridge-Java-Highmore
Ree-Delmont-Canning
Talmo-Enet-Delmont
Talmo-Oahe-Durrstein
N
0 1 2 3
Miles
T106N
T105N
T105N
T104N
R67W
R66W
R66W
R65W
Jerauld County
Brule County
Project Area
Aurora County
SDPW Project
Figure 3.1-2
Date: 06.03.09
Soils
Author: JAG
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### 3.1.2.2 Winner Alternative

A total of five soil unit associations are mapped within the Winner Alternative area, as listed in **Table 3.1-2** and depicted in **Figure 3.1-3**. The eastern half of the site consists of loamy and eolian sands of the Valentine-Tasssel-Anselmo soil unit. Moving eastward, loamy and eolian sands dominate, but become more intermixed with sandy alluvium. The northern portion of the site is dominated by the Millboro soil unit, which is more clayey in nature, derived from shale. Along the northern and eastern fringe of the ROI, occurrences of loess associated with the Reliance-Ree-Onita soil unit begin to appear.

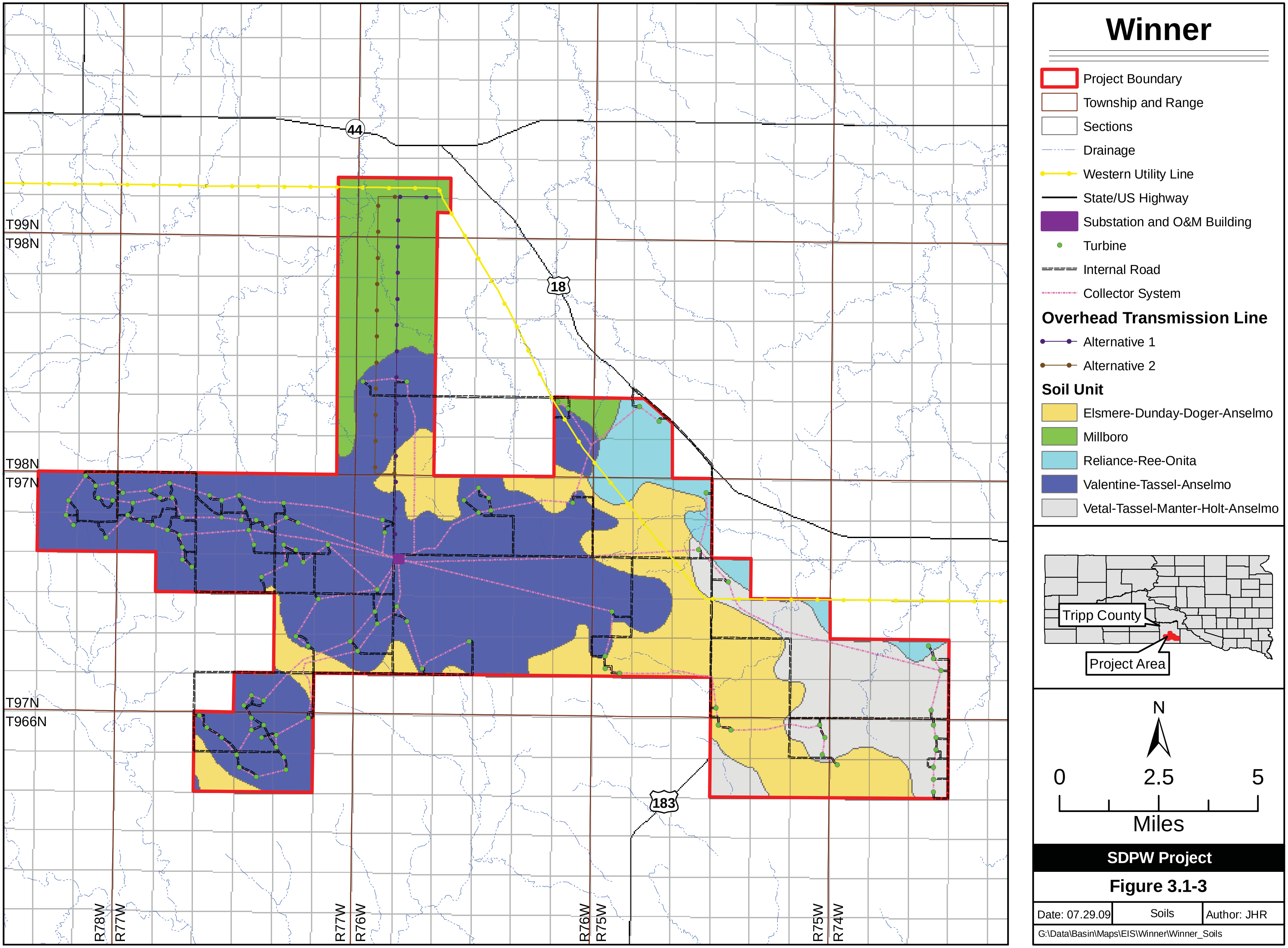
The K factors for the site soils range from 0.20 to 0.37, with the higher potential for erosion associated with the more clayey soils of the Millboro ( in the north) and Reliance-Ree-Onita (to the northeast) soil units. Sandy soils and alluvium have lower erodibility factors due to low runoff potential and high permeability.

The predominant construction considerations for the site soils are localized slopes and the potential for shrink/swell with the clayey soils of the Millboro and Reliance-Ree-Onita soil units. Characteristics of the site soils relating to the potential for erosion and limitations for construction were obtained from the NRCS database (NRCS 2009)**.**

**Table 3.1-2 Soils of the Winner Alternative**

| Name | Predominant Soils | Flooding Frequency | Representative Slope | K Factor | Percentage of Area |
|---|---|---|---|---|---|
| Valentine-Tassel-Anselmo | Eolian sands and loamy eolian sands | None | 5% | 0.20 | 50% |
| Elsmere-Dunday-Doger-Anselmo | Loamy eolian sands and sandy alluvium | None | 2% | 0.20 | 23% |
| Vetal-Tassel-Manter-Holt-Anselmo | Loamy eolian sands and loamy and sandy alluvium | None | 1% | 0.20 | 12% |
| Millboro | Clayey alluvium derived from shale | None | 4% | 0.37 | 10% |
| Reliance-Ree-Onita | Loess and loamy, clayey and sandy alluvium | None | 1% | 0.28 | 5% |

Source: NRCS 2009




SDPW Project

Figure 3.1-3

Date: 07.29.09 | Soils | Author: JHR

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# 3.2 WATER RESOURCES

The ROI for water resources encompasses hydrologic systems that could be impacted by discharges, spills and/or stormwater runoff associated with implementing the Proposed Project Components and proposed Federal actions.

## 3.2.1 SURFACE WATER RESOURCES

The Crow Lake and Winner alternatives are within the Missouri River Basin surface water drainage system. This system includes a watershed of approximately 529,350 square miles, including about 9,700 square miles in Canada (USACE 2006). The Missouri River Basin surface water drainage system consists of region, subregion, basin and subbasin drainages in accordance with hydrologic unit maps published by the U.S. Geological Survey (USGS). Six mainstem reservoir system dams line the Missouri River (beginning upstream): Fort Peck, Garrison, Oahe, Big Bend, Fort Randall and Gavins Point.

In the vicinity of the two sites, Fort Randall Dam on the Missouri River forms Lake Francis Case, and accepts drainage from the White River. Below the Fort Randall Dam is Gavins Point Dam, which impounds Lewis & Clark Lake. Ponca Creek and the Niobrara River join the Missouri River downstream of Fort Randall Dam, above Lewis & Clark Lake. The James River flows into the Missouri River downstream of Gavins Point Dam.

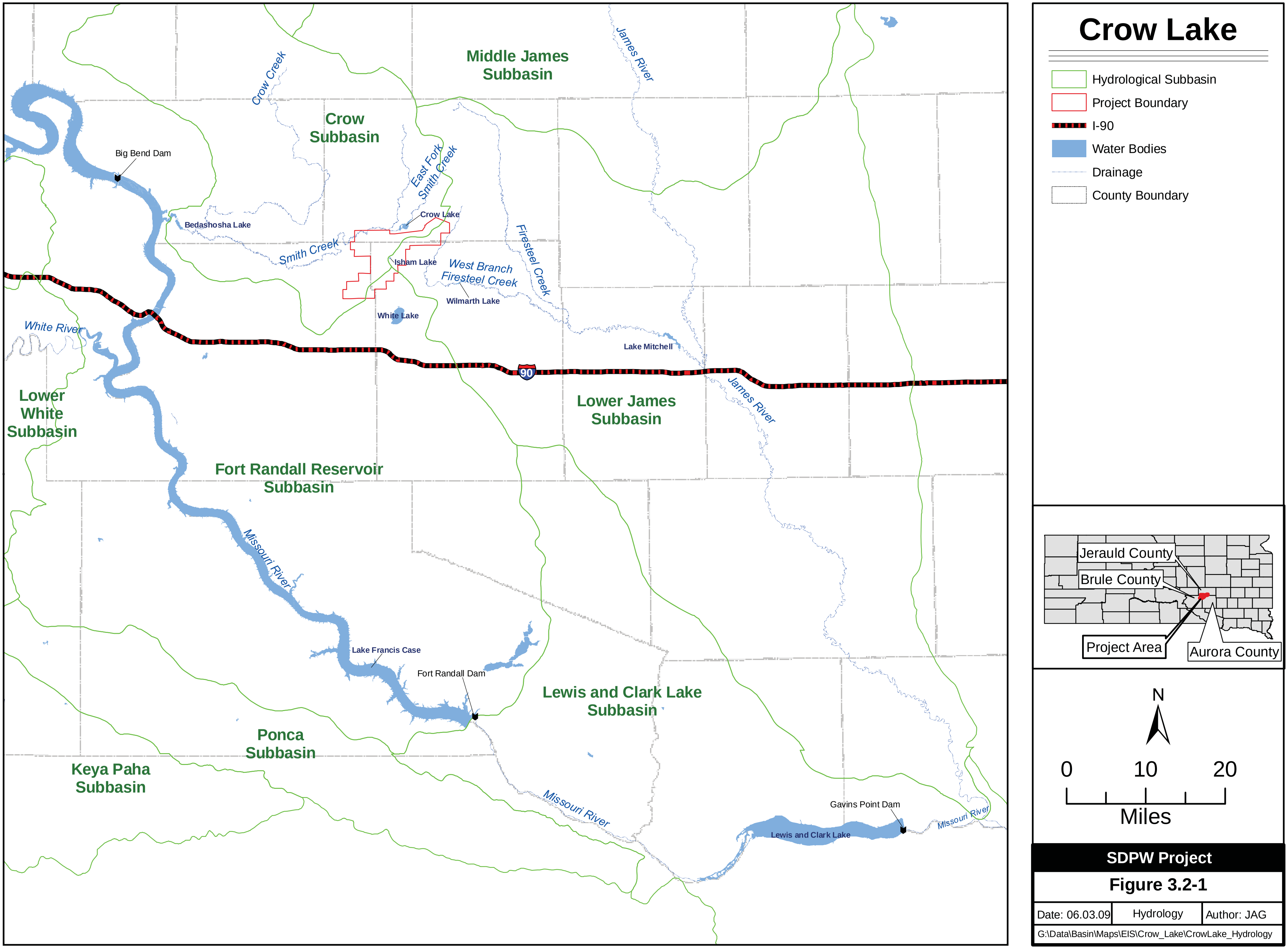
The following sections describe the path of surface water flows from within the alternative site boundaries to their confluence with the Missouri River. Impaired waters, listed under Section 303(d) of the CWA, within the flow path to the Missouri River are also discussed. Impaired waters do not meet water quality standards due to pollution or other degradation.

### 3.2.1.1 Crow Lake Alternative

The Crow Lake Alternative is within the prairie pothole region of the northern Great Plains. As described in **Section 3.1**, well-drained, hilly terrain dominates the site along the northern and western side of a noticeable northeast-southwest trending axis in the site topography. The poorly drained prairie pothole areas and water-holding sloughs are along the eastern side of this axis. Intermittent streams are prevalent at the Crow Lake Alternative, and the stream drainages are dendritic, resembling the branching pattern of blood vessels or tree branches. Various intermittent and perennial lakes and ponds associated with prairie potholes and intermittent streams are throughout the site.

As depicted in **Figure 3.2-1**, drainage from the majority of the Crow Lake Alternative flows into the Missouri-White Subregion of the Missouri Region. A portion of the site along the north half of the eastern site boundary drains easterly toward the James Subregion of the Missouri Region.

Within the Missouri-White Subregion, the site falls into the Fort Randall Reservoir Basin and spans two subbasins:



Crow Lake
Hydrological Subbasin
Project Boundary
I-90
Water Bodies
Drainage
County Boundary
Middle James Subbasin
Crow Subbasin
Crow Creek
James River
East Fork Smith Creek
Crow Lake
Big Bend Dam
Bedashosha Lake
Smith Creek
Isham Lake
West Branch Firesteel Creek
Firesteel Creek
Wilmarth Lake
White Lake
White River
Lake Mitchell
90
Lower White Subbasin
Lower James Subbasin
Fort Randall Reservoir Subbasin
Missouri River
Lake Francis Case
Fort Randall Dam
Lewis and Clark Lake Subbasin
Ponca Subbasin
Keya Paha Subbasin
Gavins Point Dam
Lewis and Clark Lake
Jerauld County
Brule County
Project Area
Aurora County
N
0
10
20
Miles
SDPW Project
Figure 3.2-1
Date: 06.03.09
Hydrology
Author: JAG
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- The Crow Subbasin dominates the surface water drainage on the western and northwestern portions of the site
- The Fort Randall Reservoir Subbasin drains the southeastern portion of the site

Within the James Subregion:

- The Lower James Subbasin drains an eastern portion of the site

The Crow Subbasin

The majority of the Crow Lake Alternative lies within the Crow Subbasin. The East Fork of Smith Creek flows westerly into Crow Creek along the northern boundary of the site. Downstream of Crow Lake, East Fork Smith Creek converges into Smith Creek. Sayles Creek also begins within the northwestern portion of the site and flows into Smith Creek just west of the site boundary. Smith Creek continues westerly until the confluence with Crow Creek. Headwaters to these creeks originate within the site boundaries. Crow Creek used to flow into the man-made reservoir which formed Bedashosha Lake. Water was drained from the Bedashosha Lake impoundment, and the spillway and abutment walls were removed between 1995 and 2000. Crow Creek was restored to its natural elevation and currently flows through the lake bed and discharges to the Lake Francis Case portion of the Missouri River, just downstream of the Big Bend Dam (DENR 2009). No impaired waters lie downstream of the Crow Lake Alternative within this subbasin.

The Fort Randall Reservoir Subbasin

A small portion of the southeastern corner of the Crow Lake Alternative drains to the southeast in the Fort Randall Reservoir Subbasin. One unnamed stream drains Isham Lake, located within the site, and directs flows toward White Lake. White Lake is in this hydrologic subbasin, but does not have an outflow. No impaired waters lie downstream of the Crow Lake Alternative within this subbasin.

The Lower James Subbasin

The northeastern corner of the Crow Lake Alternative includes unnamed tributaries to the West Branch of Firesteel Creek. A dam was constructed along the West Branch to form Wilmarth Lake in 1936. Outflows exit over the spillway, and flow continues easterly to the convergence with Firesteel Creek. Firesteel Creek continues to flow eastward through Lake Mitchell and then into the James River at Mitchell, South Dakota. The James River flows south-southeast into the Missouri River downstream of the Gavins Point Dam at Yankton, South Dakota, outside of the ROI.

Substantial organic loading from nonpoint sources occur throughout the James River watershed during storm events (DENR 2008). Decay of organic matter contributes to low dissolved oxygen and degraded trophic state index. Agricultural activities such as livestock operations, grazing in riparian zones, lack of riparian vegetation, and row crop production contribute to the amount of suspended sediments and fecal coliforms in the basin. Wilmarth Lake, Firesteel Creek and segments of the James River are listed as impaired waters under Section 303(d) of the CWA.

#### 3.2.1.2 Winner Alternative

The area is characterized by rolling plains of relatively low relief, giving rise to butte and mesa topography typical of the high plains. The Winner Alternative is located on generally well-drained terrain; intermittent streams are prevalent at the site. The upland portions of the Winner Alternative act as a drainage divide between the Missouri-White and Niobrara Subregions of the Missouri Region hydrologic unit. The northern portion of the site flows north as a part of the White Basin; the southern portion of the site flows south as a part of the Niobrara Basin, as depicted in **Figure 3.2-2**.

Within the White Basin:

- The Lower White Subbasin includes the northern portion of the site

The Niobrara Basin includes flows from the following subbasins:

- The Keya Paha Subbasin dominates the surface water drainage on the southwestern portions of the site
- The Ponca Subbasin drains the southeastern portion of the site

The stream drainages at the Winner Alternative are dendritic. Various intermittent and perennial lakes and ponds associated with artificially dammed intermittent streams are located across the Winner Alternative. The artificial lakes and ponds are primarily used for stock watering.

Lower White Subbasin

The headwaters and tributaries of Mud Creek and Dog Ear Creek begin on the northern portion of the site, flowing northward to their confluence just southwest of Winner, South Dakota. Dog Ear Creek continues northward until its confluence with the White River. Similarly, the headwaters of Sand Creek and Thunder Creek begin on the site. Following their confluence, Thunder Creek continues northward until its confluence with the White River. The White River flows eastward until discharging to the Lake Francis Case portion of the Missouri River, just downstream of Big Bend Dam, outside of the ROI.

A downstream segment of the White River is designated as impaired for elevated concentrations of total suspended solids (TSS) and fecal coliforms. Water quality throughout the White River basin is generally poor and often exceeds numeric standards (DENR 2008). Highly erosive soils from the western Badlands and within the river drainage are considered a major natural source of both suspended and dissolved solids. Rangeland grazing may also contribute to the TSS concentrations. DENR is currently reviewing a study to develop site-specific water quality criteria for the White River to address naturally occurring TSS. The source of fecal coliforms in the Lower White River may include animal feeding operations, crop production and livestock grazing.

Keya Paha Subbasin

The headwaters of an unnamed tributary to the Keya Paha River flow southward from the southern portion of the site, through Rahn Lake and continue southward to its confluence with the Keya Paha River. The Keya Paha River flows generally southeasterly across the South Dakota State line into Nebraska where it drains into the Niobrara River. The Niobrara River flows generally east-southeastward and drains into the Missouri River at Niobrara, Nebraska, downstream of the Fort Randall Dam and above Lewis & Clark Lake, outside of the ROI.

Rahn Lake is impaired for trophic state index due to nutrient enrichment and siltation related to agricultural activities. The Keya Paha River is impacted by fecal coliforms and TSS; sources of fecal coliforms likely include grazing in rangeland, riparian areas and/or along shorelines. TSS is thought to originate from natural sources. The Niobrara River is listed as impaired by the State of Nebraska for *Escherichia coli* (*E. coli*) contamination. Point sources have been identified and include municipal wastewater treatment facilities, fish hatchery/rearing facilities and confined animal feeding operations. Nonpoint sources may also contribute *E. coli*, including failing septic tanks, runoff from livestock pastures, improper or over-application of biosolids (wastewater treatment facility sludge, septage or manure) and urban storm water runoff not regulated by a NPDES permit. Wildlife may also contribute *E. coli* to the river (EPA 2005).

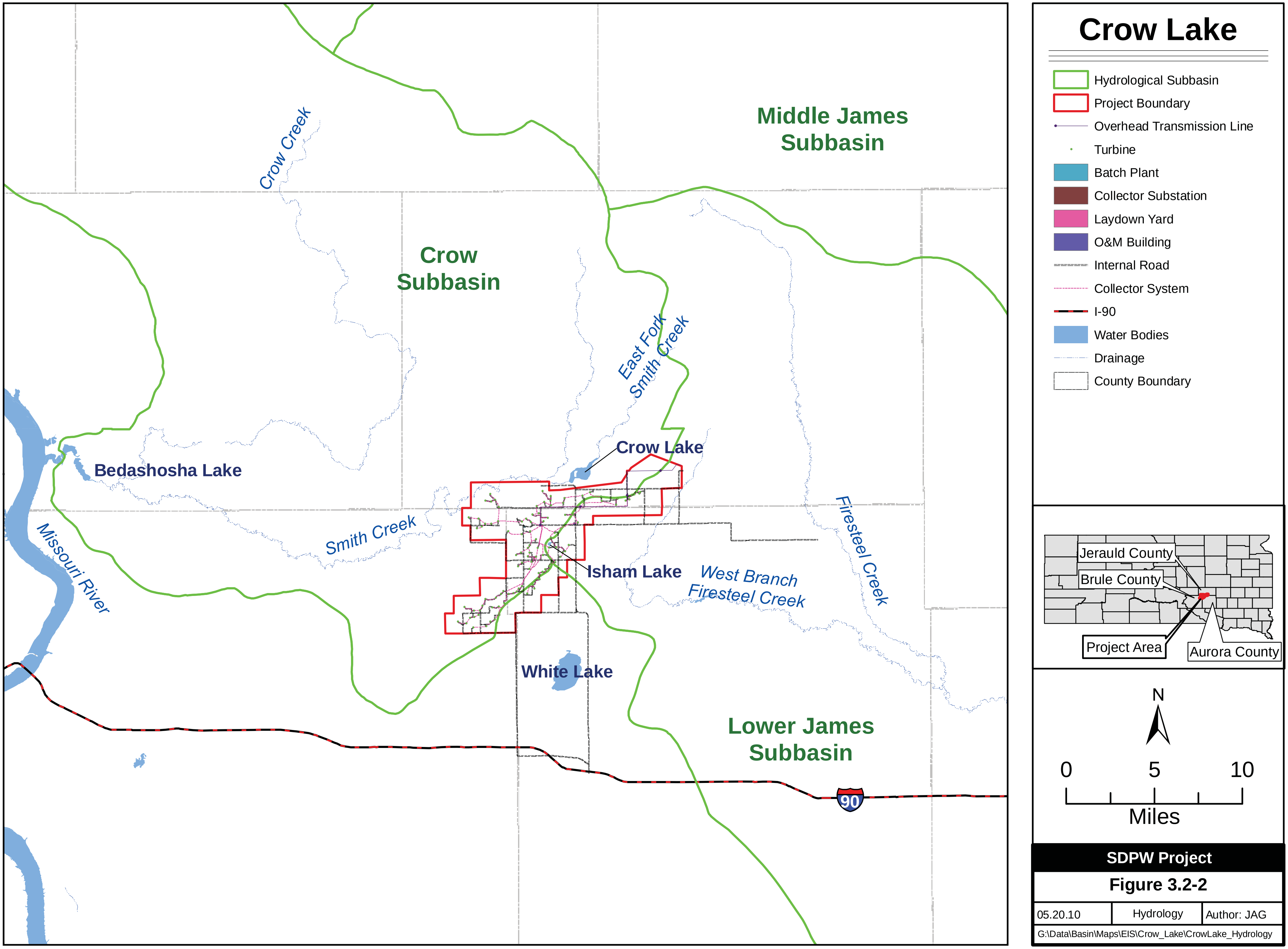
<u>Ponca Subbasin</u>

The eastern portion of the Winner site contains the unnamed headwaters to Ponca Creek, generally draining to the east and northeast. One tributary is dammed to form Roosevelt Lake near the eastern extreme of the site. The spillway from Roosevelt Lake directs flow northward to Ponca Creek. Ponca Creek flows east and southeast across the South Dakota State line into Nebraska, generally paralleling the Keya Paha River. Ponca Creek continues southeastward and drains into the Missouri River just upstream of the confluence of the Niobrara and Missouri rivers, outside of the ROI.

Roosevelt Lake has exhibited high concentrations of mercury, and is listed as impaired. The source of the mercury contamination is unknown. Assessment of the lake is included in the Lewis and Clark Watershed Assessment, which is ongoing by Randall Resource Conservation and Development and DENR. Ponca Creek has reported elevated concentrations of TSS and fecal coliforms, and is also impaired. Agricultural activities such as livestock operations, grazing in riparian zones, lack of riparian vegetation and row crop production likely contribute to the amount of suspended sediments and fecal coliforms in Ponca Creek.

### 3.2.2 FLOODPLAINS

This FEIS evaluates mapped floodplains within the alternative site boundaries to identify areas that may be subject to flooding.


Crow Lake
Hydrological Subbasin
Project Boundary
Overhead Transmission Line
Turbine
Batch Plant
Collector Substation
Laydown Yard
O&M Building
Internal Road
Collector System
I-90
Water Bodies
Drainage
County Boundary
Middle James Subbasin
Crow Subbasin
Lower James Subbasin
Crow Creek
East Fork Smith Creek
Crow Lake
Bedashosha Lake
Smith Creek
Missouri River
Isham Lake
West Branch Firesteel Creek
Firesteel Creek
White Lake
90
Jerauld County
Brule County
Project Area
Aurora County
N
0
5
10
Miles
SDPW Project
Figure 3.2-2
05.20.10
Hydrology
Author: JAG
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#### 3.2.2.1 Crow Lake Alternative

The Federal Emergency Management Agency (FEMA) has not mapped flood hazards in the unincorporated areas of Brule and Jerauld counties; flood insurance rate map (FIRM) panels are not available for review. Aurora County has been mapped and is designated as a flood hazard Zone D on the FIRM panel. A flood hazard Zone D is described as follows:

> *Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk.*

#### 3.2.2.2 Winner Alternative

Floodplains and flood hazards in the unincorporated areas of Tripp County are largely unmapped by FEMA. The cities of Winner and Colome (southeast of Winner) have FIRM panels available. No flood hazard zones are mapped within Winner, and Colome has a strip of land running parallel to U.S. Highway 18 designated as a flood hazard Zone A. Zone A flood hazards are described as follows:

> *Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.*

### 3.2.3 GROUNDWATER RESOURCES

This FEIS characterizes groundwater resources underlying the alternative sites. Where site specific data is limited, the configuration of the groundwater resources in the region is provided.

#### 3.2.3.1 Crow Lake Alternative

The primary aquifers underlying the Crow Lake Alternative are associated with the regional, Northern Great Plains aquifer system. Small, localized and shallow aquifers within the near-surface shale deposits and glacial sediments can also produce groundwater (Terracon 2009a).

The regional aquifer can be anticipated at depths of approximately 900 to 1,250 feet below ground surface (bgs) and is separated from the near-surface glacial sediments by a confining unit associated with portions of the Pierre Shale formation. The groundwater flow direction in the regional aquifer is generally east-northeast (Terracon 2009a).

Many private wells within the Crow Lake Alternative have been advanced in the shallow, localized sand and gravel aquifers associated with Pleistocene glacial deposits. Water encountered in sands and gravels within 200 feet bgs are classified by the USGS as the Crow Lake local aquifers. Water levels reported for the Crow Lake local aquifers ranged from 1.9 to 100 feet bgs. The Crow Lake local aquifer has approximately 190,000 acre-feet of water in storage in Aurora and Jerauld counties and underlies approximately 50 square miles; the aquifer exhibits a strong correlation between precipitation events and groundwater levels (Terracon 2009a). Locally, the uppermost and highly weathered/fractured beds of the Pierre Shale also can yield groundwater to support domestic uses (Terracon 2009a).

#### 3.2.3.2 Winner Alternative

The Winner Alternative is located within an area of south-central South Dakota where the Northern Great Plains and High Plains regional aquifer systems overlap (Terracon 2009b). Groundwater at the site is primarily obtained from the unconsolidated deposits associated with the High Plains aquifer system. Depths to near-surface groundwater at the Winner site were within 50 feet bgs in the majority of the well records. Well depths generally ranged from 28 to 260 feet bgs, and six wells indicated groundwater levels at or near the ground surface (Terracon 2009b).

The near-surface permeable sediments allow direct infiltration of precipitation, recharge to the aquifer and seepage though the beds of streams over the majority of the site. Recharge is rapid where the surficial material consists of poorly consolidated sand, stream-valley deposits of sand and gravel or highly weathered sediments. Recharge is slower where sandstone or local beds of fine grained sediments are at the ground surface. Near the northeastern boundary of the site, near-surface deposits of the Pierre Shale sediments are not as readily permeable (Terracon 2009b).

### 3.2.4 WETLANDS AND WATERS OF THE UNITED STATES

The site alternatives are within the prairie pothole region, as designated by the USFWS. Wetlands, or prairie potholes, are scattered across the landscape throughout much of eastern and south-central South Dakota. Ranging from small lakes to temporary wetlands, these areas perform several important functions, including:

- flood control
- groundwater recharge
- water quality protection
- plant, aquatic and wildlife habitat production

Under Section 404 of the CWA, the USACE has authority to regulate the discharge of dredged and fill material into WUS. WUS include traditional navigable waters and their non-navigable tributaries that typically flow year-round or have flow at least seasonally (*e.g.*, typically three months).

Wetlands, which are special aquatic sites, can be jurisdictional under Section 404 as a subset of WUS. Wetlands, as defined by the EPA and the USACE in the *Wetland Delineation Manual* (Environmental Laboratory 1987), are “those areas that are inundated or saturated by surface or groundwater at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.” The USACE will assert jurisdiction over wetlands adjacent to navigable waters and wetlands that directly abut their non-navigable tributaries.

National Wetlands Inventory (NWI) maps, produced by the USFWS and microfilmed by the USGS, provide a cursory evaluation of potential wetland areas. NWI maps are prepared primarily by stereoscopic analysis of high altitude aerial photographs. Potential wetland areas are noted based on vegetation, visible hydrology and geography. Generally, water bodies visible on the high altitude aerial photographs would be designated by the USFWS as “potential” wetland areas. Field investigations for site characterization in 2008 and 2009 (see **Section 3.4**) identified wetlands as part of the review of biological resources and land uses. NWI wetlands were field-verified, and existing wetlands were mapped as part of the field investigations (Tierra EC 2009).

The USFWS has been acquiring conservation easements in the vicinity of the site alternatives to support the preservation of grasslands and wetlands habitat. These conservation easements are further discussed in **Sections 3.4** and **3.6.3**.

### 3.2.4.1 Crow Lake Alternative

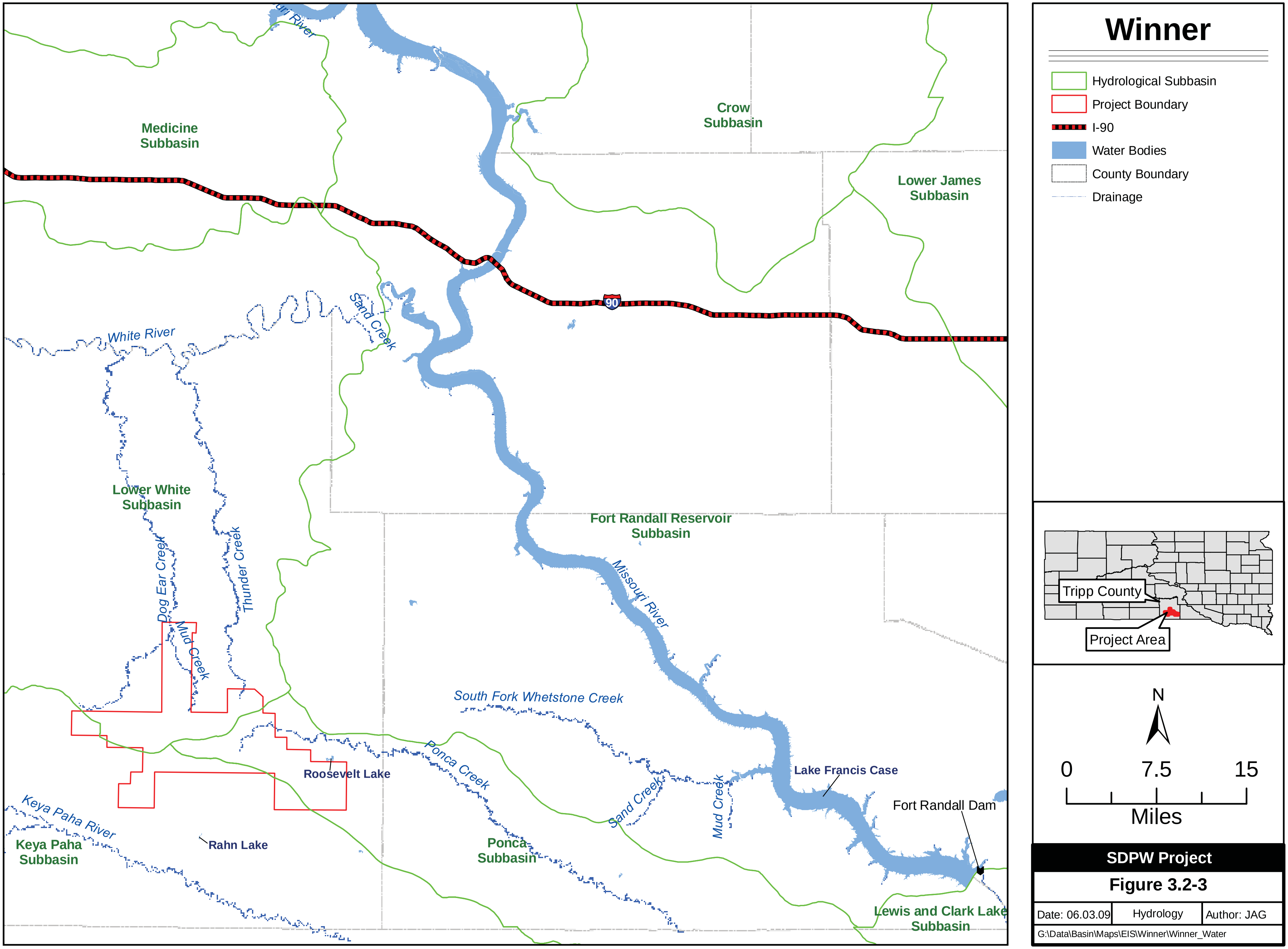
Based on the NWI, two wetland classification types are mapped at various locations across the Crow Lake Alternative, including Freshwater Emergent Wetland and Freshwater Pond. **Figure 3.2-3** depicts the NWI indicated wetland areas. **Table 3.2-1** lists the total number of NWI indicated wetland acres in the Crow Lake Alternative.

**Table 3.2-1 Wetland Areas within the Crow Lake Alternative**

| Wetland Type | Area (acres) |
|---|---|
| Freshwater Emergent Wetland | 385 |
| Freshwater Pond | 91 |
| Total | 476 |

Source: NWI

As a secondary measurement of the wetlands anticipated within the Crow Lake Alternative, field investigations in 2008 and 2009 were conducted to verify NWI wetlands and map the actual location of wetlands. These surveys identified 517 acres of prairie potholes, stock ponds, wetlands and wetland fringe, as depicted in **Figure 3.2-3** (Tierra EC 2009). Many of the wetland locations that were obtained from the NWI data were not located where the data indicated. Additionally, field surveys for jurisdictional wetlands and other WUS were conducted from October 7 to October 15, 2009 (WEST 2009a) for the Proposed Project. The survey areas included corridors with a width of 125 feet (62.5 feet on either side of a centerline)for access roads requiring construction or improvement, collector line corridors of 125 feet wide (62.5 feet on either side of a centerline), and an area 500 feet by 500 feet around turbine locations. A wetland delineation for the Wind Partners’ proposed development would be conducted prior to the start of construction in accordance with USACE standard protocols to identify any wetland potentially affected. **Section 3.4.3.1** further describes the field-verified wetland areas.




SDPW Project

Figure 3.2-3

| | | |
|---|---|---|
| Date: 06.03.09 | Hydrology | Author: JAG |

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### 3.2.4.2 Winner Alternative

Four wetland classification types are mapped at various locations across the Winner Alternative, including Freshwater Emergent Wetland, Freshwater Forested/Shrub Wetland, Freshwater Pond and Lake. **Figure 3.2-4** depicts the NWI indicated wetland areas and field-verified wetlands. **Table 3.2-2** lists the total area of NWI indicated wetland in the site.

**Table 3.2-2 Wetland Areas within the Winner Alternative**

| Wetland Type | Area (acres) |
|---|---|
| Freshwater Emergent Wetland | 1,937 |
| Freshwater Forested/ Shrub Wetland | 155 |
| Freshwater Pond | 98 |
| Lake | 51 |
| Total | 2,240 |

Source: NWI

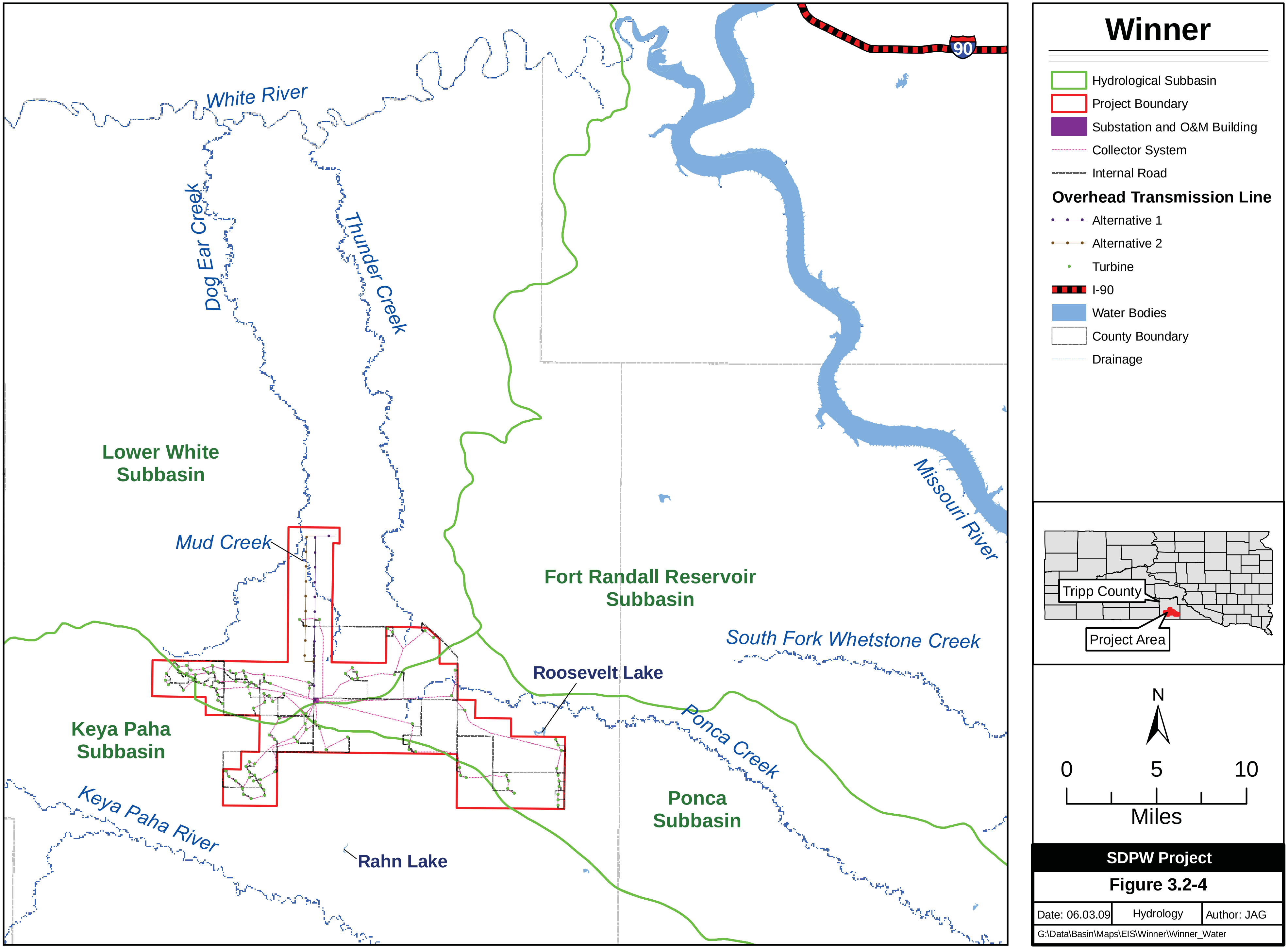
Field investigations in 2008 and 2009 identified a total of 931 acres of deciduous wetland, forested wetland, lake, stock pond, wetland and wet meadow within the Winner Alternative, as depicted in **Figure 3.2-4** (Tierra EC 2009). **Section 3.4.3.2** further describes the field-verified wetland areas. Wetlands (including jurisdictional, non-jurisdictional wetlands and WUS, collectively termed “wetlands”) were not delineated for the Winner Alternative because the Crow Lake Alternative was identified as the preferred alternative. If the Winner Alternative is to be further considered for development, then wetlands would be delineated.

# 3.3 CLIMATE CHANGE AND AIR QUALITY

The ROI for climate change and air quality includes areas of immediate disturbance associated with the Proposed Project Components and proposed Federal actions, in association with regional conditions.

## 3.3.1 REGIONAL CLIMATE AND METEOROLOGY

The Chamberlain Station (Station #024) is the closest weather station to either alternative and it is equidistant to both sites. Between 1971 and 2000, and considering the annual average highs and lows, this station recorded an annual mean high temperature of 79.6 degrees Fahrenheit, an annual mean low temperature of 2.9 degrees Fahrenheit (South Dakota Office of Climate [SDOC] 2009), and an annual mean temperature of 46.7 degrees Fahrenheit. Station #024 receives an average yearly rainfall of 22.35 inches. The annual average surface wind velocity for South Dakota ranges from 10 to 12 miles per hour (mph), as depicted in **Chapter 1**, **Figure 1-1.**


White River
Dog Ear Creek
Thunder Creek
Missouri River
90
Lower White
Subbasin
Mud Creek
Fort Randall Reservoir
Subbasin
South Fork Whetstone Creek
Roosevelt Lake
Ponca Creek
Keya Paha
Subbasin
Ponca
Subbasin
Keya Paha River
Rahn Lake
Winner
Hydrological Subbasin
Project Boundary
Substation and O&M Building
Collector System
Internal Road
Overhead Transmission Line
Alternative 1
Alternative 2
Turbine
I-90
Water Bodies
County Boundary
Drainage
Tripp County
Project Area
N
0
5
10
Miles
SDPW Project
Figure 3.2-4
Date: 06.03.09
Hydrology
Author: JAG
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### 3.3.2 AIR POLLUTANTS

Air quality in South Dakota is regulated by the DENR Air Quality Program, which is responsible for permitting and enforcement. Federal and State laws seek to reduce air pollution to levels shown by research to protect the majority of individuals and reduce overall impacts to ecosystems. The implementation of these laws begins with setting air quality standards, which describe the existing air environment in the site alternative areas. The EPA sets NAAQS to regulate the emissions of six air pollutants referred to as "criteria pollutants." DENR has adopted the NAAQS for the State air quality program. The criteria pollutants include:

- Carbon monoxide (CO)
- Lead (Pb)
- Nitrogen dioxide ($NO_2$)
- Ozone ($O_3$)
- Particulate matter less than 10 ($PM_{10}$) and 2.5 ($PM_{2.5}$) microns in diameter
- Sulfur dioxide ($SO_2$)

### 3.3.3 AMBIENT AIR QUALITY

Both the Crow Lake and Winner alternatives are in attainment for the NAAQS, thus no special mitigation measures are required for new activities.

### 3.3.4 CLIMATE CHANGE

Carbon dioxide ($CO_2$) is one of six greenhouse gases (GHGs) that contributes to climate change. $CO_2$ emissions represent approximately 84 percent of all GHG emissions in the U.S. $CO_2$ is generated whenever a carbon-based fuel, such as coal, wood, natural gas, or fuel oil is burned. It is the primary GHG emitted from fossil-fired utility boilers, with approximately 41 percent of U.S. carbon emissions (primarily $CO_2$) coming from power plant sources (Energy Information Administration [EIA] 2009). Other significant sources are automobile and truck exhaust, industrial combustion sources and residential heating sources. Wind-generating stations do not emit $CO_2$.

Within South Dakota, $CO_2$ emissions resulting from fossil fuel combustion totaled 13.78 million tons in 2007 (EPA 2009a). Five principal sectors contribute to $CO_2$ emissions through the combustion of fossil fuels, including commercial, industrial, residential, transportation and electric power. Of these, activities related to the generation of electric power accounted for 2.96 million tons of $CO_2$ emitted in South Dakota (EPA 2009a).

In addition to $CO_2$, sulfur hexafluoride ($SF_6$) is another GHG listed by the Intergovernmental Panel on Climate Change (IPCC). Western's existing substations in the site alternative areas use $SF_6$, a gaseous dielectric, used in high-voltage circuit breakers, switchgears and other electrical equipment, such as circuit breakers. Since 2000, Western has had an aggressive program to identify and repair leaks throughout the transmission system to reduce $SF_6$ emissions. Project personnel would monitor the use, storage and replacement of $SF_6$ to minimize any releases to the environment. The likelihood for accidental release is low, as $SF_6$ gas is supplied in sealed units and is factory-certified not to leak. The activities associated with Western's proposed Federal action would be done in accordance with Western's environmental protection provisions.

Wind farms and substations do not emit substantial amounts of the other GHGs.

# 3.4 BIOLOGICAL RESOURCES

## 3.4.1 REGULATORY FRAMEWORK

### 3.4.1.1 Federal Statutes

***Endangered Species Act***

The ESA provides for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The purpose of the ESA is to conserve threatened and endangered species and the ecosystems on which they depend. Based on the Federal authorization associated with the Proposed Project and Wind Partners' proposed development, several provisions of the ESA apply. First, under Section 7(a)(1) of the ESA, all Federal agencies have an affirmative obligation to use their authorities to proactively carry out programs that will help provide for the conservation of threatened and endangered species.

In addition, Federal agencies must ensure that their actions are not likely to jeopardize the continued existence of a species listed as threatened or endangered, or result in the destruction or adverse modification of critical habitat. The assessment of the impacts to listed species under ESA must address direct, indirect, and cumulative effects of the agency's action, as well as the effects of activities that are interrelated or interdependent with the action.

The ESA and implementing regulations also prohibit the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in such conduct. Take that is incidental to the action is not considered to be prohibited, provided it is in compliance with terms and conditions of an Incidental Take Statement issued by the USFWS.

***Migratory Bird Treaty Act***

The MBTA, which is administered by the USFWS, is the primary statute for migratory bird conservation and protection in the U.S. This statute prohibits take of migratory birds (e.g., waterfowl, shorebirds, birds of prey, songbirds) except when specifically authorized by the U.S. Department of the Interior by permit or depredation order. "Take" under the MBTA means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.

The MBTA is a strict liability statute wherein proof of intent is not an element of a taking violation. Most actions that result in a "taking" or possession (permanent or temporary) of a protected species can be a violation. There is no threshold as to the number of birds or other animals taken at wind energy sites beyond which the USFWS will initiate enforcement action. The regulations implementing the MBTA do not provide for issuance of permits that authorize take of migratory birds that may be killed or injured by activities that are otherwise lawful.

The MBTA provides for significant criminal penalties. Thus, the Applicants for the Proposed Project and Wind Partners' development have fully coordinated their activities in advance with the USFWS.

Executive Order 13186 directs executive departments and agencies to take certain actions, under agency authorities, to proactively protect and conserve migratory birds. In furtherance of that purpose, the DOE and USFWS have entered into an MOU (DOE and USFWS 2006) to strengthen migratory bird conservation through enhanced collaboration. The MOU identifies specific areas in which this cooperation can substantially contribute to the conservation and management of migratory birds and their habitats.

***Bald and Golden Eagle Protection Act***

The BGEPA (16 U.S.C. 668-668c) prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald and golden eagles, including their parts, nests or eggs, and violations are subject to both criminal and civil penalties. This law affords eagles additional protections beyond those provided by the MBTA, in particular, by making it unlawful to disturb eagles. On a very limited basis, the USFWS may authorize take of eagles when: thresholds for take in the eagle population have not yet been reached and take is compatible with a stable or increasing breeding population; comprehensive measures to avoid and reduce take are developed in coordination with the USFWS, and; any subsequent take is unavoidable. Permits issued by USFWS may require pre- or post-project surveys, and may require that conservation measures be implemented to offset unavoidable take. The BGEPA defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

***National Wildlife Refuge System Improvement Act***

The National Wildlife Refuge System Improvement Act requires that any activity on Refuge lands be determined as compatible with the Refuge system mission and Refuge purpose(s). Compatibility determinations are made by the USFWS Refuge Managers.

## 3.4.1.2 State Statutes

***South Dakota Wildlife Diversity Program***

The South Dakota Wildlife Diversity Program (South Dakota Codified Laws [SDCL] 34A-8-6, 34A-8-2) protects species and habitats that comprise the biological diversity of the State "in a manner that meets the needs and desires of the citizens of the State." Statutory policies are geared toward the conservation of water and soils to help preserve wildlife. The Wildlife Division of the SDGFP houses the South Dakota Natural Heritage Program (SDNHP), a program that is part of an international network of biological inventories that collect and manage data, develop products, tools, and services to meet conservation needs for the State.

***South Dakota Endangered Species Law***

The South Dakota Endangered Species Law (SDCL Ann. 34A-8-1 *et seq.*) includes animals and plants. Listings are based on scientific, commercial and other data. The law does not require recovery plans, critical habitat designation or agency consultation.

## 3.4.2 STUDY METHODS

The ROI for biological resources is different for vegetation and wildlife. The ROI for vegetation includes areas of direct disturbance (temporary and permanent) associated with the Proposed Project Components. The ROI for wildlife includes all areas within the project area boundary, because the Proposed Project could impact wildlife species in areas that extend beyond the footprint for construction (including temporary and permanent disturbance areas) of the Proposed Project Components. This includes lands adjacent to proposed facilities but within the boundaries that are used by wildlife, such as migration corridors.

Biological data was collected from literature searches; agency personnel and reports from USFWS, SDGFP and the SDNHP; ecological reports and databases (*e.g.*, NatureServe, GAP analysis); and field investigations. Biologists from Western, Tierra EC, Western EcoSystems Technology, Inc. (WEST) and Terracon provided regional and site-specific information for biological resources. USFWS correspondence provided input during EIS scoping (**Appendix C**). Information for federally-listed species was requested from the USFWS on October 14, 2009; a response was provided on November 12, 2009 (**Appendix C**).

Field investigations were conducted for site characterization at both alternative sites in July, September, October and November 2008, and March through July 2009. WEST conducted grouse lek surveys, breeding bird surveys, migratory bird surveys and bat use surveys during the spring and summer of 2009. WEST continued to conduct avian use surveys (until November 2009) and bat use surveys (through October 2009). WEST provided interim survey reports in August 2009, including data for analysis in this EIS. In addition to the avian and bat use surveys, a PII study (see **Sections 4.4.3.1** and **4.4.3.2, Wildlife, *Birds***) was completed to evaluate potential impacts to biological resources in accordance with the USFWS's *Interim Guidelines on Assessing Wind Impacts to Wildlife* (USFWS 2003a). Where feasible, site development, turbine design and operational recommendations were incorporated into the project design, as described in **Chapter 2**.

## 3.4.3 VEGETATION COMMUNITIES

### 3.4.3.1 Crow Lake Alternative

***Regional Overview***

The Crow Lake Alternative is within the Southern Missouri Coteau subregion of the Northern Glaciated Plains Ecoregion (Bryce *et al.* 1998; Omernik 2005). Bailey *et al.* (1995) describe this area as the Eastern Prairie Ecoregion, Mixedgrass Subregion. This region is characterized by elevation ranges of 1,985 to 2,510 feet AMSL. The area is mesic with average annual precipitation in excess of 20 inches. Mixed grasses dominate the native vegetation. Species of wheatgrass (*Agropyron* spp.), needlegrass (*Stipa* spp.) and grama (*Bouteloua* spp.) are common, while woody vegetation is rare and generally limited to drainages. Cropland is also common and consists primarily of corn, small grains and alfalfa. Most of the area is nearly level to undulating glacial till plains with prairie pothole wetlands and moraines. Steep slopes are prevalent adjacent to the major streams. Wetland basin densities in the Prairie Pothole Region (PPR) are some of the highest in the country with densities as high as 83 wetland basins per square mile. The wetland basin density in the Crow Lake area is nine to 10 basins per square mile, some of the lower basin densities in the PPR (Kempema 2007).

### *Crow Lake Alternative Description*

As detailed in **Table 3.4-1** and **Figure 3.4-1**, the Crow Lake Alternative is composed of rolling hills intermixed with mixed-grass prairie, including rangeland, pastureland and Conservation Reserve Program (CRP)/prairie, cropland, wetlands (including stock ponds), farmsteads and patches of deciduous trees (mostly shelterbelts) (Tierra EC 2009). Elevations range from 1,644 feet AMSL in the bottomlands to 1,985 feet AMSL in the northwest portion of the site.

**Table 3.4-1 Vegetation Communities in the Crow Lake Alternative**

| Vegetation Type | Acres | Percentage of Area |
|---|---|---|
| Mixed-grass prairie | 23,016 | 64% |
| Cropland | 11,678 | 33% |
| Wetlands | 517 | 1% |
| Farmstead | 276 | <1% |
| Shelterbelt | 261 | <1% |
| Deciduous forest | 82 | <1% |

Mixed-grass Prairie (including rangeland, pastureland and CRP/prairie)

Mixed-grass prairie accounts for approximately 64 percent (23,016 acres) of the Crow Lake Alternative. Mixed-grass prairie includes rangeland (untilled areas, as well as areas that were tilled at one time but have reverted to grassland), pasture and CRP/prairie. There is very little unbroken sod in the area, though it is important to note that land that has been plowed at one time but reverted back to prairie, still provides value to grassland wildlife species.

Rangeland (22,231 acres) includes areas of expansive, mostly unimproved land on which native or adapted, introduced plant species are managed for livestock grazing. Some areas contain unbroken sod; however, much of this acreage has been plowed at one time. Dominant herbaceous vegetation includes smooth brome (*Bromus inermis*) and sweet-clover (*Melilotus* spp.), with occasional occurrences of *Carduus* spp., *Artemisia* spp. and various members of the Asteraceae family. In addition to herbaceous plant species, rangeland often contains scattered plains cottonwood (*Populus deltoides*) and various shrub species.

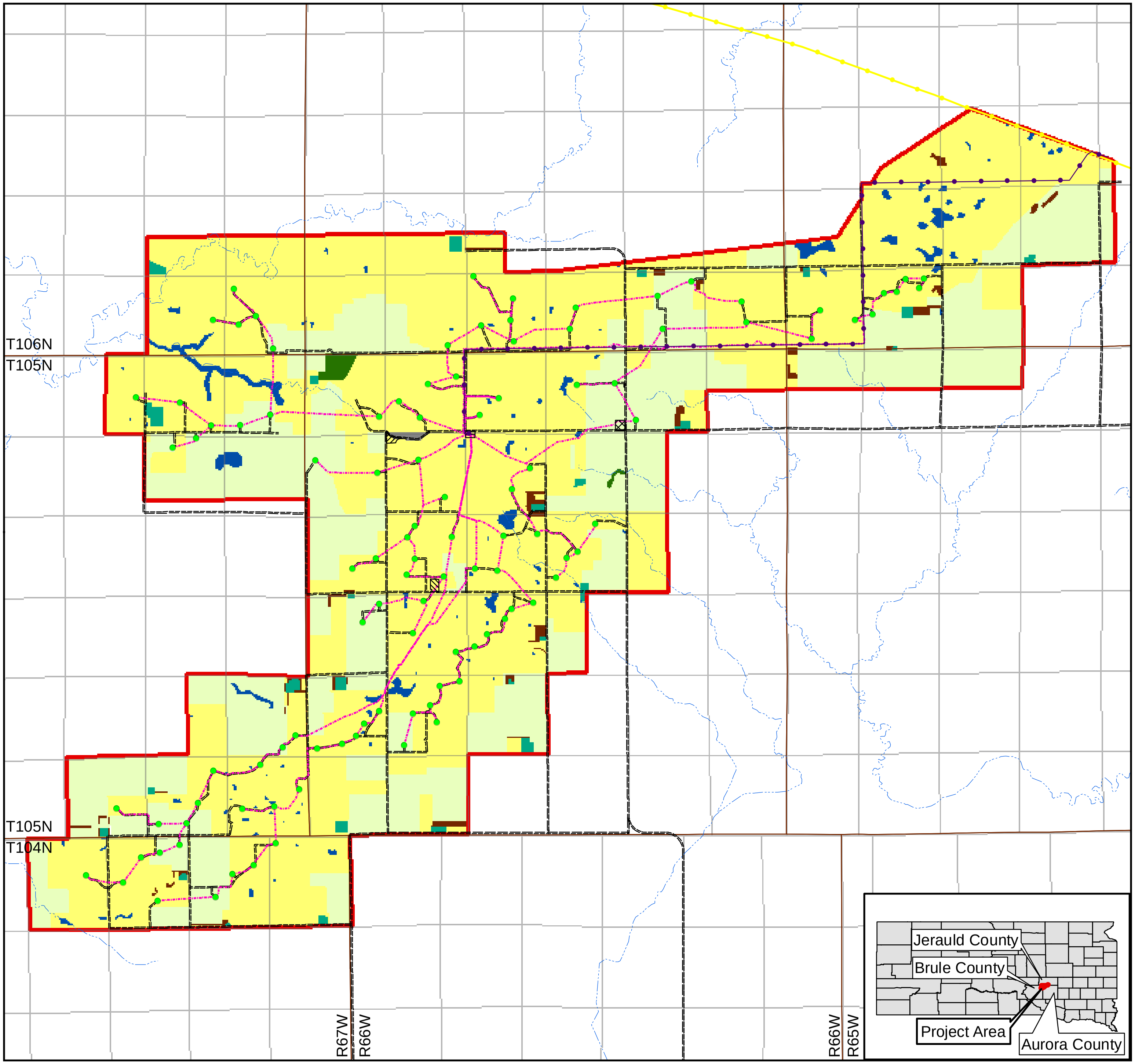
Pasture (692 acres) includes areas where livestock are held in high densities. Herbaceous vegetation is minimal; where present, the vegetation is often heavily grazed.

CRP/prairie (93 acres) is areas of naturally occurring prairie or planted grasslands where native prairie grasses are dominant. CRP includes areas of cropland that have been removed from crop production for a specific period (usually 10 years) and are planted with cover designed to conserve soil and water. Hay production and livestock grazing are not permitted on CRP land unless specifically allowed during droughts. The Farm Service Agency (FSA) handbook, updated by the USDA in May 2008, expressly forbids the FSA from revealing acreages or locations of CRP; therefore, this information is no longer available so an estimate of CRP lands within the Crow Lake Alternative cannot be made. Based on field observations, the majority of lands in the CRP/prairie category appear to be CRP (previously broken sod), and not naturally occurring prairie (unbroken sod). CRP/prairie is dominated by smooth brome, prairie beard grass (*Schizachyrium scoparium*), big blue-stem (*Andropogon gerardii*), switch grass (*Panicum virgatum*), Kentucky bluegrass (*Poa pratensis*) and sweet-clover (*Melilotus* spp.).

The USFWS has approximately 1,629 acres of grasslands in five parcels enrolled in the Grassland Easement program within the Crow Lake Alternative (USFWS 2008a). Grassland Easements are included in the mixed-grass prairie land use category in **Table 3.4-1**. **Figure 3.4-2** identifies the locations of the Grassland Easements within the area. Grasslands protected under easements are prevented from being permanently converted to cropland or development. Landowners may use the land within the easement for grazing and haying; however, mowing, haying and grass seed harvesting must be delayed until after July 15$^{th}$ of each year. Locating turbines on Grassland Easements requires coordination with the USFWS.

Cropland

Cropland accounts for approximately 33 percent (11,678 acres) of the Crow Lake Alternative. It includes all open space areas where agricultural products are currently in production. This category was further divided into specific cover type classifications based on the previous year's crop type (*i.e.*, row crop or cover crop). Row crops include plantings such as sorghum or corn; cover crops include alfalfa, winter wheat or hay. Many agricultural lands alternate between row and cover crops. Some areas defined as cropland are also used as rangeland during parts of the year.




# Crow Lake

Project Boundary
Township and Range
Section
Drainage
Western Utility Line
Turbine
Collector System
Internal Road
Batch Plant
Collector Substation
Laydown Yard
O&M Building
Overhead Transmission Line

**Habitat**

Cropland
Deciduous Forest
Farmstead
Mine/Quarry
Mixed-grass Prairie
Shelterbelt
Wetland

N

0 1 2 3

Miles

**SDPW Project**

**Figure 3.4-1**

| Date: 07.12.10 | Habitat | Author: JAG |
|---|---|---|

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Wetlands (including stock ponds)

Wetlands account for slightly over one percent (517 acres) of the Crow Lake Alternative. Prairie potholes describe the naturally occurring depressional wetlands where native and non-native hydrophytic vegetation persists. Dominant vegetation includes prairie cord grass (*Spartina pectinata*), reed canary grass (*Phalaris arundinacea*), narrow-leaved cattail (*Typha angustifolia*) and river bulrush (*Bolboschoenus fluviatilis*).

Stock ponds are areas where ranchers have bermed natural drainage features or seasonal wetlands to create a persistent water supply for livestock. These areas are often heavily grazed and do not generally contain a perimeter of hydrophytic vegetation.

The USFWS has approximately 2,836 acres of wetlands and adjacent uplands in 15 parcels enrolled in the Wetland Easement program within the Crow Lake Alternative (USFWS 2008a). Wetland Easement areas are not displayed in **Table 3.4-1,** but are accounted for in both the mixed-grass prairie and wetlands area estimates. They are not displayed as wetland easements because wetland easements include both habitat types and the data do not distinguish these acreages by parcel.

Farmstead, Shelterbelt and Deciduous Forest

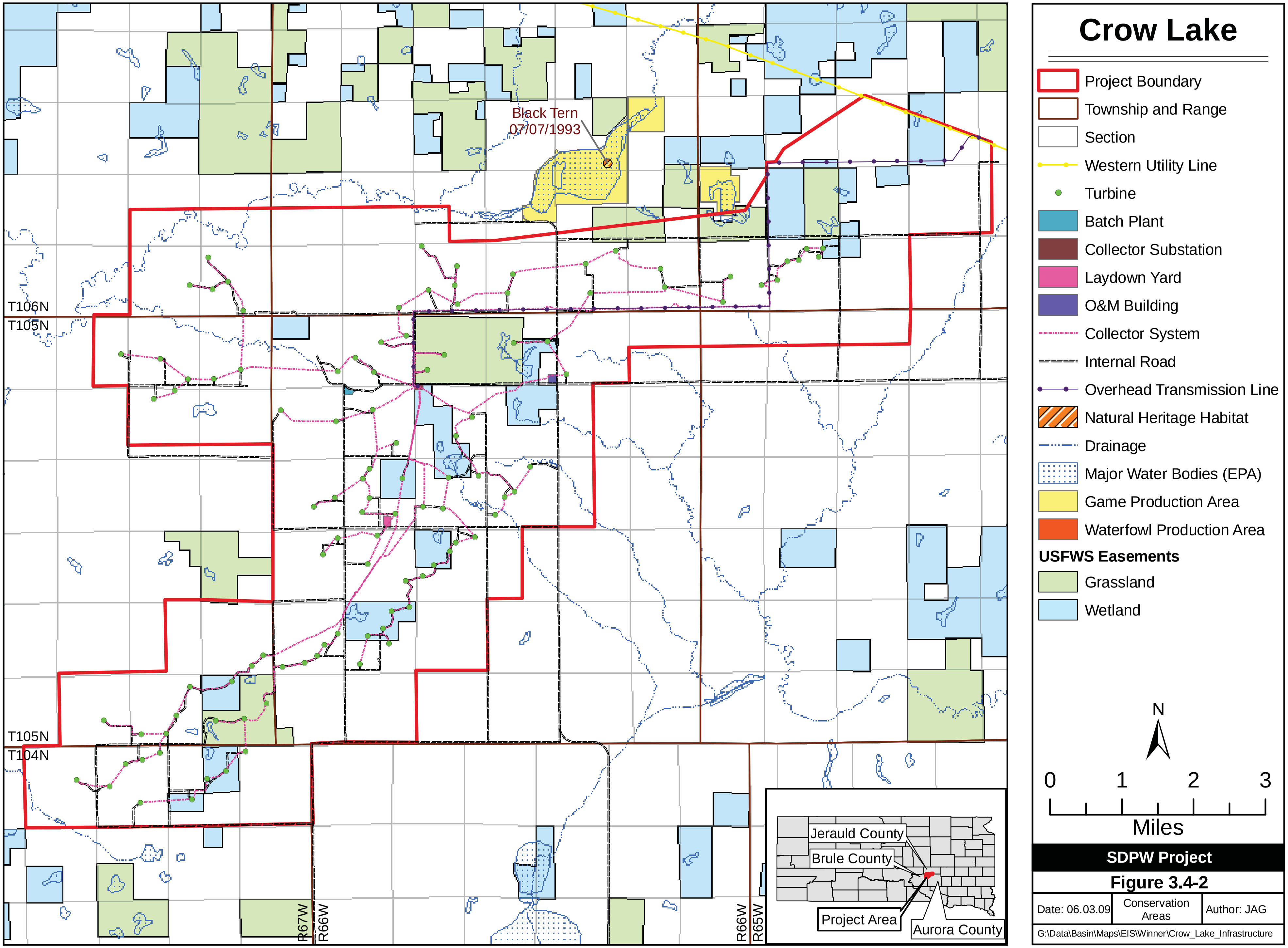
Farmsteads account for less than one percent (276 acres) of the Crow Lake Alternative. Farmsteads include developed areas of land with various structures devoted to residential, commercial or industrial practices. These areas are adjacent to pasture or rangeland and are scattered throughout the site.

Shelterbelts account for less than one percent (261 acres) of the Crow Lake Alternative. Shelterbelts are trees or shrubs planted in one or more rows that provide shelter from wind or protect soil from erosion. Shelterbelts are typically found around the edges of fields, pastures and/or farmsteads. Most of the shelterbelts are associated with farmsteads. The most commonly observed tree species within the shelterbelts is eastern red cedar (*Juniperus virginiana*); plains cotton wood (*Populus deltoides*) and wild plum (*Prunus americana*) are also present.

Deciduous forest accounts for less than one percent of the Crow Lake Alternative. These are areas of dense, naturally occurring tree species. In upland areas, plains cottonwoods (*Populus deltoides*) are most abundant, with occurrences of eastern red-cedar (*Juniperus virginiana*), Siberian elm (*Ulmus pumila*), green ash (*Fraxinus pennsylvanica*) and wild plum (*Prunus americana*). Deciduous forest is often located as islands within rangeland.

Invasive and Noxious Plants

In South Dakota, invasive species include declared pests and noxious weeds. These are defined as species which the South Dakota Weed and Pest Control Commission has designated as sufficiently detrimental to the State to warrant enforcement of control measures (Administrative Rule [AR] 12:62:02:01). South Dakota has documented 27 invasive species under this rule.



Crow Lake
Project Boundary
Township and Range
Section
Western Utility Line
Turbine
Batch Plant
Collector Substation
Laydown Yard
O&M Building
Collector System
Internal Road
Overhead Transmission Line
Natural Heritage Habitat
Drainage
Major Water Bodies (EPA)
Game Production Area
Waterfowl Production Area
USFWS Easements
Grassland
Wetland
Black Tern
07/07/1993
T106N
T105N
T105N
T104N
R67W
R66W
R66W
R65W
Jerauld County
Brule County
Project Area
Aurora County
N
0
1
2
3
Miles
SDPW Project
Figure 3.4-2
Date: 06.03.09
Conservation Areas
Author: JAG
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**Table 3.4-2 South Dakota Invasive Plant Species Documented in Jerauld, Aurora or Brule Counties**

| Common Name | Scientific Name |
|---|---|
| Absinth wormwood | *Artemisia absinthium* |
| Hoary cress | *Cardaria draba* |
| Plumeless thistle | *Carduus acanthoides* |
| Musk thistle | *Carduus nutans* |
| Russian knapweed | *Centaurea repens* |
| Canada thistle | *Cirsium arvense* |
| Field bindweed | *Convolvulus arvensis* |
| Leafy spurge | *Euphorbia esula* |
| Perennial sow thistle | *Sonchus arvensis* |
| Puncturevine | *Tribulus terrestris* |
| Common mullein | *Verbascum thapsus* |

Source: South Dakota Department of Agriculture 2008

**Table 3.4-2** presents the 11 invasive species documented in Jerauld, Aurora and Brule counties. The distribution of invasive species in the Crow Lake Alternative is unknown at this time.

<u>Federally-listed Species</u>

No federally-listed plant species are known to occur within Aurora, Brule or Jerauld counties (USFWS 2009a).

<u>State-Listed Species</u>

No rare, threatened or endangered plant species tracked by the SDNHP are known to occur in the Crow Lake Alternative (SDNHP 2009).

### 3.4.3.2 Winner Alternative

***Regional Overview***

The Winner Alternative is in the Great Plains Steppe Ecoregion (Omernik 2005). This ecoregion includes approximately 25 million acres. This ecoregion is characterized by elevations from approximately 1,644 to 1,985 feet AMSL. Topography is gently sloping to rolling with well-drained shale plains. The area is dry mesic to mesic with average annual precipitation between 12 and 23 inches. Mixed grasses dominate the vegetation. The Winner Alternative is in the Keya Paha Tablelands and Ponca Plains subregions (Bryce *et al.* 1998). The Keya Paha Tablelands Subregion (16”-20” annual precipitation) covers the western half of the Winner Alternative. Natural vegetation includes blue grama, sideoats grama, western wheatgrass, little bluestem and needleandthread. The Ponca Plains Subregion covers the eastern half of the Winner Alternative, and is more mesic (20”-22” annual precipitation) than the Keya Paha Tablelands Subregion. Natural vegetation consists of mixed-grass prairie containing little bluestem, prairie sandreed, green needlegrass and needleandthread. Wetland densities are similar to the Crow Lake Alternative and are relatively low.

### *Winner Alternative Description*

The Winner Alternative is predominantly in the mixed-grass prairie zone and is intermixed with mixed-grass prairie (including rangeland, pastureland and CRP/prairie), cropland, wetlands (including herbaceous wetlands, forested wetlands, stock ponds and lakes), deciduous forests, farmsteads and shelterbelts (**Table 3.4-3** and **Figure 3.4-3**). Elevations range from 1,985 feet AMSL in the bottomlands at the northern extent of the Winner Alternative to 2,510 AMSL at the western extent of the area.

**Table 3.4-3 Vegetation Communities in the Winner Alternative**

| Vegetation Type | Acres | Percentage of Area |
|---|---|---|
| Mixed-grass prairie | 53,925 | 65% |
| Cropland | 24,450 | 29% |
| Wetlands | 931 | 1% |
| Farmstead | 1,351 | 1.5% |
| Shelterbelt | 1,261 | 1.5% |
| Deciduous forest | 1,464 | 2% |

<u>Mixed-grass Prairie (including rangeland, pastureland and CRP/prairie)</u>

Mixed-grass prairie accounts for approximately 65 percent (53,925 acres) of the Winner Alternative. Mixed-grass prairie includes rangeland, pasture and CRP/prairie. A small percentage of the Winner Alternative is unbroken sod, although there is more than the Crow Lake Alternative.

Rangeland (51,432 acres) defines areas of expansive, mostly unimproved land on which native or adapted introduced plant species are managed for livestock grazing. Some areas contain unbroken sod; however, much of this acreage has been plowed at one time. The most common taxa include smooth brome, sweet-clover, *Carduus* spp., *Artemisia* spp., various members of the Asteraceae family, switch grass (*Panicum virgatum*), prairie beard grass (*Schizachyrium scoparium*), *Muhlenbergia* spp., *Sonchus* spp., hoary verbena (*Verbena stricta*), *Agropyron* spp., *Trifolium* spp. and bull thistle (*Cirsium vulgare*).

Pasture (1,282 acres) defines areas where animals are held in high densities. Herbaceous vegetation is minimal; where present, the vegetation is often heavily grazed.

CRP/prairie (1,211 acres) defines areas of naturally occurring prairie or planted grasslands where native prairie grasses are dominant. As explained above, the 2008 USDA FSA handbook expressly forbids revealing acreages or locations of CRP; therefore, this information is no longer available so an estimate of CRP lands within the Winner Alternative cannot be made. Based on field observations, the majority of lands in the CRP/prairie category appear to be CRP (previously broken sod), and not naturally occurring prairie (unbroken sod). CRP/prairie is dominated by prairie beard grass with switch grass and yellow Indian grass (*Sorghastrum nutans*) as secondary dominants. Other species include prairie beard grass, goldenrod species (*Solidago* spp.), evening-primrose (*Oenothera* spp.), *Juncus* spp., hoary verbena (*Verbena stricta*), *Artemisia* spp. and various members of the Asteraceae family.

The USFWS has approximately 220 acres of grasslands in one parcel enrolled in the Grassland Easement program within the Winner Alternative and no Wetland Easements (USFWS 2008a). The Grassland Easement is included in the mixed-grass prairie land use category in **Table 3.4-3** and **Figure 3.4-4**.

Cropland

Cropland accounts for approximately 29 percent (24,450 acres) of the Winner Alternative. Cropland classifications are the same as described in **Section 3.4.3.1**.

Wetlands (including deciduous wetland, forested wetland, lake, stock pond, wetland and wet meadow)

Wetlands account for slightly over one percent (931 acres) of the Winner Alternative. A variety of wetland complexes, composed of wet meadow, shrub-carr and deciduous wetland forest communities are located within the site. The deciduous wetland communities are dominated by plains cottonwood; the wet meadow communities are dominated by prairie cord grass, switch grass, river bulrush, reed canary grass, narrow-leaved cattail and *Juncus* spp. The shrub-carr communities are dominated by willow (*Salix* spp.) and olive species (*Elaeagnus* spp.). The forested wetland communities are dominated by cottonwood and willow species (*Salix* spp.). These vegetation communities are often within rangeland.

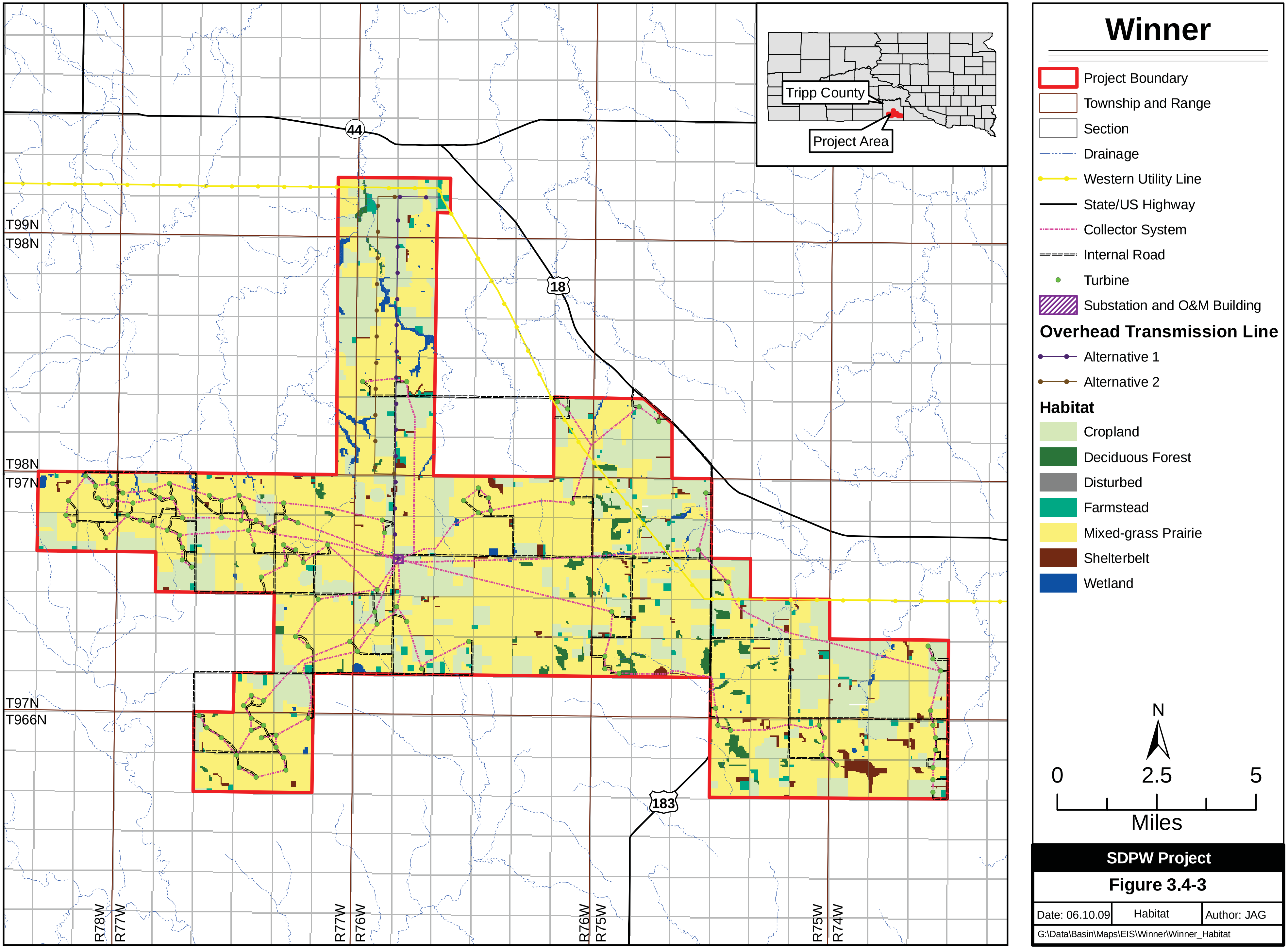
Stock ponds are areas that are bermed (natural drainage features or seasonal wetlands) to create a persistent water supply for livestock. These areas are often heavily grazed and do not contain a perimeter of hydrophytic vegetation.

Deciduous Forest

Deciduous forest accounts for approximately 2 percent (1,464 acres) of the Winner Alternative. This designation describes areas of dense, naturally occurring tree species. In upland areas, plains cottonwood is most abundant; occurrences of eastern red-cedar, Siberian elm, box elder (*Acer negundo*), green ash and wild plum are also present. This vegetation community is often islands within rangeland.

Farmstead and Shelterbelt

Farmsteads account for approximately 1.5 percent (1,351 acres) of the Winner Alternative and are similar to those described in **Section 3.4.3.1**. Shelterbelts account for approximately 1.5 percent (1,261 acres) of the Winner Alternative. Species composition of the shelterbelts is similar to that seen at Crow Lake.



Winner
Project Boundary
Township and Range
Section
Drainage
Western Utility Line
State/US Highway
Collector System
Internal Road
Turbine
Substation and O&M Building
Overhead Transmission Line
Alternative 1
Alternative 2
Habitat
Cropland
Deciduous Forest
Disturbed
Farmstead
Mixed-grass Prairie
Shelterbelt
Wetland
Tripp County
Project Area
44
18
183
T99N
T98N
T97N
T966N
R78W
R77W
R76W
R75W
R74W
N
0
2.5
5
Miles
SDPW Project
Figure 3.4-3
Date: 06.10.09
Habitat
Author: JAG
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Invasive and Noxious Plants

**Table 3.4-4** presents the 12 invasive species documented in Tripp County. The distribution of invasive species in the Winner Alternative is unknown.

**Table 3.4-4 South Dakota Invasive Plant Species Documented in Tripp County**

| Common Name | Scientific Name |
|---|---|
| Hoary cress | *Cardaria draba* |
| Plumeless thistle | *Carduus acanthoides* |
| Musk thistle | *Carduus nutans* |
| Diffuse knapweed | *Centaurea diffusa* |
| Spotted knapweed | *Centaurea maculosa* |
| Russian knapweed | *Centaurea repens* |
| Canada thistle | *Cirsium arvense* |
| Bull thistle | *Cirsium vulgare* |
| Leafy spurge | *Euphorbia esula* |
| Perennial sow thistle | *Sonchus arvensis* |
| Common mullein | *Verbascum thapsus* |

Source: South Dakota Department of Agriculture 2008

Federally-listed Species

No federally-listed plant species are known to occur within Tripp County (USFWS 2009a).

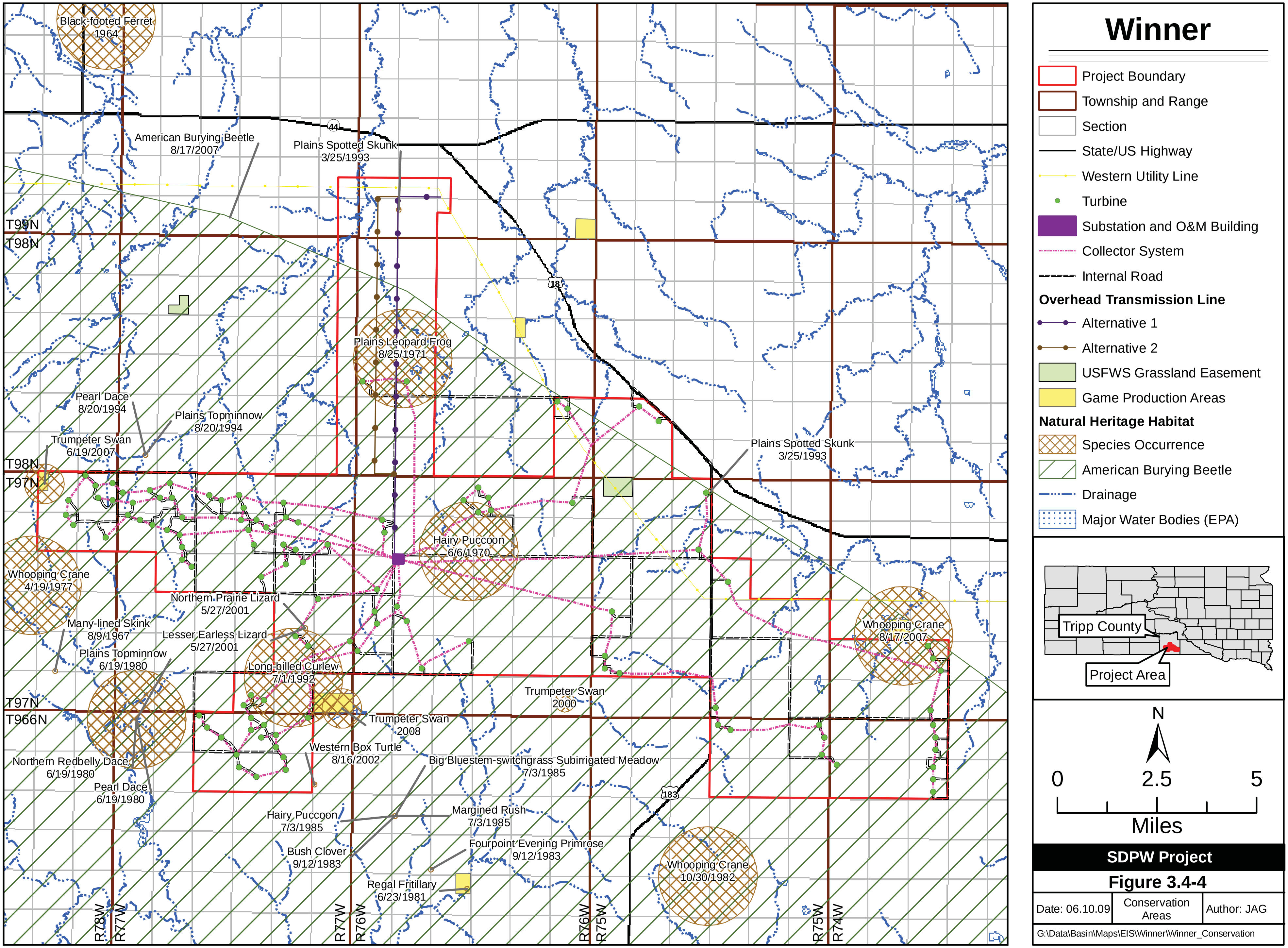
State-Listed Species

No rare, threatened or endangered plant species tracked by the SDNHP are known to occur in the Winner Alternative (SDNHP 2009).

## 3.4.4 WILDLIFE

The ROI evaluated for wildlife resources encompasses all areas within the boundaries of the site alternatives. As the Proposed Project may impact wildlife species in areas that extend beyond the construction footprint of the Proposed Project Components (including temporary and permanent disturbance areas), adjacent lands utilized by wildlife, such as migration corridors, are also included. The ROI for wildlife is greater than the ROI for vegetation because wildlife species move in and out of the alternative sites. Extending the ROI ensures that all species are evaluated. The analysis of existing conditions and potential effects from the Proposed Project are based on field studies and the *USFWS PII Score for PrairieWinds SD1* (see **Sections 4.4.3.1** and **4.4.3.2, Wildlife, *Birds***) (Terracon 2008b).

This section is based on information contained within *Reference (Lake Andes), Crow Lake, Winner, and Fox Ridge Project Sites Central, South Dakota* (Terracon 2008b), *PrairieWinds SD1, Inc. Project Compilation of Resource Technical Memorandums* (Terracon 2009a and 2009b), *Wildlife Studies for the PrairieWinds SD1 Crow Lake Wind Resource Area Aurora, Brule, and Jerauld Counties, South Dakota* (Derby *et al.* 2010c), *Wildlife Studies for the PrairieWinds SD1 Winner Wind Resource Area Tripp County, South Dakota* (Derby *et al.* 2010d), *and Prairie Winds Vegetation Mapping, NRC Project # 009-0044-01, Portions of Jerauld, Aurora, Brule and*




SDPW Project

**Figure 3.4-4**

| Date: 06.10.09 | Conservation Areas | Author: JAG |
|---|---|---|

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*Tripp Counties, South Dakota* (Tierra EC 2009). Where additional sources of information have been used to evaluate the potential impacts associated with the Proposed Project, those sources have been cited.

### 3.4.4.1 Crow Lake Alternative

Terrestrial fauna within the Crow Lake Alternative are characteristic of mixed grasslands within the PPR. Fertile soils and high wetland basin density provide an abundance of forage and habitat cover for species of small mammals, amphibians, reptiles and birds, although wetland density is relatively low at the Crow Lake Alternative when compared to the PPR (Kempema 2007). Wildlife shares the region with cattle and other livestock. Agricultural practices have reduced the amount and continuity of prairie and wetland habitat. Smaller patches of prairie and wetland are now often intermixed with woody species in tree rows and shelterbelts. A list of wildlife species observed during field surveys in 2008 and 2009 is provided in **Appendix C, Table C-1.** A total of 100 bird species, 12 mammal species and one amphibian were observed.

Hunting is a popular recreational activity in and around the Crow Lake Alternative. Game species pursued most frequently include pheasants and other upland gamebirds, white-tailed deer, fox, coyotes and waterfowl. Review of State and Federal databases indicates that there are no WPAs, State Game Production Areas (GPA) or Walk-in Areas within the Crow Lake Alternative (SDGFP 2009a and 2009b) (**Figure 3.4-2**).

***Mammals***

Habitat models produced by the South Dakota GAP Analysis Program (Smith *et al.* 2001) were consulted to identify common wildlife species that may occur within the Crow Lake Alternative.

In addition to the species observed, the GAP analysis predicts mammals including red fox (*Vulpes vulpes*), bobcat (*Lynx rufus*), opossum (*Didelphis marsupialis*), raccoon (*Procyon lotor*) and those listed in **Appendix C, Table C-2**. Small burrowing mammals, such as shrews, voles, mice and gophers, use soft soils for denning and cover. Game species include pronghorn (*Antilocapra americana*), mule deer and white-tailed deer. White-tailed deer are considered common in the area.

Bat species reside in and migrate through the region. Thirteen species of bats are documented in South Dakota, seven of which may occur within the Crow Lake Alternative (Ellison *et al.* 2003; SDGFP 2004; SDGFP 2007; Kempema 2007)(**Table 3.4-5).**

Little specific information regarding roosting, breeding, foraging and migration is known for bats in the Crow Lake Alternative. Areas adjacent to pothole lakes and wetlands are mesic and support cover and foraging habitat for mammal species. Peaks in insect hatches during warm season months provide a good prey base for many mammals.

**Table 3.4-5 Bat Species that May Occur within the Crow Lake Alternative**

| Common Name | Scientific Name | Type of Residency | Ranking | Occurrence |
|---|---|---|---|---|
| Northern long-eared bat | *Myotis septentrionalis* | Year-round | Apparently secure/rare or local range (G4/S3) | May Occur |
| Silver-haired bat | *Lasionycteris noctivagans* | Summer | Secure/apparently secure (G5/S4) | May Occur |
| Little brown bat | *Myotis lucifugus* | Year-round | Secure (G5/S5) | May Occur |
| Western small-footed bat | *Myotis ciliolabrum* | Year-round | Secure (G5/S5) | May Occur |
| Big brown bat | *Eptesicus fuscus* | Year-round | Secure (G5/S5) | May Occur |
| Eastern red bat | *Lasiurus borealis* | Summer | Secure (G5/S5) | Occurs |
| Hoary bat | *Lasiurus cinereus* | Summer | Secure (G5/S5) | Occurs |

Source: SDGFP 2004, 2007, Derby *et al.* 2010a.
**KEY TO CODES USED IN GLOBAL AND STATE RANKS:**
G5/S5 – Demonstrably secure, though it may be quite rare in parts of its range
G4/S4 – Apparently secure, though it may be quite rare in parts of its range
S3 – Either very rare and local throughout its range, or found locally

Bat Survey Results

Bat use surveys were performed from May 27 to October 14, 2009. Surveys were performed using Anabat, a system to identify and survey bats by detecting and analyzing their echolocation calls. The objective of the surveys was to estimate the seasonal and spatial use of the Crow Lake Alternative site by bats, not to estimate population sizes.

Six of the seven species of bats likely to occur in the study area have had documented fatalities at other wind energy facilities. Results of acoustic bat surveys at the Crow Lake Alternative were used to classify bat calls by frequency groups that correspond roughly to groups of relative risk. Approximately 68 percent of recorded passes were by low-frequency bats, suggesting higher relative abundance of species such as the big brown bat, silver haired bat, and hoary bat. These bats typically forage over fields, forests, and water in the late evening, before sunset, and before sunrise. Nineteen percent of calls were greater than 40 kHz in frequency (*e.g. Myotis* spp), bats that typically forage over water, meadows, and farmland. The remaining calls (12.8 percent) were by mid-frequency (30-40 kHz) bat species (*e.g.* little brown bat, eastern red bat). These bats forage over water at night, and some prefer forested environments. All three species groups were most active in July and August, suggesting resident breeding populations for some (or all) of these species occur at the Crow Lake Alternative. The relatively high number of passes by low-frequency bats in the early summer suggests possible spring migration by members of this species group through the area. Mid-frequency species appear to depart the area by September, while low- and high-frequency species remain in the area until October (Derby *et al.* 2010a).

The mean number of bat passes per detector-night was compared to existing data from six wind energy facilities where both bat activity and mortality levels have been measured. The level of bat activity documented at the Crow Lake Alternative was similar to bat activity at facilities in Minnesota and Wyoming, where bat mortality was low compared to other wind facilities in the region (Derby *et al.* 2010a). Bat surveys are currently being conducted at the nearby Wessington Springs wind facility; however, results of these surveys were not available at the time of publication of this FEIS.

Species identification was only possible for the hoary bat and eastern red bat. Hoary bats comprised 5.1 percent of all bat passes, and were most active in early June, suggesting spring migration through the area. July and August activity by hoary bats suggests that some individuals reside at the Crow Lake Alternative during the summer. Eastern red bats comprised 5.6 percent of all bat passes, most of which were recorded in July and August, suggesting that this species also resides in the Crow Lake Alternative during the summer (Derby *et al.* 2010a).

The Crow Lake Alternative is not located near any large, known bat colonies or other features that are likely to attract large numbers of bats. The number of bat calls detected per night at the Crow Lake Alternative was relatively high in July and August, with the majority of bat passes recorded in July. Activity in July likely corresponds with the reproductive season, when pups are being weaned and foraging rates are high. August and September activity likely represents a continuation of foraging activity by resident bats, mixed with some movement of migrating bats through the area. The relatively low activity in early summer and fall suggests that few bats migrate through the Crow Lake Alternative in the spring and fall. However, it is possible that spring migration may have occurred prior to the start of the study period. No bats were recorded in October, indicating that most bats had left the area for warmer climates or winter hibernacula (Derby *et al.* 2010a).

### *Reptiles and Amphibians*

Common reptiles include the common garter snake (*Thamnophis sirtalis*), plains garter snake (*Thamnophis radix*), plains hognose snake (*Heterodon nasicus*), fox snake (*Elaphe vulpine*), the western painted turtle (*Chrysemys picta belli*) and snapping turtle (*Chelydra serpentina*). Amphibians such as the northern leopard frog (*Rana pipiens*), American toad (*bufo americanus*) and tiger salamander (*Ambystoma tigrinum*) are also likely to be present. Habitat for these species includes open agricultural and grasslands, hedgerows and wet lowlands. The density of reptiles and amphibians is considered similar to that of the surrounding areas, as the Crow Lake Alternative does not contain unique habitats.

### *Birds*

Mixed grasslands and the PPR intersect many avian migratory routes and provide breeding grounds for birds. Wetland basins are highly productive and provide birds with ample resources for reproduction. The resulting mosaic of grassland and wetland basins and linear wetland corridors makes the Crow Lake Alternative an important migration route for birds (Kempema 2007). Bird species that were observed in the area during surveys are listed in **Appendix C, Table C-2**.

<u>Bird Survey Results</u>

Intact mixed-grass prairie in the Crow Lake Alternative provides suitable habitat for many resident and migratory bird species. Avian use surveys were conducted in 2009 to estimate temporal and spatial distributions of birds in the area and to collect baseline data to be used for the “before/after” study designed for the project. Migratory bird surveys (fixed point counts) were conducted from mid-March through mid-November 2009. Breeding bird surveys (transect surveys) were conducted from early June to early July 2009. Collectively, field surveys recorded

7,785 individual birds (Derby *et al.* 2010c). Aerial grouse lek surveys were also conducted (Derby *et al.* 2010c).

Results for migratory bird surveys indicate a total of 76 unique bird species; a total of 5,000 individual birds were recorded (**Appendix C, Table C-2 and Table C-3**). One-hundred-sixty-five individual raptors in 156 groups (a group contains one or more individuals) were recorded (3.3 percent of overall bird observations), representing 12 species. Northern harrier and red-tailed hawk were the most frequently observed raptor species. Passerines were the most abundant bird type, accounting for 51.2 percent of overall bird observations, with red-winged blackbird (*Agelaius phoeniceus*), western meadowlark (*Sturnella neglecta*), and horned lark (*Eremophila alpestris*) being the most commonly observed passerine species. Waterfowl accounted for 21.8 percent of observations. Canada geese (*Branta canadensis*) and mallards (*Anas platyrhynchos*) were the most commonly observed waterfowl. Bird use was shown to be consistent with the level of bird use at other wind facilities with similar habitats and is not a particularly “high use” area compared to other wind facilities (Derby *et al.* 2010c). Avian surveys are currently being conducted at the nearby Wessington Springs wind facility; however, results of these surveys were not available at the time of publication of this FEIS.

A total of 2,785 individual bird observations were recorded during breeding bird surveys, representing 57 unique species. Cumulatively, four species (6.8 percent of all species) accounted for 58.3 percent of observations: brown-headed cowbird, western meadowlark, grasshopper sparrow and red-winged blackbird, which are species typical of open grassland habitats. Over half of the birds observed during breeding bird surveys were blackbirds and orioles. Woodland and wetland birds were also observed, but were less abundant than grassland species (Derby *et al.* 2010c).

Upland game bird species known to occur in the Crow Lake Alternative include ring-necked pheasant, greater prairie chicken and sharp-tailed grouse. Ring-necked pheasant habitat includes primarily mixed grasses and cropland. The intact native grasslands in the area (64 percent of the Crow Lake Alternative) provide habitat for sharp-tailed grouse and greater prairie chicken. Sharp-tailed grouse and greater prairie chicken were documented during spring and summer surveys (Derby *et al.* 2010c; Tierra EC 2009). Five grouse leks were identified during aerial surveys. Four are within the Crow Lake Alternative and one is immediately adjacent to the site. Two of the leks were confirmed to species (one sharp-tailed grouse and one greater prairie chicken). The remaining three could not be identified to species (Derby *et al.* 2010c).

Waterfowl utilize the wetland basins in and adjacent to the Crow Lake Alternative for nesting, foraging and migratory stopover. WPAs are USFWS preserves with quality habitat often used by waterfowl. There are no WPAs within the Crow Lake Alternative; the closest WPA is approximately seven miles to the southeast. Wetlands, streams, ponds and lakes in and near the site provide nesting, foraging and cover habitat for several shorebird species. Seven groups of sandhill cranes (70 individuals) were observed at the Crow Lake Alternative during migratory bird surveys and through incidental observations (Derby *et al.* 2010a). Sandhill cranes are often used as a surrogate species for whooping cranes because they use similar habitat types. Preliminary results from one year of data collection indicate that the number of individuals observed is consistent with low habitat suitability for sandhill cranes; ongoing data collection will help confirm this.

Based on the results from other wind resource areas, a ranking of seasonal mean raptor use was developed (Derby *et al.* 2010c). Mean raptor use during spring, summer, and fall of 2009 was low (0.38, 0.13, and 0.43 raptors/plot/20-minute survey, respectively) compared to other wind resource areas with similar survey methods and with spring, summer, and fall data. Raptor use at sites around the United States is between 1.65 and 0.1 birds per plot per survey (Derby *et al.* 2010c). Raptor use at the Crow Lake Alternative ranked thirty-first relative to 44 other wind resource areas with spring data, forty-first relative to 41 other wind resource areas with summer data, and twenty-third relative to 38 other wind resource areas with fall data. Although habitats in these wind resource areas are not necessarily the same as those at the Crow Lake Alternative, they provide the best available comparison for raptor use. Based on this analysis, raptor use is relatively low at the Crow Lake Alternative.

The Crow Lake Alternative occurs in the Central Flyway, a major migration corridor through the United States. Avian use surveys conducted in the Crow Lake Alternative indicate that spring and fall migration of songbirds, waterfowl and raptors occurs in the region. There are no topographic features, such as mountain passes or large rivers, which funnel or direct migratory paths to the area or certain portions of the area. Both raptors and songbirds migrate along a broad front throughout the region. Topographic relief in the area is primarily associated with the ridgetop that runs through the site from the southwest portion to the northeast portion. This ridge may provide a source of updrafts that could be used by soaring raptors. Concentrated prey sources, specifically waterfowl, fluctuate seasonally with migrations. Concentrations of waterfowl are expected to be higher in the spring and fall, so raptor populations may increase during those periods. Roosting trees are limited in the area.

Nesting habitat in the Crow Lake Alternative is limited for above ground nesting raptor species and includes scattered trees, tree rows and shelterbelts. No cliffs or rock outcrops were identified during field studies. Ground-nesting raptors likely nest in areas of continuous grassland habitats within the Crow Lake Alternative. Field studies did not reveal raptor nests within the area (Derby *et al.* 2010c; Tierra EC 2009), although it is likely that raptors nest here.

#### 3.4.4.2 Winner Alternative

Terrestrial fauna within the Winner Alternative are characteristic of mixed grasslands within the mixed-grass prairie zone. Fertile soils provide an abundance of forage and habitat cover for many species of small mammals, amphibians, reptiles and birds. Wetlands provide habitat for many species, although wetland densities are relatively low when compared to the region. Wildlife shares the region with cattle and other livestock. Agricultural practices have reduced the amount and continuity of prairie and wetland habitat. As a result, patches of habitat have become smaller and are often intermixed with woody species in tree rows and shelterbelts. A list of wildlife species observed during field surveys in 2008 and 2009 is provided in **Appendix C, Table C-4**. A total of 98 bird species, 12 mammal species, two reptile species and two amphibian species were observed.

Hunting is a popular recreational activity in and around the Winner Alternative. Game species pursued most frequently include pheasants and other upland gamebirds, white-tailed deer, fox, coyotes and waterfowl. Review of State and Federal databases indicates that there are no Waterfowl Production Areas or Walk-in Areas within the Winner Alternative (SDGFP 2009a and 2009b). The Little Dog Ear Lake GPA is located in the western portion of the site and is approximately 77 acres (**Figure 3.4-4**).

***Mammals***

Common mammal species residing in the Winner Alternative are similar to those described in **Section 3.4.4.1**.

Bat species reside and migrate through the region. There are 13 species of bats documented in South Dakota, seven of which may occur in the area (Ellison *et al.* 2003; SDGFP 2004; SDGFP 2007; Kempema 2007) (**Table 3.4-6**).

Little specific information regarding roosting, breeding, foraging and migration is known for bats in the Winner Alternative. Areas adjacent to lakes and wetlands are mesic and support cover and foraging habitat for mammal species. Peaks in insect hatches during warm season months provide a good prey base for many mammals.

<u>Bat Survey Results</u>

Bat use surveys were performed from May 26 to October 14, 2009. The objective of the surveys was to estimate the seasonal and spatial use of the Winner Alternative by bats, not to estimate population size.

Six of the seven species of bats likely to occur in the study area have been documented as fatalities at other wind energy facilities. Results of acoustic bat surveys at the Winner Alternative were used to classify bat calls to frequency groups that correspond roughly to groups of relative risk. The majority (84.5 percent) of passes were by low-frequency bats, suggesting higher relative abundance of species such as the big brown bat, silver haired bat, and hoary bat, while 9 percent were by mid-frequency bats (*e.g.* little brown bat, eastern red bat), and the remaining

**Table 3.4-6 Bat Species that May Occur within the Winner Alternative**

| Common Name | Scientific Name | Type of Residency | Ranking | Occurrence |
|---|---|---|---|---|
| Northern long-eared bats | *Myotis septentrionalis* | Year-round | Apparently secure/rare or local range (G4/S3) | May Occur |
| Silver-haired bat | *Lasionycteris noctivagans* | Summer | Secure/apparently secure (G5/S4) | May Occur |
| Little brown bat | *Myotis lucifugus* | Year-round | Secure (G5/S5) | May Occur |
| Western small-footed bat | *Myotis ciliolabrum* | Year-round | Secure (G5/S5) | May Occur |
| Big brown bat | *Eptesicus fuscus* | Year-round | Secure (G5/S5) | May Occur |
| Eastern red bat | *Lasiurus borealis* | Summer | Secure (G5/S5) | Occurs |
| Hoary bat | *Lasiurus cinereus* | Summer | Secure (G5/S5) | Occurs |

Source: SDGFP 2004, 2007, Derby *et al.* 2010b
**KEY TO CODES USED IN GLOBAL AND STATE RANKS:**
G5/S5 – Demonstrably secure, though it may be quite rare in parts of its range
G4/S4 – Apparently secure, though it may be quite rare in parts of its range
S3 – Either very rare and local throughout its range, or found locally

calls were high-frequency bats (*e.g. Myotis* spp). All three species groups were most active in the summer, suggesting resident breeding populations for some (or all) of these species occur at the Winner Alternative. Activity levels for all bat passes, including hoary and red bats, was highest during the summer and likely represents foraging activity by summer residents. Relatively low activity in August and September suggest that few individuals migrate through the Winner Alternative during the fall (Derby *et al.* 2010b).

The mean number of bat passes per detector-night was compared to existing data from seven wind energy facilities where both bat activity and mortality levels have been measured. The level of bat activity documented at the Winner Alternative was similar to bat activity at facilities in Minnesota and Wyoming, where bat mortality was low, and was much lower than activity recorded at facilities in Virginia, Iowa, and Tennessee, where bat mortalities were higher (Derby *et al.* 2010b).

Species identification was only possible for the hoary bat and eastern red bat. Hoary bats comprised 11.8 percent of all bat passes, and were most active in the summer. July and August activity by hoary bats suggests that some individuals reside at the Winner Alternative during the summer. Eastern red bats comprised 3.8 percent of all bat passes, most of which were recorded in the summer, suggesting that both species reside in the Winner Alternative during the summer (Derby *et al.* 2010b).

The Winner Alternative is not located near any large, known bat colonies or other features that are likely to attract large numbers of bats. The number of bat calls detected per night at the Winner Alternative was greater during the summer than during the fall. Activity in July likely corresponds with the reproductive season, when pups are being weaned and foraging rates are high. Bat use during the remainder of the study was relatively steady through late September. August and September activity likely represents a continuation of foraging activity by resident bats, mixed with some movement of migrating bats through the area. The relatively low activity in early summer and fall suggests that few bats migrate through the Winner Alternative in the spring and fall. However, it is possible that spring migration may have occurred prior to the start of the study period. Few bats were recorded in October, indicating that most bats had left the area for warmer climates or winter hibernacula (Derby *et al.* 2010b).

***Reptiles and Amphibians***

Common reptile and amphibian species residing in the Winner Alternative are similar to those described in **Section 3.4.4.1**. Habitat for these species includes open agricultural and grasslands, hedgerows and wet lowlands. The density of reptiles and amphibians is considered similar to that of the surrounding areas, as the Winner Alternative does not contain unique habitats.

***Birds***

Bird species observed in the Winner Alternative are listed in **Appendix C, Table C-5**.

<u>Bird Survey Results</u>

Intact mixed-grass prairie in the Winner Alternative provides suitable habitat for many resident and migratory bird species. Avian use surveys were conducted in 2009 to estimate temporal and spatial distributions of birds in the area. Fixed point count migratory bird surveys were conducted from early-April through mid-November 2009. Transect surveys for breeding birds were conducted from early-June to early-July 2009. Collectively, field surveys recorded 6,226 individual birds.

Results for migratory bird surveys indicate a total of 72 unique bird species. A total of 3,994 individual birds were recorded (**Appendix C, Table C-5 and Table C-6**). One-hundred-six individual raptors in 98 separate groups were recorded (2.7 percent of overall bird observations), representing ten species. Red-tailed hawk was the most frequently observed raptor species. Passerines were the most abundant bird type comprising 56.7 percent of observations, primarily due to high numbers of red-winged blackbird, western meadowlark, and horned lark. Upland gamebirds were the second most abundant bird type, with primarily ring-necked pheasant. Waterbirds were also relatively abundant compared to other bird types. The most abundant waterbird species was double-crested cormorant (Derby *et al.* 2010d).

A total of 2,232 individual bird observations within 1,744 separate groups were recorded during breeding bird surveys, representing 53 unique species. Cumulatively, six species (11.3 percent of all species) composed 67.6 percent of the individual observations: brown-headed cowbird, western meadowlark, red-winged blackbird, savanna sparrow, bobolink and upland sandpiper. Blackbirds and orioles were the most abundant passerine subtype, accounting for nearly half of all observations (Derby *et al.* 2010d).

Upland game bird species are the same as at the Crow Lake Alternative (Derby *et al.* 2010d; Tierra EC 2009), although habitats for these species are more abundant because the Winner Alternative has larger areas of intact grasslands. Eight grouse leks were located and confirmed. Two of the confirmed leks were verified as greater prairie chicken. The other six leks could not be confirmed to species (Derby *et al.* 2010d).

There are no WPAs within or near the area. Four groups (145 individuals) of sandhill cranes were observed while conducting surveys at the Winner Alternative (Derby *et al.* 2010d). Sandhill cranes are often used as a surrogate species for whooping cranes because they use similar habitat types. From one year of data collection, the number of individuals observed indicates that habitat suitability for sandhill cranes is low; more data collection is needed to confirm this.

Mean raptor use in the Winner Alternative during spring, summer, and fall of 2009 was low (0.23, 0.13, and 0.27 raptors/plot/20-min survey, respectively) relative to other existing and proposed wind energy facilities with spring, summer, or fall data. The Winner Alternative ranked 40$^{th}$ compared to 44 other wind energy facilities with spring data, 41$^{st}$ compared to 41 other wind energy facilities with summer data, and 27$^{th}$ compared to 38 other wind energy facilities with fall data. Raptor use at different sites around the United States has been observed between 1.65 and 0.1 birds per plot per survey (Derby *et al.* 2010d). Although habitats in these wind resource areas are not necessarily the same as those at the Winner Alternative, they provide the best available comparison for raptor use. Based on this analysis, raptor use is relatively low.

Nesting habitat in the Winner Alternative is limited for above ground nesting raptor species and includes scattered trees, tree rows and shelterbelts. No cliffs or rock outcrops were identified during field studies. Ground-nesting raptors likely nest in areas of continuous grassland habitats within the Winner Alternative. Field studies did not reveal raptor nests within the area (Derby *et al.* 2010d; Tierra EC 2009); although, it is likely that raptors nest here.

## 3.4.5 SPECIAL STATUS SPECIES

A list of federally endangered, threatened, proposed and candidate species by county was obtained from the USFWS (USFWS 2009a) for the Crow Lake and Winner alternatives. Lists for State-listed threatened and endangered species, species of greatest conservation need and species of concern were obtained from the SDGFP (SDGFP 2009c). SDGFP identifies 23 species of fish, reptiles, mammals and birds that warrant special protection.

### 3.4.5.1 Crow Lake Alternative

**Table 3.4-7** identifies the Federal and State-listed species that may occur in Aurora, Brule and Jerauld counties, summarizes the habitat associations, lists the status of these species and lists the likelihood of occurrence in the Crow Lake Alternative.

***Federally-listed Species***

A BA (Appendix G) addressing potential impacts to federally-listed species as a result of the Proposed Project and Wind Partners' proposed development was prepared and submitted to the USFWS on February 22, 2010. Detailed information (*i.e.,* legal status, species ecology, local distribution) from the BA is summarized in this section.

**Table 3.4-7 Federal and State-listed Species that May Occur within the Crow Lake Alternative**

| Common Name | Scientific Name | Habitat Association | Status[1] | Occurrence |
|---|---|---|---|---|
| Whooping crane | *Grus americana* | Aquatic/wetland/cropland | E, SE | May occur |
| Topeka shiner | *Notropis topeka* | Small streams with moderate to high water quality; pool substrate gravel, rubble or sand. | E | None – may occur downstream |
| Piping plover | *Charadrius melodus* | Shorelines along small alkaline lakes, large reservoirs or river islands with wide beach. | T, ST | May occur as migrant, but unlikely |
| Bald eagle | *Haliaeetus leucocephalus* | Aquatic/wetland | BCC, ST | May occur |

**KEY TO CODES USED IN FEDERAL AND STATE RANKS:**
[1]T = USFWS Threatened, E = USFWS Endangered, BCC = USFWS Bird of Conservation Concern, ST = State Threatened, SE = State Endangered

<u>Whooping Crane</u>

Whooping cranes are listed as endangered except where nonessential experimental populations exist. In the U.S., the whooping crane was listed as threatened with extinction in 1967 and endangered in 1970; both listings were "grandfathered" into the ESA. Migration areas within the U.S. designated as critical habitat are the Platte River between Lexington and Denman, Nebraska; Cheyenne Bottoms State Waterfowl Management Area and Quivira National Wildlife

Refuge, Kansas; and Salt Plains National Wildlife Refuge, Oklahoma. The Aransas National Wildlife Refuge, Texas and vicinity has been designated by the FWS as critical wintering grounds for the conservation of the species. A species recovery plan was completed in 2005 and revised in 2007. No critical habitat has been designated in South Dakota (Canadian Wildlife Service and USFWS 2007).

*Life History and Habitat Requirements*

The whooping crane occurs at three locations in the wild and at twelve captive sites (Stehn 2010). The only self-sustaining wild population is the Aransas-Wood Buffalo National Park population, which migrates more than 2,400 miles twice annually between summer nesting grounds in Wood Buffalo National Park in Canada and winter habitat in the coastal marshes of Aransas National Wildlife Refuge in Texas (Canadian Wildlife Service and USFWS 2007; USGS 2006; Meine and Archibald 1996). Spring migration begins in late-March to early-April and is completed within two to four weeks (Austin and Richert 2001). In the fall, the Aransas-Wood Buffalo National Park population conducts the return migration.

The migration corridor of the Aransas –Wood Buffalo Population follows an approximate straight path, with the cranes traveling through Alberta, Saskatchewan, extreme eastern Montana, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. The migration route approximately follows the Missouri River corridor through the midwestern United States. The primary migration corridor can be over 200 miles wide as cranes are pushed east or west by winds, and occasionally cranes have been documented in Colorado, Missouri, Wyoming, Minnesota, Iowa, and Illinois.

The cranes usually migrate in small groups primarily during daylight hours, relying heavily on tailwinds and thermal currents to aid their flight. They stop nightly to roost in shallow wetlands and may fly out of wetlands during the morning to feed in agricultural fields. If weather is unfavorable for migration, the cranes will stay in place for several days until conditions improve.

Whooping cranes use a variety of habitats during migration, but feed primarily in croplands and sub-irrigated wet meadows. They typically roost in shallow, seasonally and semi-permanently flooded palustrine wetlands (Lewis 1995; Austin and Richert 2001; Stehn 2007). In general, most of the roosting wetlands are less than 10 acres in size and are within ½ mile of a feeding area. Heavily vegetated wetlands are used less frequently than less dense wetlands areas. Riverine habitats are also used during migration, particularly large rivers such as the Platte and Loup in Nebraska, and the Missouri River in South Dakota. Cranes roost on submerged sandbars in wide, unobstructed channels that have little human disturbance (Canadian Wildlife Service and USFWS 2007).

The Project area has seen conversion of native prairie and wetlands into agricultural land use beginning with 19th-century settlement, negatively impacting the quality and quantity of migration habitat for numerous migratory birds. Construction of utility lines and roads has also negatively affected whooping cranes and migration habitat.

*Current Population Trend*

The most recent count of the Aransas-Wood Buffalo National Park (April 2010) revealed that a total of 263 individuals, including last year's juveniles, were accounted for. The flock experienced a population increase during the summer of 2009-2010 (Stehn 2010); the current estimated population of 263 is up from a winter peak count of 238 in 2009. The population will continue to lose genetic material with each generation until the downlisting target of 1,000 individuals is reached because the gene pool is so small with only 263 individuals in the population. Recovery objectives call for establishing two additional self-sustaining populations with 1,000 individuals each within portions of the historic range (Canadian Wildlife Service and USFWS 2007). Reintroductions, which began in 1975, have continued to the present. Of the three reintroductions attempted, one in the Rocky Mountains failed with all birds becoming extirpated. The non-migratory flock in Florida started in 1993 is declining in size with high mortality rates and low productivity, casting significant doubts on its ability to become self-sustaining (Canadian Wildlife Service and USFWS 2007). The eastern migratory population started in 2001 between Wisconsin and Florida has showed some promise, but early productivity has been relatively low and mortality is considerable (USFWS 2008b). Thus, it is imperative that all efforts continue to promote growth of the Aransas-Wood Buffalo National Park by reducing mortality, increasing productivity and reducing threats to the population.

*Threats*

While numerous historic factors have led to the decline of the whooping crane, major current threats include limited genetic diversity, loss and degradation of migration stopover habitat, construction of additional utility infrastructure, degradation of coastal habitat, and the threat of chemical spills in Texas. Whooping cranes are faced with various natural obstacles and risks during their annual migration and at wintering grounds, primarily severe weather events (including hurricanes). Loss of migration habitat can concentrate a variety of wetland birds, including waterfowl and cranes, into remaining areas and increase the spread of disease. Migrating cranes are also exposed to a variety of physical hazards such as collisions with structures, predation of young cranes, disease, and illegal shooting (Canadian Wildlife Service and USFWS 2007). Degradation of wintering grounds at and around Aransas National Wildlife Refuge have continued to worsen, ranging from land development decreasing suitable habitat, reduced freshwater inflows from the Guadalupe and San Antonio rivers affecting blue crab populations, spread of black mangrove, and sea level rise on lands where whooping cranes are known to occur (Stehn 2009b). Breeding grounds in Canada are also being degraded by changing weather patterns and reduced permafrost resulting in wetter soils and changes in the prey base.

*Status of the Species in the Proposed Project Area*

The Crow Lake Alternative occurs within the portion of the migration corridor in which 75 to 80 percent of the recorded whooping cranes sightings have occurred (**Figure 3.4-5**); the Whooping Crane Tracking Database maintained by the USFWS (USFWS 2009c) reports two sightings in Aurora County (16 and 18 miles from the site) and four sightings in Brule County (6.5, 17, 21, and 22 miles from the site). These whooping cranes were observed flying and using grassland, cropland, and wetland habitats. **Figure 3.4-5** shows these and all documented whooping crane sightings in South Dakota. Because much of the Central Flyway is sparsely populated by people,

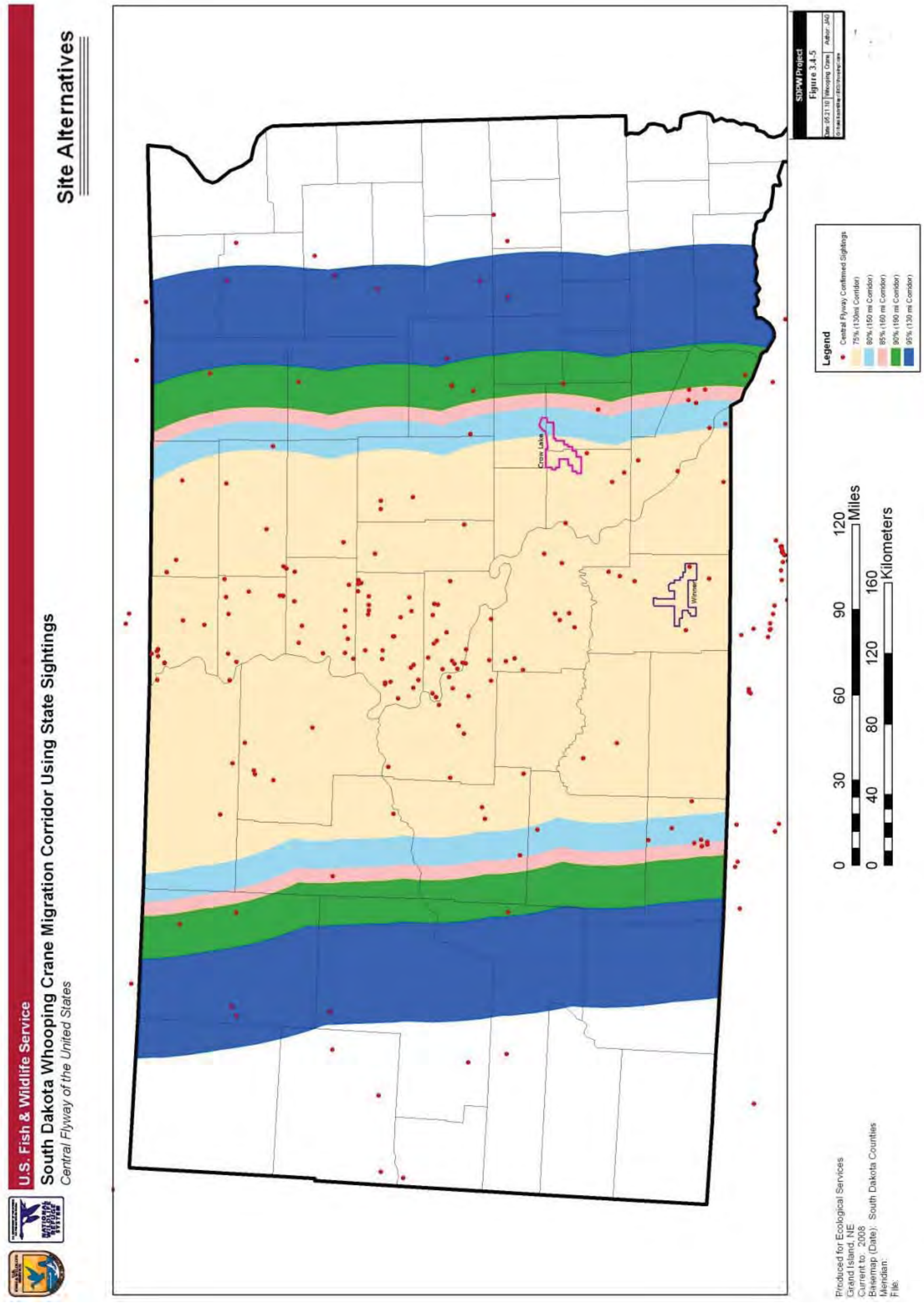



**Figure 3.4-5 Whooping Crane Migration Corridor with Sightings**

only a small proportion of actual stopovers are observed or reported. Based on the crane population and the average flight distances, as little as four percent of crane stopovers are reported (USFWS 2009c). Therefore, the absence of documented whooping crane use of a given area does not mean that whooping cranes do not use the area or that various projects in the vicinity will not adversely affect the species (Austin and Richert 2001; USFWS 2009c).

No whooping cranes  were observed during the avian use surveys conducted in the Crow Lake Alternative in 2009, although sandhill cranes were observed (Derby *et al.* 2010c). These surveys were conducted from March 19 through November 12, including the whooping crane migration seasons; however, the surveys were not designed to detect the extent of whooping crane use of the Crow Lake Alternative. The site contains suitable whooping crane roosting and feeding habitat consisting of rolling hills intermixed with wetlands (1 percent of the Crow Lake Alternative, 9-10 lacustrine and palustrine wetland basins per square mile, ranging from temporary to semi-permanent flooding regimes), mixed grass prairie (64 percent of the Crow Lake Alternative), and cropland (33 percent of the Crow Lake Alternative). Crow Lake is the largest body of water in the vicinity. Nielson North is the closest Waterfowl Production Area (WPA), and emergent and submergent wetland vegetation is present in the lake at the Nielson North WPA. Historical occurrence, location of the site within the migration corridor, and the presence of suitable foraging, roosting and stopover habitat indicate that whooping cranes may occur in the Crow Lake Alternative (Stehn 2007).

Stopover occurrence during migration is common throughout South Dakota; there were 214 observations of whooping cranes in South Dakota between 1943 and 2007. The majority of sightings were in the central portion of the State along the Missouri River corridor (Austin and Richert 2001). Whooping cranes have not been observed in Jerauld County, although they have been sighted in Brule and Aurora counties, but the percentage of this flock that might pass within the vicinity of the Crow Lake Alternative is unknown.

Qualitatively, the site appears to represent suitable stopover habitat for whooping cranes; however, it is of lower quality than habitats at the adjacent Wessington Springs Wind Farm. The Wessington Springs site contains higher quality whooping crane roosting and feeding habitat consisting of rolling hills intermixed with wetlands (7 percent of Wessington Springs site, 21 lacustrine and palustrine wetland basins per square mile, ranging from temporary to semi-permanent flooding regimes), mixed grass prairie (70 percent of Wessington Springs site), and cropland (13 percent of Wessington Springs site). The Crow Lake Alternative is more disturbed by human activities, mainly farming. Although sandhill cranes were not documented in the Crow Lake Alternative area in 2009, they have been documented to use the adjacent Wessington Springs site in relatively high numbers (approximately 1,400 observed onsite in 2007) (USFWS 2008b); this information may indicate potential use of the site by sandhill and whooping cranes. This species is considered to be a surrogate species for whooping crane habitat use and behavior. Whooping cranes are often observed within flocks of sandhill cranes. Preliminary anecdotal observations (USFWS 2008b) suggest that sandhill cranes avoid wind farms. Birds observed in the past, using habitat that is now occupied by wind energy facilities, appear to be using other suitable sites away from the wind energy facilities, however this could also be due to changed habitat conditions (*e.g.* precipitation variations) unrelated to the wind energy facilities. It is uncertain whether whooping cranes would react to wind energy facilities similarly to sandhill cranes. Whooping cranes have been observed at stopover sites that large groups of sandhill cranes likely would not use, including farmsteads and sites close to residences (USFWS 2008b). Regardless, confirmed sightings of whooping cranes do exist within the counties in the Crow Lake Alternative area.

Piping Plover

The U.S. range of the Great Plains population includes New Mexico, Colorado, Wyoming, Montana, Iowa, Minnesota, North Dakota, South Dakota, and Nebraska, with most of the birds currently nesting in North Dakota, South Dakota, Montana, and Nebraska (USFWS 2003b). Most breeding activity in South Dakota occurs on sandbars along the Missouri River from Fort Randall Dam to Springfield, and from Yankton to Ponca, Nebraska (USFWS 1988). Piping plovers winter primarily along the southern Gulf Coast and Pacific Ocean.

The Great Plains population was estimated to be between 2,137 and 2,684 adults in the early 1980's and 2,953 in a 2001 census (USFWS 2003b). The historical decline is often attributed to reservoir and river operations, marina development, drought and other factors that impact the species' breeding and wintering habitats. Plovers prefer to nest in sand/gravel substrates on the shorelines of wetlands and rivers, and tend to forage in the same substrates. There is a preference for alkali wetlands, likely due to their lack of shoreline vegetation. Typical freshwater wetlands are more vegetated, and often have a high degree of silt and detritus in the substrate, further precluding use as nesting by piping plovers even in dry years (C. Derby, pers. comm.).

The piping plover was listed as threatened on December 11, 1985 (50 FR 50726-50734) in its entire range except for the Great Lakes watershed, where it was listed as endangered. In 2002, the USFWS designated critical habitat for the Northern Great Plains breeding population of the piping plover (50 CFR Part 17, Federal Register, Volume 67, Number 176 / September 11, 2002/ Final Rule)(USFWS 2002). Critical habitat includes prairie alkali wetlands and surrounding shoreline, including 200 feet of uplands above the high water mark; river channels and associated sandbars, and islands; reservoirs and their sparsely vegetated shorelines, peninsulas, and islands; and inland lakes and their sparsely vegetated shorelines and peninsulas. In South Dakota, critical habitat includes the Missouri River Fort Randall Reach (36 miles), approximately 56 miles south of the Crow Lake Alternative area; Lewis and Clark Lake (32.9 miles), approximately 84 miles southeast of the Crow Lake Alternative area, Gavins Point Reach (58.9 miles), approximately 84 miles southeast of the Crow Lake Alternative area, and Lake Oahe (159.7 miles), approximately 88 miles northwest of the Crow Lake Alternative area (USFWS 2002). There is no designated piping plover critical habitat within the Crow Lake Alternative boundary.

According to the USGS Breeding Birds of South Dakota Database and the USGS Breeding Bird Survey (Sauer *et al.* 2008), there have been no documented occurrences of the piping plover in Jerauld, Brule and Aurora counties (including the Crow Lake Alternative area) to date (USGS 2009); however, piping plovers may fly through the area during migration.

Since piping plovers primarily occur along river corridors, and suitable habitat does not exist in the Crow Lake Alternative, they are unlikely to occur in the Crow Lake Alternative. No piping plovers were observed during the avian use surveys conducted in the site (Derby *et al.* 2010c). Piping plovers may migrate through the area during spring and fall migration; however, due to the absence of rivers, reservoirs, and alkali wetlands within or near the Crow Lake Alternative area, they would be infrequent visitors to the area, mostly in spring and fall, and would likely avoid the site in search of suitable habitat.

Topeka Shiner

This species was listed by USFWS in December 1998. Critical habitat was designated on July 27, 2004. There is no designated critical habitat in South Dakota (Shearer 2003).

The Topeka shiner is a small pool dwelling minnow that is found in prairie streams of the lower Missouri River Basin and upper Mississippi River Basin. The range of this fish covers eastern South Dakota, southwest Minnesota, eastern Nebraska, Iowa, northern Kansas and Missouri. In South Dakota, the Topeka shiner has been found in about 40 streams in the James River, Big Sioux River and Vermillion River watersheds. The Topeka shiner currently retains its historic distribution and is locally abundant in South Dakota; however, population trends are unclear.

According to the SDDOT website, the species was observed in the Firesteel Creek and the West Branch Firesteel Creek, approximately 25 miles downstream of the Crow Lake Alternative, as recently as 2006 (SDDOT 2006). The eastern portion of the site (within Aurora County) supports the headwaters of three small tributaries to West Branch Firesteel Creek. Shearer (2003) lists BMPs for crossing streams inhabited by the Topeka shiner.

***State-Listed Species***

Whooping Crane (State Endangered)

The legal status, species ecology and local distribution of whooping cranes are discussed above.

Bald Eagle (State Threatened)

In 1978, the bald eagle was designated as a federally-endangered species throughout most of the lower 48 states (43 FR 6233). The species was subsequently downlisted to threatened and in August 2007, the bald eagle was de-listed (USFWS 2007). The bald eagle remains protected under the Federal BGEPA and MBTA. The bald eagle is also listed as threatened by SDGFP (2007).

Bald eagle habitat consists of large trees in proximity to water bodies that support fish populations (Groves *et al.* 1997). While fish represent the primary food source, bald eagles in the western United States also scavenge for carrion on big game winter range. Principal food items for bald eagles in South Dakota include fish, waterfowl, jackrabbits and carrion (Groves *et al.* 1997). Bald eagles typically nest in tall trees or on cliffs within 0.5 mile of a permanent water body.

In South Dakota, bald eagles nest along the Missouri River in the central part of the State and along the James River in the southeast portion of the State. They also nest along the Big Sioux, Grand, Moreau, and Belle Fourche Rivers (Kempema 2010). Bald eagles winter near fish runs, waterfowl concentrations and open water. Impoundments along the Missouri River in South Dakota often support wintering and migrating bald eagles. Bald eagles are generally present in this area between November and March. No bald eagles were observed during the avian use surveys conducted in the Crow Lake Alternative (Derby *et al.* 2010c). While there are no known nests or suitable roost sites (very few, small shelterbelts occur) within the Crow Lake Alternative, the bald eagle may occur as a transient within the area during winter months.

### *State and Federal Species of Concern*

Certain species are not protected as threatened, endangered or candidate species, but are identified as species of concern in the *South Dakota Comprehensive Wildlife Conservation Plan* (SDGFP 2006). The plan identifies wildlife species meeting three criteria of conservation concern: 1) Federal or State threatened or endangered listing; 2) South Dakota represents the majority of a species range; and 3) the species depends on a declining or unique habitat in South Dakota. Species in the Eastern Prairie Ecoregion, Mixedgrass Subregion that may occur in the Crow Lake Alternative are listed in **Table 3.4-8**. In addition to those species, South Dakota maintains a list of Level 1 priority bird species (**Table 3.4-8**). Level 1 priority bird species are those with the highest conservation priority due to: 1) high maximum abundance of the species within its range; 2) South Dakota constitutes the core of the species breeding range; and 3) the species is showing population declines in South Dakota or across its range (Bakker 2005). Some Level 1 birds are also species of concern.

The USFWS has also identified species, subspecies and populations of migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA. Birds of Conservation Concern (BCC) (2008) is the most recent effort to carry out this mandate.

<u>Greater Prairie Chicken</u>

Greater prairie chicken populations continue to decline, especially in grassland habitat. greater prairie chickens are year-round residents of central South Dakota. Breeding occurs throughout the State; however, greater prairie chicken breeding has not been documented in Jerauld County (Huxoll 2005). Greater prairie chickens were observed in the Crow Lake Alternative during 2009 aerial grouse lek surveys (Derby *et al.* 2010c, Tierra EC 2009). Five grouse leks were found; one was confirmed as greater prairie chicken. Three of the leks could not be identified to species (Derby *et al.* 2010c).

<u>Sharp-tailed Grouse</u>

Sharp-tailed grouse populations continue to decline, especially in grassland habitat. Sharp-tailed grouse are year-round residents in the western portion of South Dakota. Breeding occurs throughout the State distribution and has been documented in northwestern Jerauld County (Huxoll 2005). Sharp-tailed grouse were observed in the Crow Lake Alternative during 2009 aerial grouse lek surveys (Derby *et al.* 2010c). Five grouse leks were found; one was confirmed Sharp-tailed grouse.

## Table 3.4-8 South Dakota Species of Concern, Level 1 Bird Species and Birds of Conservation Concern Occurring in the Crow Lake Alternative

| Common Name | Scientific Name | Ecosystem | Global Rank | State Rank | BCC | Occurrence |
|---|---|---|---|---|---|---|
| **Birds** | | | | | | |
| Greater prairie chicken | *Tympanuchus cupido* | Grass/shrub | G4 | S4 | No | Occurs |
| Sharp-tailed grouse | *Tympanuchus phasianellus* | Grass/shrub | G4 | S4 | No | Occurs |
| LeConte's sparrow | *Ammodramus leconteii* | Riparian/wetland | G4 | S1 | No | May occur[1] |
| Chestnut-collared longspur | *Calcarius ornatus* | Grass/shrub | G5 | S4 | Yes | May occur[1] |
| American bittern | *Botaurus lentiginosus* | Riparian/wetland | G4 | S4 | Yes | May occur |
| Northern harrier | *Circus cyaneus* | Grassland | G5 | S5 | No | Occurs |
| Ferruginous hawk | *Buteo regalis* | Grassland | G4 | S4 | Yes | Occurs |
| Swainson's hawk | *Buteo swainsoni* | Grassland/woodland | G5 | S4 | Yes | Occurs |
| Upland sandpiper | *Bartramia longicauda* | Grassland | G5 | S5 | Yes | Occurs |
| Marbled godwit | *Limosa fedoa* | Riparian/wetland/grassland | G5 | S5 | Yes | Occurs |
| Wilson's phalarope | *Phalaropus tricolor* | Riparian/wetland/grassland | G5 | S4 | No | May occur |
| Black-crowned night heron | *Nycticorax nycticorax* | Wetland | G5 | S3 | No | Occurs |
| Long-billed curlew | *Numenius americanus* | Grassland | G5 | S3 | Yes | May occur |
| Grasshopper sparrow | *Ammodramus savannarum* | Grassland | G5 | S4 | Yes | Occurs |
| Western meadowlark | *Sturnella neglecta* | Grassland | G5 | S5 | No | Occurs |
| Lark bunting | *Calamospiza melanocorys* | Grassland | G5 | S5 | No | May occur |
| Burrowing owl | *Athene cunicularia* | Grassland | G4 | S3/S4 | Yes | May occur |
| Black tern | *Chlidonias niger* | Wetland/open water | G4 | S3 | Yes | Occurs[2] |
| American white pelican | *Pelecanus erythrorhynchos* | Aquatic | G3 | S3B/ SZN | No | Occurs |
| Prairie falcon | *Falco mexicanus* | Grassland | G5 | S3/S4 | Yes | Occurs |
| Red-headed woodpecker | *Melanerpes erythrocephalus* | Open woodland | G5 | S3 | Yes | Occurs |
| McCown's longspur | *Calcarius mccownii* | Grassland | G5 | SU/S Z | Yes | Occurs |
| Dickcissel | *Spiza americana* | Grassland | G5 | S2 | Yes | Occurs |
| Loggerhead shrike | *Lanius ludovicianus* | Grassland/woodland | G4 | S4 | Yes | Occurs |
| **Invertebrates** | | | | | | |
| Regal fritillary | *Speyeria idalia* | Grass/shrub | G3 | S3 | N/A | May occur |

[1]Migratory occurrence is likely
[2]Known to occur at Crow Lake one mile north of the Crow Lake Alternative (SDNHP 2009)

**KEY TO CODES USED IN GLOBAL AND STATE RANKS:**

G1 S1 Critically imperiled because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
G2 S2 Imperiled because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
G3 S3 Either very rare and local throughout its range, or found locally (even abundantly at some of its locations) in a restricted range, or vulnerable to extinction throughout its range because of other factors; in the range of 21 of 100 occurrences.
G4 S4 Apparently secure, though it may be quite rare in parts of its range, especially at the periphery. Cause for long term concern.
G5 S5 Demonstrably secure, though it may be quite rare in parts of its range, especially at the periphery.
SZ No definable occurrences for conservation purposes, usually assigned to migrants.
Bird species may have two State ranks, one for breeding (S#B) and one for nonbreeding seasons (S#N)
BCC – USFWS Birds of Conservation Concern

Le Conte's Sparrow

Le Conte's sparrows may be common within its range where suitable habitat is present. Le Conte's sparrows are migratory residents in central South Dakota and summer residents in the northeastern portion of the State. Breeding has not been documented in Aurora, Brule or Jerauld counties (Peterson 1995; South Dakota Birds 2009). Le Conte's sparrows were not observed in the Crow Lake Alternative during 2009 avian surveys (Derby *et al.* 2010c).

Chestnut-collared Longspur

Chestnut-collared longspurs are common within their range where suitable habitat is present. Declining populations are generally local. Chestnut-collared longspurs are summer residents in South Dakota. Breeding has been documented in northwest Jerauld County and is probable in Aurora County (Peterson 1995; South Dakota Birds 2009). Chestnut-collared longspurs were observed in the Crow Lake Alternative during 2009 avian surveys (Derby *et al.* 2010c).

American Bittern

American bittern populations continue to decline in wetland habitat, especially in the southern portion of its range. American bitterns are summer residents in South Dakota. Breeding has not been documented in Aurora, Brule or Jerauld counties, although it is possible in Jerauld County, and has been documented in northeastern South Dakota (Peterson 1995; South Dakota Birds 2009). American bitterns were not observed in the Crow Lake Alternative during 2009 avian surveys (Derby *et al.* 2010c).

Northern Harrier

Northern harrier populations continue to decline primarily due to loss of wetland habitat and pesticide use within its range. Northern harriers are summer residents of South Dakota and breed throughout the State. Breeding has not been documented in Aurora, Brule or Jerauld counties although it is probable (Peterson 1995; South Dakota Birds 2009). Northern harriers were observed in the Crow Lake Alternative during 2009 migratory and breeding bird surveys (Derby *et al.* 2010c).

Ferruginous Hawk

Ferruginous hawks are summer residents of South Dakota and breed throughout much of the State. They occur in the northern half of the Eastern Prairie Ecoregion (the northern portion of the Crow Lake Alternative). However, breeding has not been documented in Aurora, Brule or Jerauld counties (Peterson 1995; South Dakota Birds 2009), although it is possible in Jerauld County. Ferruginous hawks were observed in the area during 2009 migratory and breeding bird surveys (Derby *et al.* 2010c).

Swainson’s Hawk

Swainson’s hawks are summer residents of South Dakota and breed throughout much of the State. Breeding has been documented in Brule and Aurora counties, and it is possible in Jerauld

County (Peterson 1995; South Dakota Birds 2009). Swainson's hawks were observed in the Crow Lake Alternative during 2009 avian bird surveys (Derby *et al.* 2010c).

Upland Sandpiper

Upland sandpiper populations continue to decline primarily due to loss of wetland habitat and pesticide use. Upland sandpipers are summer residents of South Dakota and breed throughout the State. However, breeding has not been documented in Aurora, Brule or Jerauld counties, although it is probable (Peterson 1995; South Dakota Birds 2009). Upland sandpipers were observed in the Crow Lake Alternative during 2009 avian surveys (Derby *et al.* 2010c).

Marbled Godwit

Marbled godwit populations continue to decline from historic levels primarily due to loss of wetland habitat within its range. Marbled godwits are summer residents of South Dakota and breed throughout the State. Breeding has not been documented in Aurora, Brule or Jerauld counties (Peterson 1995; South Dakota Birds 2009). Marbled godwits were observed in the Crow Lake Alternative during migratory and breeding bird surveys (Derby *et al.* 2010c).

Wilson's Phalarope

Wilson's phalarope populations continue to decline in local portions of its range due to loss of wetland habitat. Wilson's phalaropes are summer residents of South Dakota and breed throughout the State. Breeding has not been documented in Aurora, Brule or Jerauld counties (Peterson 1995; South Dakota Birds 2009), although it is possible in Aurora County. Wilson's phalarope was not observed in the Crow Lake Alternative during 2009 avian use surveys (Derby *et al.* 2010c).

Black-crowned Night Heron

Black-crowned night heron threats include wetland loss and degradation, and pesticides that result in indirect adult mortality and direct mortality of eggs and young. Black-crowned night herons are summer residents of South Dakota and breed throughout the eastern part of the State. Breeding has been observed in Aurora and Jerauld counties (Peterson 1995; South Dakota Birds 2009). Black-crowned night herons were observed in the Crow Lake Alternative during spring 2009 migratory bird surveys (Derby *et al.* 2010c).

Long-billed Curlew

Long-billed curlew threats include habitat loss, degradation and alteration, nest site disturbance, and pesticide/herbicide impacts (SDGFP 2006). Long-billed curlews are summer residents of South Dakota and breed throughout the western part of the State. Breeding has not been observed east of the Missouri River or in Aurora, Brule and Jerauld counties (Peterson 1995; South Dakota Birds 2009). Long-billed curlews were not observed in the Crow Lake Alternative during spring 2009 migratory bird surveys (Derby *et al.* 2010c).

Grasshopper Sparrow

Grasshopper sparrow populations continue to decline in local portions of its range due to loss of grassland habitat. Grasshopper sparrows are summer residents of South Dakota and breed throughout the State. Breeding has not been documented in Aurora, Brule or Jerauld counties, although it is probable (Peterson 1995; South Dakota Birds 2009). Grasshopper sparrows were observed in the Crow Lake Alternative during 2009 breeding bird surveys (Derby *et al.* 2010c).

Western Meadowlark

Western meadowlark populations are secure, and considered abundant and widespread. Local populations are monitored due to declines in grassland habitat. Western meadowlarks are summer residents of South Dakota and breed throughout the State. Breeding is probable in Jerauld County but has been confirmed in Aurora and Brule counties (Peterson 1995; South Dakota Birds 2009). Western meadowlarks were observed in the Crow Lake Alternative during 2009 breeding and migratory bird surveys (Derby *et al.* 2010c).

Lark Bunting

Lark bunting populations are secure, and considered abundant and widespread. Local populations are monitored due to declines in grassland habitat in South Dakota. Lark buntings are summer residents throughout South Dakota and breed throughout the State. Breeding has not been documented in Aurora, Brule or Jerauld counties, although it is probable (Peterson 1995; South Dakota Birds 2009). Lark buntings were not observed in the Crow Lake Alternative during 2009 breeding and migratory bird surveys (Derby *et al.* 2010c).

Burrowing Owl

Burrowing owl threats include habitat loss, degradation and alteration, nest depredation, vehicle collisions and illegal shooting (SDGFP 2006). Burrowing owls are summer residents throughout South Dakota and mostly breed in the western two-thirds of the State. Breeding has not been documented in Aurora, Brule or Jerauld counties, although it is probable in Brule County (Peterson 1995; South Dakota Birds 2009). Burrowing owls were not observed in the Crow Lake Alternative during 2009 breeding and migratory bird surveys (Derby *et al.* 2010c); however, two prairie dog towns were observed along the northwest Crow Lake Alternative boundary. Burrowing owls have been shown to prefer active prairie dog towns; it has been suggested that large colonies are needed to maintain Burrowing owl populations.

Black Tern

Black terns are summer residents throughout South Dakota and breed throughout the State. Breeding has been documented in Aurora County and is probable in Jerauld County (Peterson 1995; South Dakota Birds 2009). According to the SDNHP database (2009) and the NRCS (1999), Black terns occur at Crow Lake approximately one mile north of the Crow Lake Alternative (**Figure 3.4-2**). Black terns were not observed in the area during 2009 breeding and migratory bird surveys (Derby *et al.* 2010c).

American White Pelican

American white pelican threats include habitat loss, degradation and alteration resulting in the reduction of shallow areas, irregular managed water flows, nest site disturbance and pesticide impacts (SDGFP 2009).

American white pelicans are mostly migratory through South Dakota, although summer residents have been documented in northeastern South Dakota; very little breeding is known in the State (SDGFP 2006). Breeding has been observed but not confirmed in Jerauld County and has not been observed in Aurora and Brule counties (Peterson 1995; South Dakota Birds 2009). American white pelicans were observed in the Crow Lake Alternative during 2009 breeding and migratory bird surveys (Derby *et al.* 2010c).

Prairie Falcon

Prairie falcons are permanent residents throughout South Dakota; however, some move short distances to the south for the winter. They are known to breed in the western portion of the State; breeding has not been documented in Aurora, Brule or Jerauld counties (Peterson 1995; South Dakota Birds 2009). Prairie falcons were observed in the area during 2009 breeding and migratory bird surveys (Derby *et al.* 2010c).

Red-headed Woodpecker

Red-headed woodpeckers are permanent residents throughout South Dakota. They are known to breed statewide. Breeding has been documented in Jerauld County, is possible in Aurora County, and is probable in Brule County (Peterson 1995; South Dakota Birds 2009). Red-headed woodpeckers were observed in the area during 2009 breeding and migratory bird surveys (Derby *et al.* 2010c).

McCown’s Longspur

McCown’s longspurs are rare migrants throughout South Dakota. South Dakota is on the eastern edge of their major breeding grounds (Bakker 2005), and they are rare breeders in western South Dakota (Peterson 1995; South Dakota Birds 2009). Breeding is not likely in Aurora, Brule or Jerauld counties. McCown’s longspurs were observed in the area during 2009 breeding bird surveys (Derby *et al.* 2010c). The last documented breeding occurrence in South Dakota was recorded in 1910 in northwest Harding County, and breeding behavior was observed in 1993 in the northwest portion of the State (Kempema 2010).

Dickcissel

Dickcissels are summer residents throughout South Dakota. Dickcissels preferred large grasslands in the mixed grass region of eastern South Dakota (Bakker 2005). Breeding is confirmed in Brule County, is probable in Aurora County, and is possible in Jerauld County (Peterson 1995; South Dakota Birds 2009). Dickcissels were observed in the area during 2009 breeding and migratory bird surveys (Derby *et al.* 2010c).

Loggerhead shrike

Loggerhead shrikes are summer residents throughout South Dakota. They breed statewide. Breeding is confirmed in Aurora County, and is possible in Brule and Jerauld counties (Peterson 1995; South Dakota Birds 2009). Loggerhead shrikes were observed in the area during 2009 breeding and migratory bird surveys (Derby *et al.* 2010c).

Regal Fritillary Butterfly

The regal fritillary butterfly is vulnerable, at moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer) and recent widespread declines. Regal fritillaries are distributed throughout the State and have been documented in all counties except three (Buffalo, Aurora and Miner). Regal fritillaries continue to do well in areas in and around Fort Pierre National Grassland in central South Dakota. Regal fritillaries were last documented in Jerauld County in 1992 (SDNHP 2007). The presence of regal fritillary butterflies in the Crow Lake Alternative is unknown.

### 3.4.5.2 Winner Alternative

**Table 3.4-9** identifies the Federal and State-listed species that may occur in Tripp County, summarizes the habitat associations, lists the status of these species and lists the likelihood of occurrence in the Winner Alternative.

#### *Federally-listed Species*

Whooping Crane

Whooping crane legal status and species ecology was discussed in **Section 3.4.5.1, Federally-listed Species, *Whooping Crane*.** Whooping Cranes have been observed in Tripp County near the Winner Alternative.

The Winner Alternative is within the 75 percentile sighting band in the 200-mile migration corridor. No Whooping Cranes were observed during the avian use surveys conducted in the Winner Alternative in 2009 (Derby *et al.* 2010d). These surveys were conducted from April 6 through November 11, including the whooping crane migration seasons; however, the surveys were not designed to detect the extent of whooping crane use of the site area. The Winner Alternative contains numerous small wetlands, small lakes, mixed grasses and cultivated fields. Dog Ear Lake is the largest body of water in the project vicinity and is within 0.25 mile of the Winner Alternative. Little Dog Ear Lake is smaller, and is within the Winner Alternative. Emergent and submergent wetland vegetation is present in both lakes. There are no WPAs within or near the Winner Alternative. Wetland habitat represents slightly over one percent of the Winner Alternative, some of which is whooping crane roosting habitat. The Winner Alternative also contains cropland and is dominated by grasslands, both of which could be used as foraging habitat. Previous sightings in Tripp County suggest that whooping cranes may occasionally fly over the Winner Alternative during seasonal migrations. Historical occurrence, location of the Winner Alternative within the 200-mile migration corridor, and the presence of suitable foraging, roosting and stopover habitat indicate that whooping cranes occur in the Winner Alternative (Stehn 2007).

**Table 3.4-9 Federal and State-listed Species that May Occur within the Winner Alternative**

| Common Name | Scientific Name | Habitat Association | Status[1] | Occurrence |
|---|---|---|---|---|
| Whooping crane | *Grus americana* | Aquatic/wetland/cropland | E, SE | Occurs during migration. |
| Bald eagle | *Haliaeetus leucocephalus* | Aquatic/wetland | BCC, ST | Occurs |
| Peregrine falcon | *Falco peregrinus* | Variety of Habitats | SE | Occurs |
| American burying beetle | *Nicrophorus americanus* | Large landscapes with abundant carrion and sandy soils | E | Occurs |
| Blacknose shiner | *Notropis heterolepis* | Aquatic | SE | None – occurs downstream in Keya Paha River |
| Northern redbelly dace | *Phoxinus eos* | Aquatic | ST | Occurs in Keya Paha Watershed* |
| Pearl dace | *Margariscus margarita* | Aquatic | ST | Occurs in Keya Paha Watershed* |

**KEY TO CODES USED IN FEDERAL AND STATE RANKS:**
[1]T = USFWS Threatened, E = USFWS Endangered, XN= Proposed/Experimental Population, ST = State Threatened, SE = State Endangered
*SDNHP data shows known occurrence in or very near the Winner Alternative.

<u>American Burying Beetle</u>

The American burying beetle was listed as an endangered species in 1989 (FR 54:29652-29655). A recovery plan was published in 1991 (USFWS 1991). No critical habitat has been designated for this species.

Considering the broad geographic range formerly occupied by the American burying beetle, it is unlikely that vegetation or soil type were historically limiting. Today, the American burying beetle seems to be largely restricted to areas most undisturbed by human influence.

Carrion availability (appropriate in size as well as numbers) may be more important in determining where beetles occur than the type of vegetation or soil structure. Habitats in Nebraska where these beetles have been recently found consist of grassland prairie, forest edge and scrubland. Specific habitat requirements are unknown.

Adults become active in early summer. Carrion beetles lay their eggs in the carcasses of small animals. The larvae receive parental care while feeding and growing. This is an extremely rare behavior in insects, a condition normally found only in social bees, wasps, ants and termites. The adults continually tend the carcass, removing fungi and covering the carrion ball with an antibacterial secretion. After about a week, the larvae have consumed all but the bones of the carcass, and the adults fly away. Adults live only one season. The young pupate in the nearby soil and emerge as adults about a month later. Beetles overwinter in the adult stage.

Burial of the food resource, which effectively removes it from intense competition by maggots, other carrion-feeding insects and even mammal scavengers, is of principal importance to the beetles and their young (USFWS 2009b).

Populations of American burying beetles have been extirpated from 90 percent of their original range. Known populations occur in South Dakota, Arkansas, Nebraska, Oklahoma and Rhode

Island. A few collections have also been made in Kansas. There are perhaps fewer than 1,000 individuals in the only remaining population east of the Mississippi River, and the Oklahoma, Arkansas and South Dakota populations (currently being inventoried) are of uncertain size. South Dakota estimates over 500 square miles of occupied habitat with a high population density. American burying beetles have been documented in South Dakota in numerous locations in Tripp County between 1995 and 2003, including in the Winner Alternative (SDGFP 2009e).

***State-Listed Species***

Whooping Crane

The legal status and species ecology of whooping cranes are discussed in **Section 3.4.5.1, Federally-listed Species, *Whooping Crane***. The local distribution of whooping cranes is discussed above.

Bald Eagle

The legal status and species ecology of bald eagles are discussed in **Section 3.4.5.1, State-listed Species, *Bald Eagle***. The local distribution of bald eagles is also discussed in that section**.** One bald eagle was observed incidentally in the Winner Alternative during 2009 avian surveys (Derby *et al*. 2010d).

Peregrine Falcon

The peregrine falcon is listed endangered in South Dakota. It prefers open grasslands with suitable nesting cliffs and rock outcroppings near a concentrated prey base such as waterfowl or colonial ground squirrels. It is migratory in South Dakota with few breeding records in eastern and western South Dakota. There are several winter records in the central portion of the state (SDGFP 2006). The peregrine falcon remains protected under the Federal MBTA.

While there are no known or suitable nest sites within the Winner Alternative, the peregrine falcon may occur as a transient within the area during winter months or migrate through the area, and one was observed during 2009 avian surveys (Derby *et al*. 2010d).

Blacknose Shiner

Blacknose shiner is listed by the State as endangered. The species is an important indicator of high water quality and pristine streams. It is known to occur in southern Tripp County in the Keya Paha watershed (SDGFP 2006).

Northern Redbelly Dace

Northern redbelly dace is listed by the State as threatened. This species is widespread in the northern United States and Canada in boggy lakes, creeks and ponds. It is often found in tea-colored, slightly acidic water. It is found in the Big Sioux, Minnesota, Niobrara and Crow Creek drainages in South Dakota. Northern redbelly dace are known to occur in the Keya Paha watershed within one mile of the Winner Alternative (SDNHP 2009).

Pearl Dace

Pearl dace is listed by the State as threatened. It occurs in southern Tripp County in the Keya Paha watershed (SDGFP 2006) and has been documented within one mile of the Winner Alternative (SDNHP 2009).

***State and Federal Species of Concern***

State species of concern that may occur in the Winner Alternative are listed in **Table 3.4-10**. In addition to those species, South Dakota maintains a list of Level 1 priority bird species, and the USFWS maintains the BCC list (**Table 3.4-10**).

Greater Prairie Chicken

The legal status and species ecology of greater prairie chicken are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Greater Prairie Chicken***.

Breeding has been documented in Tripp County (Huxoll 2005). Greater prairie chickens were observed in the Winner Alternative during spring and summer surveys as well as in 2009 aerial grouse lek surveys (Derby *et al.* 2010d, Tierra EC 2009). Eight grouse leks were confirmed in the Winner Alternative during the surveys. Two of the leks were confirmed greater prairie chicken. The remaining six could not be identified to species (Derby *et al.* 2010d); however, three of the leks had greater prairie chicken flying over and are likely associated with this species. Eight additional areas (six in the Winner Alternative and two adjacent to the Winner Alternative) likely support leks based on the presence of large or multiple groups of grouse, but leks were not confirmed.

Sharp-tailed Grouse

The legal status and species ecology of sharp-tailed grouse are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Sharp-tailed Grouse***. Breeding has been documented in Tripp County (Huxoll 2005). Sharp-tailed grouse were observed in the Winner Alternative during 2009 aerial grouse lek surveys (Derby *et al.* 2010d). Eight grouse leks were confirmed in the Winner Alternative during the surveys. Six could not be identified to species (Derby *et al.* 2010d); however, it is likely that some of them were sharp-tailed grouse. Eight additional areas (six in the Winner Alternative and two adjacent to the Winner Alternative) likely support leks based on the presence of large or multiple groups of grouse, but leks were not confirmed. Three of these had sharp-tailed grouse.

**Table 3.4-10 South Dakota Species of Concern, Level 1 Bird Species and Birds of Conservation Concern Occurring in the Winner Alternative**

| Common Name | Scientific Name | Ecosystem | Global Rank | State Rank | BCC | Occurrence |
|---|---|---|---|---|---|---|
| **Birds** | | | | | | |
| Greater prairie chicken | *Tympanuchus cupido* | Grass/shrub | G4 | S4 | No | Occurs |
| Sharp-tailed grouse | *Tympanuchus phasianellus* | Grass/shrub | G4 | S4 | No | Occurs |
| Chestnut-collared longspur | *Calcarius ornatus* | Grass/shrub | G5 | S4 | Yes | Occurs |
| American bittern | *Botaurus lentiginosus* | Riparian/wetland | G4 | S4 | Yes | May occur |
| Northern harrier | *Circus cyaneus* | Grassland | G5 | S5 | No | Occurs |
| Ferruginous hawk | *Buteo regalis* | Grassland | G4 | S4 | Yes | Occurs |
| Swainson's hawk | *Buteo swainsoni* | Grassland/woodland | G5 | S4 | No | Occurs |
| Upland sandpiper | *Bartramia longicauda* | Grassland | G5 | S5 | Yes | Occurs |
| Marbled godwit | *Limosa fedoa* | Riparian/wetland/ grassland | G5 | S5 | Yes | Occurs |
| Wilson's phalarope | *Phalaropus tricolor* | Riparian/wetland/ grassland | G5 | S4 | No | Occurs |
| Long-billed curlew | *Numenius americanus* | Grassland | G5 | S3 | Yes | Occurs* |
| Grasshopper sparrow | *Ammodramus savannarum* | Grassland | G5 | S4 | Yes | Occurs |
| Western meadowlark | *Sturnella neglecta* | Grassland | G5 | S5 | No | Occurs |
| Lark bunting | *Calamospiza melanocorys* | Grassland | G5 | S5 | No | May occur |
| Orchard oriole | *Icterus spurious* | Grassland/woodland | | | No | Occurs |
| Burrowing owl | *Athene cunicularia* | Grassland | G4 | S3/S4 | Yes | Occurs |
| Black tern | *Chlidonias niger* | Wetland/open water | G4 | S3B/ SZN | No | May occur |
| Trumpeter swan | *Cygnus buccinator* | Aquatic/wetland | G4 | S3 | No | May occur* |
| American white pelican | *Pelecanus erythrorhynchos* | Aquatic | G3 | S3B/ SZN | No | Occurs* |
| Prairie falcon | *Falco mexicanus* | Grassland | G5 | S3/S4 | Yes | Occurs |
| Red-headed woodpecker | *Melanerpes erythrocephalus* | Open Woodland | G5 | S3 | Yes | Occurs |
| Loggerhead shrike | *Lanius ludovicianus* | Grassland/woodland | G4 | S4 | Yes | Occurs |
| Dickcissel | *Spiza americana* | Grassland | G5 | S2 | Yes | Occurs |
| **Mammals** | | | | | | |
| Plains spotted skunk | *Spilogale putorius interrupta* | Grassland | G5 | S3 | N/A | Occurs* |
| **Fish** | | | | | | |
| Plains topminnow | *Fundulus sciadicus* | Aquatic | G4 | S3 | N/A | Occurs* |
| **Invertebrates** | | | | | | |
| Regal fritillary | *Speyeria idalia* | Grass/shrub | G3 | S3 | N/A | May occur* |
| **Amphibians** | | | | | | |
| Plains leopard frog | *Rana blairi* | Aquatic/wetland/ grassland | G5 | S3/S4 | N/A | Occurs* |

**Table 3.4-10 South Dakota Species of Concern, Level 1 Bird Species and Birds of Conservation Concern Occurring in the Winner Alternative**

| Common Name | Scientific Name | Ecosystem | Global Rank | State Rank | BCC | Occurrence |
|---|---|---|---|---|---|---|
| **Reptiles** | | | | | | |
| Lesser earless lizard | *Holbrookia maculata* | Riparian/grassland | G5 | S2 | N/A | Occurs* |
| Western box turtle | *Terrapene ornate* | Aquatic | G5 | S2 | N/A | May occur* |

*SDNHP data shows known occurrence in or very near the Winner Alternative (SDNHP 2009).
**KEY TO CODES USED IN GLOBAL AND STATE RANKS:**
G1 S1 Critically imperiled because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
G2 S2 Imperiled because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
G3 S3 Either very rare and local throughout its range, or found locally (even abundantly at some of its locations) in a restricted range, or vulnerable to extinction throughout its range because of other factors; in the range of 21 of 100 occurrences.
G4 S4 Apparently secure, though it may be quite rare in parts of its range, especially at the periphery. Cause for long term concern.
G5 S5 Demonstrably secure, though it may be quite rare in parts of its range, especially at the periphery.
SZ No definable occurrences for conservation purposes, usually assigned to migrants
Bird species may have two state ranks, one for breeding (S#B) and one for nonbreeding seasons (S#N)
BCC – USFWS Birds of Conservation Concern

Chestnut-collared Longspur

The legal status and species ecology of chestnut-collared longspur are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Chestnut-collared Longspur***. Chestnut-collared longspur breeding has been documented in southern Tripp County (Peterson 1995; South Dakota Birds 2009). Chestnut-collared longspurs were observed in the Winner Alternative during 2009 breeding bird surveys (Derby *et al.* 2010d).

American Bittern

The legal status and species ecology of American bittern are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *American Bittern***. Breeding has not been documented in Tripp County, but it is possible (Peterson 1995; South Dakota Birds 2009). American bitterns were not observed in the Winner Alternative during 2009 avian surveys (Derby *et al.* 2010d).

Northern Harrier

The legal status and species ecology of northern harrier are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Northern Harrier***. Breeding has not been documented in Tripp County although it is possible (Peterson 1995; South Dakota Birds 2009). Northern harriers were observed in the Winner Alternative during spring 2009 migratory bird surveys (Derby *et al.* 2010d).

Ferruginous Hawk

The legal status and species ecology of ferruginous hawk are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Ferruginous Hawk***. Breeding has not been documented in Tripp County, although it is possible (Peterson 1995; South Dakota Birds 2009). Ferruginous hawks were observed in the Winner Alternative during spring 2009 avian use surveys (Derby *et al.* 2010d).

Swainson's Hawk

The legal status and species ecology of Swainson's hawk are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Swainson's Hawk***. Breeding has not been documented in Tripp County, although it is possible (Peterson 1995; South Dakota Birds 2009). Swainson's hawks were observed in the Winner Alternative during spring 2009 migratory bird surveys (Derby *et al.* 2010d).

Upland Sandpiper

The legal status and species ecology of upland sandpiper are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Upland Sandpiper***. Breeding has not been documented in Tripp County, although it is possible (Peterson 1995; South Dakota Birds 2009). Upland sandpipers were observed in the Winner Alternative during 2009 migratory and breeding bird surveys (Derby *et al.* 2010d).

Marbled Godwit

The legal status and species ecology of marbled godwit are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Marbled Godwit***. Breeding has not been documented in Tripp County (Peterson 1995; South Dakota Birds 2009). Marbled godwits were observed in the Winner Alternative during 2009 migratory bird surveys (Derby *et al.* 2010d).

Wilson's Phalarope

The legal status and species ecology of Wilson's phalarope are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Wilson's Phalarope***. Breeding has not been documented in Tripp County, although it is possible (Peterson 1995; South Dakota Birds 2009). Wilson's phalarope was observed in the Winner Alternative during 2009 breeding bird surveys (Derby *et al.* 2010d).

Long-billed Curlew

The legal status and species ecology of long-billed curlew are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Long-billed Curlew***. Breeding has been confirmed in southern Tripp County (Peterson 1995; South Dakota Birds 2009). Long-billed curlews were not observed in the Winner Alternative during spring 2009 avian use surveys (Derby *et al.* 2010d).

Grasshopper Sparrow

The legal status and species ecology of grasshopper sparrow are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Grasshopper Sparrow***. Breeding has not been documented in Tripp County, although it is possible (Peterson 1995; South Dakota Birds 2009). Grasshopper sparrows were observed in the Winner Alternative during 2009 breeding bird surveys (Derby *et al.* 2010d).

Western Meadowlark

The legal status and species ecology of western meadowlark are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Western Meadowlark***. Breeding has been documented in Tripp County (Peterson 1995; South Dakota Birds 2009). Western meadowlarks were observed in the Winner Alternative during 2009 breeding and migratory bird surveys (Derby *et al.* 2010d).

Lark Bunting

The legal status and species ecology of lark bunting are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Lark Bunting***. Breeding has not been documented in Tripp County, although it is probable (Peterson 1995; South Dakota Birds 2009). Lark buntings were not observed in the Winner Alternative during 2009 breeding and migratory bird surveys (Derby *et al.* 2010d).

Orchard Oriole

Orchard oriole is a common summer resident throughout much of South Dakota. Breeding has not been documented in Tripp, although it is possible (Peterson 1995; South Dakota Birds 2009). Orchard orioles were observed in the Winner Alternative during 2009 breeding bird surveys (Derby *et al.* 2010d).

Burrowing Owl

The legal status and species ecology of burrowing owl are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Burrowing Owl***. Breeding has not been documented in Tripp County (Peterson 1995; South Dakota Birds 2009). Burrowing owls were observed in the Winner Alternative during 2009 avian use surveys (Derby *et al.* 2010d). There are two known prairie dog towns in the Winner Alternative that are suitable burrowing owl habitat: one in the west portion and one in the southeast portion.

Black Tern

The legal status and species ecology of black tern are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Black Tern***. Breeding has been observed but not confirmed in Tripp County (Peterson 1995; South Dakota Birds 2009). Black terns were not observed in the Winner Alternative during 2009 breeding and migratory bird surveys (Derby *et al.* 2010d).

Trumpeter Swan

Trumpeter swan threats include habitat loss, degradation and alteration resulting in the reduction of shallow areas, reduction in beaver ponds, irregular managed water flows, nest site disturbance, pesticide impacts, lead poisoning and illegal shooting (SDGFP 2006). Trumpeter swans are summer residents in the western half of South Dakota; very little breeding is known in the State. Breeding has not been confirmed in Tripp County, although it is probable in southern Tripp County (Peterson 1995; South Dakota Birds 2009). Trumpeter swans were not observed in the Winner Alternative during 2009 breeding and migratory bird surveys (Derby *et al.* 2010d);

however, they are known to occur at several lakes in and near the Winner Alternative, including Little Dog Ear Lake and Dog Ear Lake (SDNHP 2009).

American White Pelican

The legal status and species ecology of American white pelican are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *American White Pelican***. Breeding has been observed but not confirmed in northwestern Tripp County (Peterson 1995; South Dakota Birds 2009). American white pelicans were observed in the Winner Alternative during 2009 breeding and migratory bird surveys (Derby *et al.* 2010d).

Prairie Falcon

The legal status and species ecology of prairie falcon are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Prairie Falcon***. Breeding has not been documented in Tripp County (Peterson 1995; South Dakota Birds 2009). Prairie falcons were observed in the Winner Alternative during 2009 breeding bird surveys (Derby *et al.* 2010d).

Red-headed Woodpecker

The legal status and species ecology of red-headed woodpecker are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Red-headed Woodpecker***. Breeding has been documented in Tripp County (Peterson 1995; South Dakota Birds 2009). Red-headed woodpeckers were observed in the Winner Alternative during 2009 breeding bird surveys (Derby *et al.* 2010d).

Dickcissel

The legal status and species ecology of dickcissel are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Dickcissel***. Breeding has been documented in Tripp County (Peterson 1995; South Dakota Birds 2009). Dickcissels were observed in the Winner Alternative during 2009 breeding bird surveys (Derby *et al.* 2010d).

Loggerhead Shrike

The legal status and species ecology of loggerhead shrike are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Loggerhead Shrike***. Breeding has not been documented in Tripp County but USGS indicates it is possible (Peterson 1995; South Dakota Birds 2009). Loggerhead shrikes were observed in the Winner Alternative during 2009 breeding bird surveys (Derby *et al.* 2010d).

Plains Spotted Skunk

The plains spotted skunk was formerly common but their populations began declining in the mid-1900s. The decrease may be related to the changes in agriculture that stressed clean farming, thereby leaving little cover for skunks. It also is possible that increased pesticide use in agricultural areas has affected insect abundance, which skunks commonly eat.

Plains spotted skunk is known to occur in the northern portion of the Winner Alternative just south of Winner (SDNHP 2009).

Plains Topminnow

The plains topminnow has a limited range, with eastern South Dakota forming the upper, western edge. The plains topminnow is threatened by any activity causing alteration of its habitat, particularly groundwater withdrawal and drainage of wetlands (SDGFP 2009d).

The plains topminnow has a limited range within the Missouri River drainage, from eastern Wyoming to southwestern Minnesota and northwestern Iowa. The plains topminnow occurs in the James, Vermillion and Big Sioux river basins in eastern South Dakota. It is most common in the James River basin where it occurs in several tributaries, as well as backwater pools and ponds. It is present west of the Winner Alternative in the Keya Paha watershed (SDNHP 2009).

Plains Leopard Frog

Plains leopard frogs occur in the vicinity of streams, natural and artificial ponds, reservoirs, creek pools, irrigation ditches and other bodies of water in plains grassland, sand hills, stream valleys and canyon bottoms. Plains leopard frogs may disperse far from water during wet, mild weather. Plains leopard frogs are known to occur in the northern portion of the Winner Alternative, approximately 5 miles south of Winner (SDNHP 2009).

Lesser Earless Lizard

Lesser earless lizard threats include habitat loss or degradation due to stabilization of sand dunes and loss of habitat from land conversion by agriculture and urban development (SDGFP 2006). Lesser earless lizards are known to occur in southern Tripp County, including the Winner Alternative (**Figure 3.4-2**) (SDGFP 2006; SDNHP 2009). This lizard prefers sand hills, sandy or gravelly areas along streams, sparsely vegetated or short grass ecosystems, and prairie dog towns (SDGFP 2006).

Western Box Turtle

Western box turtle threats include habitat loss or degradation due to stream channelization and impoundment, water pollution, removal of basking sites (large woody debris) and lack of nesting sites such as sandbars (SDGFP 2006). Western box turtles occur in southern Tripp County, including the Winner Alternative (**Figure 3.4-4**) (SDGFP 2006; SDNHP 2009).

Regal Fritillary Butterfly

The legal status and species ecology of Regal Fritillary are discussed in **Section 3.4.5.1, State and Federal Species of Concern, *Regal Fritillary Butterfly***. Regal fritillaries are distributed throughout the State and have been documented in all counties except three (Buffalo, Aurora and Miner). The presence of regal fritillary butterflies in the Winner Alternative is unknown, although there is a documented occurrence five miles south of the Winner Alternative (SDNHP 2009).

# 3.5 CULTURAL RESOURCES

A cultural resource is an all-encompassing term for an archaeological, historical or Native American resource. They are sites, structures, landscapes and objects of some importance to a culture or community for scientific, traditional, religious or other reasons. They are the materials and built features left from past human activities that are studied to reconstruct past human behavior and actions. Native American resources include but are not limited to Traditional Cultural Properties (TCPs). A TCP is a resource that is eligible for inclusion in the NRHP because of its association with cultural practices or beliefs of a living community that are rooted in that community's history and are important in maintaining the continuing cultural identity of the community. TCPs are most often associated with Native Americans, but can be associated with any group if they fit the criteria described in the definition of a TCP.

The ROI for cultural resource analysis encompasses locations within the alternatives that would potentially be disturbed by construction and operation of the Proposed Project Components. Additional prehistoric background information for the site alternatives is in **Appendix D**. The Agencies must consider impacts to cultural resources under NEPA. Western is the lead Federal agency for Section 106 of the NHPA and its implementing regulations (36 CFR 800), which include the identification, management and treatment of cultural resources, as well as the government-to-government consultation process.

## 3.5.1 NATIVE AMERICANS OF THE PROPOSED PROJECT AREA, RELIGIOUS CONCERNS

***Sioux***

The Sioux tribes share a common language, history, social organization and culture (DeMallie 2001a). Historically the Sioux were referred to as the Great Sioux Nation. The seven nations that compose the Sioux are Mdewakanton, Wahpeton, Wahpekute, Sisseton, Yankton, Yanktonai and the Teton. The Sioux tribes within the site alternative areas include the Santee (Eastern Dakota), the Yankton-Yanktonai (Western Dakota) and the Teton (Lakota) **(Figure 3.5-1)**. Linguistic reconstruction places the homeland of the proto-western Siouans west of Lake Michigan; Sioux traditions recount an origin near "the northern lakes east of the Mississippi," and $19^{th}$ century Santee tradition records that "their fathers left the lakes around the headwaters of the upper Mississippi" and traveled downstream to the Minnesota River region because of the abundance of buffalo there. The archaeological record adds little to the question of Sioux origins because the prehistoric sites in Minnesota are classified as Woodlands tradition, as are the early historic or contact sites (DeMallie 2001a). Yankton oral history; however, indicates that their territory extended into Yellowstone, Canada, and South America where they travelled for ceremonial gatherings, rites of passage, and other purposes (Youpee *et al.* 2010).

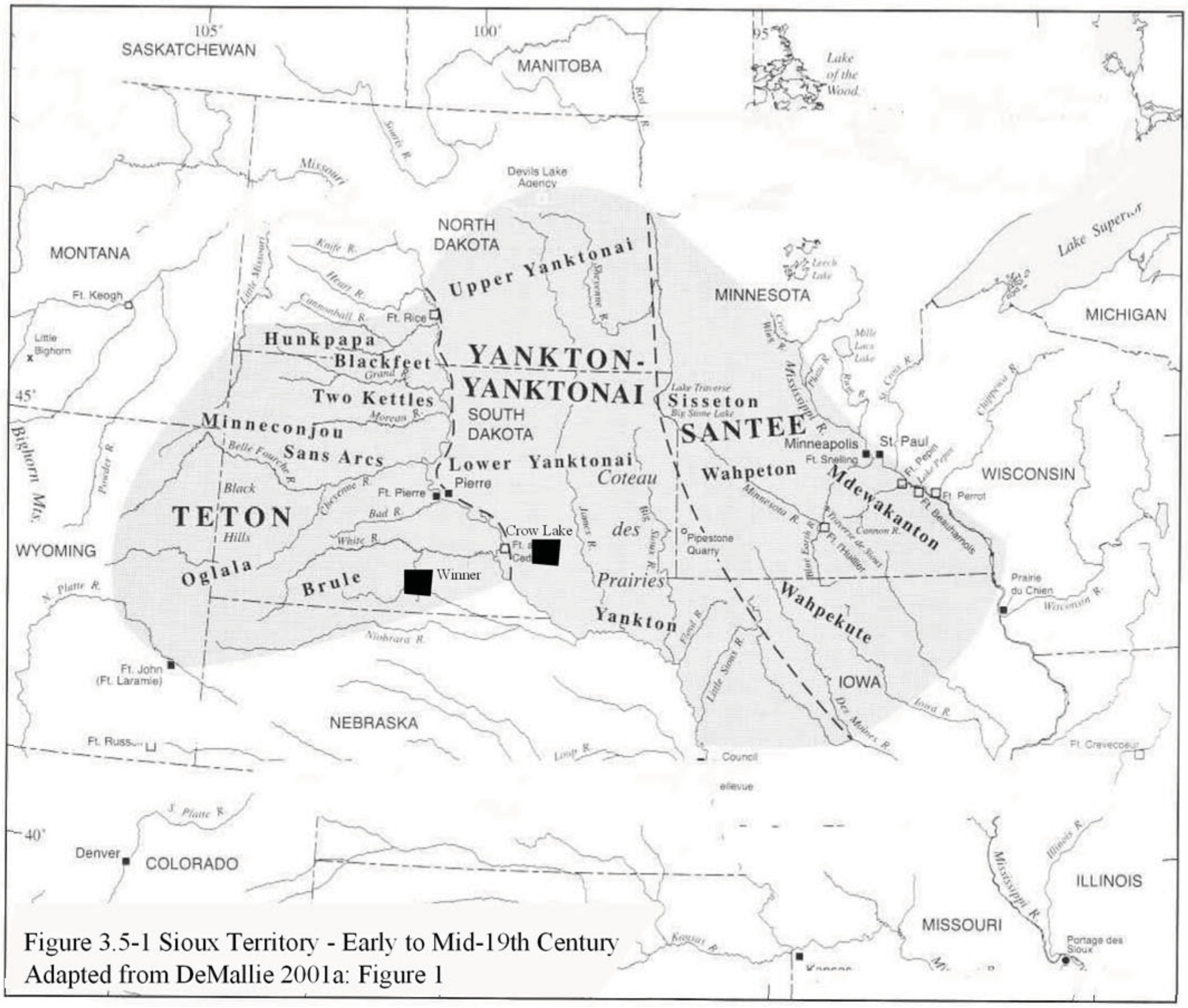



**Figure 3.5-1 Sioux Territory – Early to Mid 19th Century**

The Santee territory encompassed a transitional ecozone that included both deciduous forest and tall-grass prairie; the Yankton-Yanktonai territory was tall-grass prairie; and the Teton territory was primarily plains. Buffalo was considered the meat staple for the Santee, Yankton-Yanktonai and Teton Sioux tribes; however, as the buffalo began to disappear in the early 19th century, deer, fish and small mammals were also hunted by the Santee and the Yankton-Yanktonai. The Teton also hunted elk, deer, pronghorn, bighorn sheep, carnivores and rabbits. Tool kits varied within each ecozone, as expected; however, all three tribes continued to use the bow and arrow as their primary hunting implement. The Santee also gathered fruits, wild rice, wild beans, tubers, acorns, nuts and maple sap. Both the Santee and the Yankton-Yanktonai also cultivated corn, beans and squash. On the plains, the Teton gathered wild vegetables and fruits, but traded with the Arikara for their corn, squash and melons.

Houses in the forested and prairie areas (Santee and Yankton-Yanktonai) were either bark lodges (Santee) or earthlodges (Yankton-Yanktonai); however, all three tribes used tepees when hunting or living on the Plains.

Hidatsa

The Hidatsa tribe consists of three divisions (Hidatsa proper, Awatixa and Awaxawi). These divisions or village groups were slightly different from each other in culture, and each spoke a distinct dialect. Oral tradition asserts that the Awaxawi and Hidatsa proper came from the east, while Awatixa oral tradition maintains they have always resided on the Missouri River (Stewart 2001). Each Hidatsa village consisted of a number of large round earthlodge structures with a strong wooden framework. The earthlodges were generally closely packed together in no particular order. During the communal buffalo hunts (July and August) the people lived in tepees, which were arranged in a camp circle. In the fall people would also form small groups and live in other traditionally established camps where they hunted game and trapped eagles, returning before winter. During the winter the Hidatsa usually split the tribe and established winter camps several miles away from the summer camp. Subsistence for the Hidatsa consisted of buffalo and other large game, fish, corn, sunflower and wild fruits and vegetables.

Mandan

The Mandan lived in villages on the middle Missouri River and lived a lifestyle that combined horticulture and buffalo hunting. By the early 1700s they had well established fortified villages on both sides of the Missouri River near the mouth of the Heart River, likely due to aggressive pressure from other villages and nomadic tribes from the central Plains (Wood and Irwin 2001). The Mandan sphere of influence also included a large area to the west that they used in the fall on annual bison hunts and eagle-trapping expeditions. Mandan village locations were chosen for defense. The villages were built on high terraces overlooking the Missouri River floodplain and their gardens were planted in the floodplains. Their earthlodges were arranged around a plaza, which might be located at the edge of the village or at the center. During the winter, the main village was abandoned and temporary villages were established with smaller earthlodges. Subsistence consisted of bison, deer, antelope, elk, small game, waterfowl, fish, corn, beans, squash and sunflowers.

Arikara

The Arikara are the northernmost member of the Caddoan language family, and are considered a divergent dialect of Pawnee (Parks 2001). Devastating smallpox epidemics during the late 18$^{th}$ century forced the Arikara to consolidate into two major villages in the area of the Cheyenne and Missouri Rivers in South Dakota. Over the next century they continued to move north along the Missouri River ending up eventually on the Fort Berthold Reservation in North Dakota in 1862.

Prior to the time of the epidemics the Arikara engaged in large communal buffalo hunts that probably extended westward onto the plains. It is believed that during the historic period the pressures of population loss and warfare caused them to concentrate their subsistence practices on horticulture and trading within the vicinity of their villages. Villages were placed on high terraces overlooking the Missouri River and contained between 30 to several hundred lodges, surrounded by a ditch and earthen embankment (Parks 2001).

The Arikara buried their deceased on the prairie beyond the village in mounded graves. These village cemeteries were often one mile in length. The Arikara occasionally placed shrines outside the village on the prairie. During the fall the Arikara left the permanent village and established a smaller, identical village in the bottomlands of the Missouri River for the winter months. The people lived in tepees during the communal buffalo hunts. Subsistence practices consisted of hunting and fishing. Buffalo were the most important game animal; however, other important sources of meat included antelope, deer, elk, smaller prey and fish. Corn was the most important crop, with as many as 11 varieties being grown. Beans, squash, melons, sunflower and tobacco were also grown. Wild plants and fruits were also gathered.

Religious Concerns

The Santee, Yankton-Yanktonai and Teton Sioux tribes, like most Native people, lived their lives with ceremony. Ethnographic accounts of the Sioux tribes suggest that the alternative site areas may contain sensitive sites where sweatlodge, Sun Dance, vision quests, ritual fasting, life cycle events including surface remains or secondary pit burials, or eagle trapping ceremonies occurred (Albers 2001; DeMallie 2001b; DeMallie 2001c).

Likewise for the Hidatsa, Mandan and Arikara, ceremony was an important part of their lives, especially the “bundles” and associated ceremonies that were an integral part of their tribal and personal identity. The Hidatsa and the Mandan had dance ceremonies similar to the Sun Dance, and the Arikara also had the Sun Dance. All had the eagle-trapping ceremony as well. The Arikara also placed altars outside their villages on the prairie and constructed village cemeteries in the form of mounds also outside the villages (DeMallie 2001b; Parks 2001; Stewart 2001; Wood and Irwin 2001).

Archaeologists are able to record the material remains of these sites; however, the religious or cultural significance of these types of sites, if encountered, can only be determined by the tribes.

Federal Responsibilities

Western is the lead Federal agency for the Section 106 process of the NHPA for the Proposed Project. The Agencies and tribes participated in Government-to-Government meetings on June 24, August 5, and September 29, 2009, to discuss the Proposed Project and tribal concerns; and March 30 and 31, and May 10, 2010, to discuss the Proposed Project, Wind Partners’ proposed development, and tribal concerns. Based on the consultation meetings with Native American tribes the following concerns were identified:

- The need for Native American monitors during pedestrian surveys
- The need for a TCP survey that would include tribal elders and other tribal representatives
- The need for cultural sensitivity training for the construction crew
- The need for construction monitoring to ensure that important cultural sites are avoided
- The potential for historical significance and concerns in the area surrounding the Winner Alternative
- Avoidance of adverse effects to sites of religious and/or cultural significance

Following the early Government-to-Government consultation meetings, a record search was conducted by the Rosebud Sioux Tribe Historic Preservation Office in August 2009 for the Winner Alternative. The results indicated that there were no TCPs recorded in the tribe’s database within the Proposed Project area. However, it is the view of the tribe that this does not preclude the possibility of archaeological sites being present within the Proposed Project area **(Appendix D).** An inter-tribal TCP study of the preferred alternative (Crow Lake Alternative) was conducted by consulting tribes.

In June 2010 the Advisory Council for Historic Preservation joined as a participant in the consultation process.

## 3.5.2 PREVIOUS RESEARCH

The Class I inventory included a review of existing cultural resources documentation on file in State repositories, a preliminary architectural history windshield survey within the site alternatives, and a review of 19th century Public Land Survey maps. The Class I study area included the area within the alternative boundaries as well as a one-mile buffer. The resulting report, *Class I Cultural Resources Inventory for the PrairieWinds SD1 Project, Aurora, Brule, Jerauld, and Tripp Counties, South Dakota* (Mitchell 2009), is summarized below.

### 3.5.2.1 Crow Lake Alternative

Six previous cultural resource surveys have been conducted within the Crow Lake Alternative area. **Table 3.5-1** provides a summary of the six previous cultural resource surveys including author, year and general location of survey.

As a result of the previous surveys, six cultural resource sites were recorded. Site types include stone rings, foundations, farmsteads, a depression and an earthlodge village. Of these sites, one is recommended eligible by SHPO for the NRHP, two are recommended as not eligible and the

**Table 3.5-1 Crow Lake Alternative Previous Cultural Resource Surveys**

| Survey | Author | Year | Location |
|---|---|---|---|
| AAU-0017 | Vaillancourt | 2006 | Within Proposed Project boundary and one-mile buffer |
| AJE-0022 | Vaillancourt | 2008 | Within Proposed Project boundary and one-mile buffer |
| ESD-0263 | Buechler | 2001 | Within Proposed Project boundary and one-mile buffer |
| ESD-0288 | Buechler | 2002 | Within Proposed Project boundary and one-mile buffer |
| ESD-0301 | Buechler | 2003 | Within Proposed Project boundary and one-mile buffer |
| ESD-0068 | Buechler | 1986 | Within Proposed Project boundary and one-mile buffer |
| JExx11 | Petrosky Letter (burials) | No Date | Within one-mile of Proposed Project boundary |

eligibility of the remaining three sites is undetermined. **Table 3.5-2** provides a summary of the cultural site type, eligibility and general location.

Historic structures identified from previous investigations **(Table 3.5-1)** were also recorded within one mile of the Crow Lake Alternative, and include the Patten Consolidated School, Underwood United Methodist Church, David Grieve Place, H.C. Lyle Farm, Jerry Bennett Farm and the Elwood C. Lyle Wind Powered Mill. **Table 3.5-3** provides a summary of the historic structure type, eligibility and general location.

**Table 3.5-2 Crow Lake Alternative Cultural Resource Sites**

| Site | Site Type | NRHP Eligibility | Location |
|---|---|---|---|
| 39AU0007 | Foundation | Eligible | Within Proposed Project boundary |
| 39AU0012 | Farmstead | Not eligible | Within Proposed Project boundary |
| 39JE0039 | Stone Circle | Unevaluated | Within Proposed Project boundary |
| 39JE0044 | Foundation | Not eligible | Within Proposed Project boundary |
| 39JE0001 | Earthlodge Village | Unevaluated | Within one-mile of Proposed Project boundary |
| 39JE0037 | Depression | Unevaluated | Within one-mile of Proposed Project boundary |

**Table 3.5-3 Crow Lake Alternative Historic Structures**

| Structure | Type | NRHP Eligibility | Location |
|---|---|---|---|
| AU00000059 | Patten Consolidated School | Eligible | Within Proposed Project boundary and one-mile buffer |
| AU00000060 | Underwood United Methodist Church | Eligible | Within one-mile of Proposed Project boundary |
| JE00000040 | David Grieve Place | Not eligible | Within one-mile of Proposed Project boundary |
| JE01200001 | H. C. Lyle Farm | Not eligible | Within Proposed Project boundary and one-mile buffer |
| JE01200002 | H. C. Lyle Farm | Not eligible | Within Proposed Project boundary and one-mile buffer |
| JE01200003 | H. C. Lyle Farm | Not eligible | Within Proposed Project boundary and one-mile buffer |
| JE01200004 | H. C. Lyle Farm | Not eligible | Within Proposed Project boundary and one-mile buffer |
| JE01300001 | Jerry Bennett Farm | Not eligible | Within one-mile of Proposed Project boundary |
| JE01300002 | Jerry Bennett Farm | Not eligible | Within one-mile of Proposed Project boundary |
| JE01300003 | Jerry Bennett Farm | Not eligible | Within one-mile of Proposed Project boundary |
| JE01300004 | Jerry Bennett Farm | Eligible | Within one-mile of Proposed Project boundary |
| JE01300005 | Jerry Bennett Farm | Not eligible | Within one-mile of Proposed Project boundary |
| JE01300006 | Jerry Bennett Farm | Not eligible | Within one-mile of Proposed Project boundary |
| JE01300007 | Jerry Bennett Farm | Not eligible | Within one-mile of Proposed Project boundary |
| JE01300008 | Jerry Bennett Farm | Not eligible | Within one-mile of Proposed Project boundary |
| JE01300009 | Jerry Bennett Farm | Not eligible | Within one-mile of Proposed Project boundary |
| JE01400001 | Elwood C. Lyle Wind Powered Mill | Eligible | Within one-mile of Proposed Project boundary |
| JE01400002 | Elwood C. Lyle Wind Powered Mill | Not eligible | Within one-mile of Proposed Project boundary |
| JE01500001 | Jerry Bennett Place | Not eligible | Within Proposed Project boundary and one-mile buffer |
| JE01500002 | Jerry Bennett Place | Not eligible | Within Proposed Project boundary and one-mile buffer |
| JE01500003 | Jerry Bennett Place | Not eligible | Within Proposed Project boundary and one-mile buffer |
| JE01500004 | Jerry Bennett Place | Not eligible | Within Proposed Project boundary and one-mile buffer |
| JE01500005 | Jerry Bennett Place | Not eligible | Within Proposed Project boundary and one-mile buffer |

## 3.5.2.2 Winner Alternative

Nine previous cultural resource surveys have been conducted within the Winner Alternative area. **Table 3.5-4** provides a summary of the nine previous cultural resource surveys including author, year and general location of survey.

As a result of the previous surveys, 13 sites were recorded. Site types include cairns, farmsteads, isolated finds, a schoolhouse foundation and an artifact scatter. Of these sites, seven are recommended as not eligible, and the eligibility of the remaining six sites is undetermined. **Table 3.5-5** provides a summary of the cultural site type, eligibility and general location.

Historic structures identified from previous investigations were also recorded within one mile of the Winner Alternative, primarily from the Town of Winner. Fourteen structures and one statue were located within one mile, and eight are recommended as eligible for the NRHP. **Table 3.5-6** provides a summary of the historic structure type, eligibility and general location.

Also recorded within one mile of the Winner Alternative were two bridges. Both are recommended as not eligible. **Table 3.5-7** provides a summary of the eligibility and general location.

**Table 3.5-4 Winner Alternative Previous Cultural Resource Surveys**

| Survey | Author | Year | Location |
|---|---|---|---|
| ATP-0001 | Haberman | 1982a and 1982b | Within Proposed Project boundary |
| ATP-0005 | Haberman | 1985 | Within Proposed Project boundary |
| ATP-0010 | Haberman | 1982a and 1982b | Within Proposed Project boundary |
| ATP-0012 | Haberman | 1987 | Within Proposed Project boundary |
| ATP-0018 | Chevance | 1991a and 1991 b | Within Proposed Project boundary and one-mile buffer |
| ATP-0030 | Armitage | 2003 | Within Proposed Project boundary and one-mile buffer |
| ATP-0037 | Buechler | 2005 | Within Proposed Project boundary and one-mile buffer |
| WSD-0103 | Chevance | 1991a and 1991 b | Within Proposed Project boundary and one-mile buffer |
| WSD-0118 | Buechler | 1992 | Within Proposed Project boundary and one-mile buffer |

**Table 3.5-5 Winner Alternative Cultural Sites**

| Site | Site Type | NRHP Eligibility | Location |
|---|---|---|---|
| 39TP0019 | Cairn | Unevaluated | Within Proposed Project boundary |
| 39TP0020 | Cairn | Not eligible | Within Proposed Project boundary |
| 39TP0026 | Farmstead | Unevaluated | Within one-mile of Proposed Project boundary |
| 39TP0027 | School Foundation | Unevaluated | Within Proposed Project boundary |
| 39TP0028 | Farmstead | Not eligible | Within Proposed Project boundary |
| 39TP0034 | Farmstead | Not eligible | Within one-mile of Proposed Project boundary |
| 39TP0035 | Farmstead | Unevaluated | Within Proposed Project boundary |
| 39TP0036 | Farmstead | Unevaluated | Within Proposed Project boundary |
| 39TP0038 | Foundation | Unevaluated | Within Proposed Project boundary |
| 39TP0055 | Farmstead | Not eligible | Within Proposed Project boundary |
| 39TP0056 | Isolated find | Not eligible | Within Proposed Project boundary and one-mile buffer |
| 39TP0057 | Isolated find | Not eligible | Within Proposed Project boundary |
| 39TP0058 | Artifact scatter | Not eligible | Within Proposed Project boundary |

**Table 3.5-6 Winner Alternative Historic Structures**

| Structure | Type | NRHP Eligibility | Location |
|---|---|---|---|
| TP00000001 | Key Residence | Eligible | Within one-mile of Proposed Project boundary |
| TP00000002 | Winner Post Office | Eligible | Within one-mile of Proposed Project boundary |
| TP00000006 | Colome School | Not eligible | Within one-mile of Proposed Project boundary |
| TP00000010 | Manthey Barn | Eligible | Within Proposed Project boundary |
| TP00000020 | Barn | Not eligible | Within one-mile of Proposed Project boundary |
| TP00000021 | Barn | Not eligible | Within one-mile of Proposed Project boundary |
| TP00000065 | Winner Drive-In | Eligible | Within one-mile of Proposed Project boundary |
| TP00000066 | Immaculate Conception Church | Eligible | Within one-mile of Proposed Project boundary |
| TP00000067 | St. Joseph's Hall | Not eligible | Within one-mile of Proposed Project boundary |
| TP00000068 | St. Joseph's Rectory Garage | Not eligible | Within one-mile of Proposed Project boundary |
| TP00000069 | St. Mary's Parish Hall | Eligible | Within one-mile of Proposed Project boundary |
| TP00000070 | Methodist Church | Not eligible | Within one-mile of Proposed Project boundary |
| TP00000071 | Winner Grade School | Eligible | Within one-mile of Proposed Project boundary |
| TP00000072 | Rosebud Hospital | Not eligible | Within one-mile of Proposed Project boundary |
| TP00000073 | Tripp County Veteran's Memorial | Eligible | Within one-mile of Proposed Project boundary |

**Table 3.5-7 Winner Alternative Recorded Bridges**

| Bridge | SHPO Number | NRHP Eligibility | Location |
|---|---|---|---|
| 62-178-300 | TP00000039 | Not eligible | Within Proposed Project boundary |
| 62-270-372 | TP00000055 | Not eligible | Within Proposed Project boundary and one-mile buffer |

## 3.5.3 CLASS III SURVEY

In addition to the Class I research, the Applicants sponsored a Class III pedestrian survey of the preferred alternative (the Crow Lake Alternative), as well as a survey of historic architectural properties within the Proposed Project Components viewshed. The inventory resulted in the documentation of 69 prehistoric sites, nine historic sites, and seven isolated finds. The prehistoric site types include 37 stone cairns, 16 stone circles a depression, and 13 occurrences that were a combination of these types. The nine historic sites include two farmsteads, two depressions, a dump, a rock wall, a foundation, and a farmstead with windmill, foundation, and depression features. The other historic site is the remains of a military bomb target. The seven isolated finds include two brown chert flakes, a gray chert flake, six quartzite flakes, a chert biface, two flint bifaces, and a flint core fragment.

Two of the prehistoric sites (lithic scatters) were evaluated for inclusion in the NRHP and recommended as not eligible. The eligibility of the remaining 67 prehistoric sites is undetermined. All nine historic sites were evaluated for inclusion in the NRHP and eight of the nine were recommended as not eligible. Historic site (39JE0062) is a concrete foundation and bomb target and has been recommended as eligible for nomination to the NRHP under Criterion A primarily for its association with the postwar (World War II) construction boom that swept the country and state between 1945 and 1960 (Dennis 2007). The seven isolated finds were also evaluated for inclusion in the NRHP and recommended as not eligible.

The survey of historic architectural properties within the Proposed Project Components viewshed was conducted within the Crow Lake APE, while the Class I records review covered a much broader area and included a one-mile radius surrounding the Proposed Project boundary. Thirty-eight historic properties were identified within the Proposed Project Components viewshed and evaluated for significance **(Table 3.5-8)**. The Patten Consolidated School (AU00000059) and the historic bomb target site (39JE0062) were recommended eligible for the National Register.

## Table 3.5-8 Crow Lake Alternative Viewshed Historic Structures

| SDSHS # or Site ID # | Type | NRHP Eligibility | County |
|---|---|---|---|
| 39JE0062 | Bomb Target & Foundation | Eligible | Jerauld |
| AU00000059 | Patten Consolidated School | Eligible | Aurora |
| N/A | - | Asked to leave land. | Brule |
| 54023 | 1945-1985 Farmstead | Not Eligible | Jerauld |
| 54024 | 1935-1970 Farmstead | Not Eligible | Jerauld |
| 54027 | 1935-1945 Farmstead | Not Eligible | Jerauld |
| 54028 | 1935-1980 Farmstead | Not Eligible | Jerauld |
| 54029 | 1935 House & 1985 Silos | Not Eligible | Aurora |
| 54030 | 1935 Farmstead | Not Eligible | Jerauld |
| 54031 | 1925-2000 Farmstead | Not Eligible | Jerauld |
| 54032 | 1925-1985 Farmstead | Not Eligible | Aurora |
| 54033 | 1925 Outbuildings | Not Eligible | Aurora |
| 54034 | 1915-1935 Farmstead | Not Eligible | Jerauld |
| 54035 | 1935-1970 Farmstead | Not Eligible | Brule |
| 54036 | 1935 Farmstead | Not Eligible | Brule |
| 54037 | 1935-1985 Farmstead | Not Eligible | Aurora |
| 54038 | 1935 Farmstead | Not Eligible | Aurora |
| 54039 | 1945-1985 Farmstead | Not Eligible | Aurora |
| 54040 | 1925-1985 Farmstead | Not Eligible | Aurora |
| 54041 | 1925-1995 Farmstead | Not Eligible | Aurora |
| 54042 | 1925 Barn | Not Eligible | Aurora |
| 54043 | 1895-1990 Farmstead | Not Eligible | Aurora |
| 54044 | 1930 Farmstead | Not Eligible | Aurora |
| 54045 | 1930-1990 Farmstead | Not Eligible | Aurora |
| 54046 | 1894-1975 Farmstead | Not Eligible | Aurora |
| 54051 | 1920 Structure | Not Eligible | Brule |
| 54054 | 1920 Structure | Not Eligible | Aurora |
| 54107 | 1920-1985 Farmstead | Not Eligible | Brule |
| 54108 | 1920-2000 Farmstead | Not Eligible | Brule |
| 54110 | Farmstead | Not Eligible | Aurora |
| 54111 | Farmstead | Not Eligible | Brule |
| 54113 | Farmstead | Not Eligible | Brule |
| 54114 | Farmstead | Not Eligible | Aurora |
| 54115 | Farmstead | Not Eligible | Aurora |
| 54116 | Farmstead | Not Eligible | Aurora |
| 54118 | Farmstead | Not Eligible | Aurora |
| 54119 | Farmstead | Not Eligible | Brule |
| 54120 | Farmstead | Not Eligible | Brule |

# 3.6 LAND USE

The ROI for land use includes areas of immediate disturbance associated with the Proposed Project Components and proposed Federal actions. Land uses such as agriculture, designated prime farmland and farmland of statewide importance, rangeland, natural resource conservation areas, residential uses and recreational opportunities were identified within the alternatives.

## 3.6.1 GENERAL LAND USE

The majority of the region, including both site alternatives, is currently used for rangeland and agriculture. Western's Wessington Springs and Winner substations are industrial uses. Reviews of aerial photographs, existing public inventories (*e.g.*, USFWS, NWI, NRCS databases) and field studies were used to identify the land uses within the sites. Tierra EC contacted Aurora, Brule, Jerauld and Tripp county planners and managers to inquire whether existing land use plans for the counties were available (Hirsh 2009b) (Reindle 2009b) (Vissia 2009b) (Westindorf 2009b). Land use plans for Aurora and Brule counties are currently being revised. Jerauld County's Comprehensive Plan was approved in 1998. No land use plan is available for Tripp County.

### 3.6.1.1 Crow Lake Alternative

**Table 3.6-1** and **Figure 3.4-1** (in **Section 3.4**) identify current land uses at the Crow Lake Alternative.

**Table 3.6-1 Crow Lake Alternative Current Land Use**

| Land Use | Percentage of Area |
|---|---|
| Rangeland (mixed-grass prairie) | 64% |
| Agricultural (cropland) | 33% |
| Wetland | 1.4% |
| Farmstead | <1% |
| Shelterbelt | <1% |
| Deciduous forest | <1% |
| Industrial (mine/quarry) | <1% |

Source: Tierra EC 2009

### 3.6.1.2 Winner Alternative

**Table 3.6-2** and **Figure 3.4-3** (in **Section 3.4**) identify current land uses at the Winner Alternative.

**Table 3.6-2 Winner Alternative Current Land Use**

| Land Use | Percentage of Area |
|---|---|
| Rangeland (mixed-grass prairie) | 65% |
| Agricultural (cropland) | 29% |
| Deciduous forest | 1.8% |
| Farmstead | 1.6% |
| Shelterbelt | 1.5% |
| Wetland | 1.1% |
| Disturbed | <1% |

Source: Tierra EC 2009

## 3.6.2 PRIME FARMLAND AND FARMLAND OF STATEWIDE IMPORTANCE

The Federally-implemented Farmland Protection Policy Act (FPPA) is a set of programs and policies designed to protect farmland from urban sprawl. The FPPA created a system to classify farmland uses with categories that include prime farmland, unique farmland and farmland of statewide or local importance. FPPA requirements govern projects that may irreversibly convert farmland either directly or indirectly to nonagricultural use and are completed under the auspices of a Federal agency process. The FPPA does not authorize the Federal government to affect the property rights of private landowners or regulate the use of private land.

### 3.6.2.1 Crow Lake Alternative

The NRCS Soil Survey Geographic (SSURGO) Database (NRCS 2009) identifies 912 acres of prime farmland and 20,027 acres of farmland of statewide importance within the Crow Lake Alternative. Post-construction facilities at the Crow Lake Alternative would cover less than two acres of prime farmland and less than 100 acres of farmland of statewide importance.

### 3.6.2.2 Winner Alternative

The SSURGO Database (NRCS 2009) identifies 132 acres of prime farmland and 10,930 acres of farmland of statewide importance within the Winner Alternative. Post-construction facilities at the Winner Alternative would cover less than one acre of prime farmland and less than 60 acres of farmland of statewide importance.

## 3.6.3 CONSERVATION EASEMENTS

Areas within the site alternatives include lands that are encumbered by perpetual easements administered by the USFWS for conservation. The USFWS has been purchasing conservation easements in the prairie pothole region since 1958 as an approach to waterfowl habitat management. These conservation easements are minimally restrictive instruments that grant the USFWS the ability to protect the grassland and wetland habitat on the properties where these easements are recorded. Easements are administered as part of the National Wildlife Refuge System, acquired as an alternative to fee-title acquisition and intended to perpetually protect grasslands and wetlands to benefit migratory birds and other wildlife.

#### 3.6.3.1 Crow Lake Alternative

USFWS conservation easements within the Crow Lake Alternative boundary include 2,836 acres of Wetland Easement and 1,629 acres of Grassland Easement. The areas preserved account for 12 percent of the site in total, and are scattered throughout, as depicted in **Figure 3.4-2**. The conservation easements are further discussed in **Section 3.4**.

#### 3.6.3.2 Winner Alternative

USFWS conservation easements within the Winner Alternative boundary include one 220-acre parcel identified as Grassland Easement west of the City of Colome, as depicted in **Figure 3.4-4**. This parcel amounts to 0.26 percent of the area included in the site. The conservation easements are further discussed in **Section 3.4**.

### 3.6.4 RESIDENTIAL USE

#### 3.6.4.1 Crow Lake Alternative

The Crow Lake Alternative contains a total of 27 residences; each within a farmstead property, and may be occupied permanently, seasonally or for recreational/hunting purposes. The total farmstead acreage constitutes less than one percent of the acreage of the site. No residences are within 1,000 feet of the proposed turbine locations. The closest residence is approximately 1,270 feet away from a proposed turbine. The closest residence to the proposed transmission line right-of-way would be located approximately 1,900 feet away. The nearest residence to the proposed collector substation would be located approximately 6,700 feet away. The nearest residence to Western's existing Wessington Springs Substation is 1,500 feet away.

#### 3.6.4.2 Winner Alternative

The Winner Alternative contains a total of 127 residences; each included within a farmstead property, and may be occupied permanently, seasonally or for recreational/hunting purposes. The total farmstead acreage constitutes less than 1.6 percent of the acreage of the site. One residence is located within 1,000 feet of a proposed turbine location, at a distance of approximately 800 feet. All other residences are located more than 1,000 feet from proposed turbine locations. The closest residence to a proposed transmission line is 100 feet away from the proposed transmission corridor centerline. The closest residence to an alternative transmission line is 900 feet away from the alternative transmission corridor centerline. The nearest residence to the proposed collector substation would be located approximately 1,400 feet away. The nearest residence to Western's existing Winner Substation is 300 feet away.

### 3.6.5 RECREATION

Recreational opportunities in the vicinity of each of the site alternatives are the same. According to the South Dakota Division of Parks and Recreation (SDDPR) many outdoor recreation activities are available to the public within the State (*i.e.*, fishing, camping, off-highway vehicle use, Lewis and Clark exploration activities); these activities include a wide range of options depending on the time of year and specific interest. Hunting in South Dakota is a popular recreational activity that can be experienced year-round, on nearly five million acres of public land (SDDPR 2009), and is popular within the alternatives.

Pheasant and other upland game hunting, waterfowl hunting, small game, and deer hunting seasons all open in the fall. Late season deer and predator hunting occur during the winter months. In the spring, hunters can participate in turkey and light goose seasons. In the off-season, prairie dog hunting and other varmint hunting are permitted on private land (with permission).

# 3.7 TRANSPORTATION

The ROI for roads and highways includes existing and proposed roads near the site alternatives that would be used for delivery of construction equipment, construction worker access and maintenance access. The ROI for aviation includes airports within 20 miles.

## 3.7.1 ROADS AND HIGHWAYS

This section includes an evaluation of current road conditions and aviation activities near the site alternatives. Information used to develop this section includes regional transportation planning documents from SDDOT.

**Table 3.7-1** provides a brief inventory of the status and trends of the regional road infrastructure for each of the site alternatives.

**Table 3.7-1 Regional Roadways**

| Roadway | Lane Count / Surface Type | Aurora County | Brule County | Jerauld County | Tripp County |
|---|---|---|---|---|---|
| **Crow Lake Alternative** | | | | | |
| Interstate 90 | Four-lane / paved | X | X | | |
| State Route 34 | Two-lane / paved | | | X | |
| State Route 42 | Two-lane / paved | X | | | |
| State Route 45 | Two-lane / paved | | X | | |
| State Route 50 | Two-lane / paved | | X | | |
| State Route 224 | Two-lane / paved | | | X | |
| U.S. Highway 281 | Two-lane / paved | X | | X | |
| County Road 11 | Two-lane / paved | X | | X | |
| **Winner Alternative** | | | | | |
| State Route 44 | | | | | X |
| State Route 49 | Two-lane / paved | | | | X |
| State Route 53 | | | | | X |
| U.S. Highway 18 | | | | | X |
| U.S. Highway 183 | Two-lane / paved | | | | X |

### 3.7.1.1 Crow Lake Alternative

County and township (section line) roads characterize the existing roadway infrastructure in and around the Crow Lake Alternative. The site is crossed and accessible by County Road (CR) 11. CR11 is a two-lane paved roadway intersecting Interstate 90 (I-90) to the south, and State Route (SR) 34 to the north. The general alignment of this road is straight and flat. No average daily traffic (ADT) counts are available for CR11. According to the latest available SDDOT 2009 ADT counts, the following list provides the ADT for the major roads that cross or are near the Crow Lake Alternative (**Figure 3.7-1**):

- I-90, south of the Crow Lake Alternative: average of greater than 2,500 ADT
- SR45, west of the Crow Lake Alternative: average of 401 to 1,025 ADT
- SR34, north of the Crow Lake Alternative: average of 401 to 1,025 ADT
- U.S. Highway (US) 281, east of the Crow Lake Alternative: average of 551 to 1,500 ADT

#### 3.7.1.2 Winner Alternative

The Winner Alternative is crossed or accessible via SR44, SR49, SR53, US183 and US18. In addition, I-90 is located to the north of Tripp County, and SR47 is located to the east of Tripp County. The highways are mostly two-lane paved roadways, with general linear alignments, and collectively extend in multiple directions for access to the site (**Figure 3.7-2**).

According to the latest available ADT (SDDOT 2008), the following list provides the ADT for the major roads crossing or near the Winner Alternative:

- SR44, north of the Winner Alternative: of 960 to 1460 ADT
- SR49, northeast of the Winner Alternative: of 401 to 1,025 ADT
- SR53, west of the Winner Alternative: of 0 to 250 ADT
- US183, crossing the Winner Alternative in an north / south direction: of 125.5 to 400 ADT
- US18, northeast of the Winner Alternative: of 1,501 to 2,500 ADT

### 3.7.2 AVIATION

#### 3.7.2.1 Crow Lake Alternative

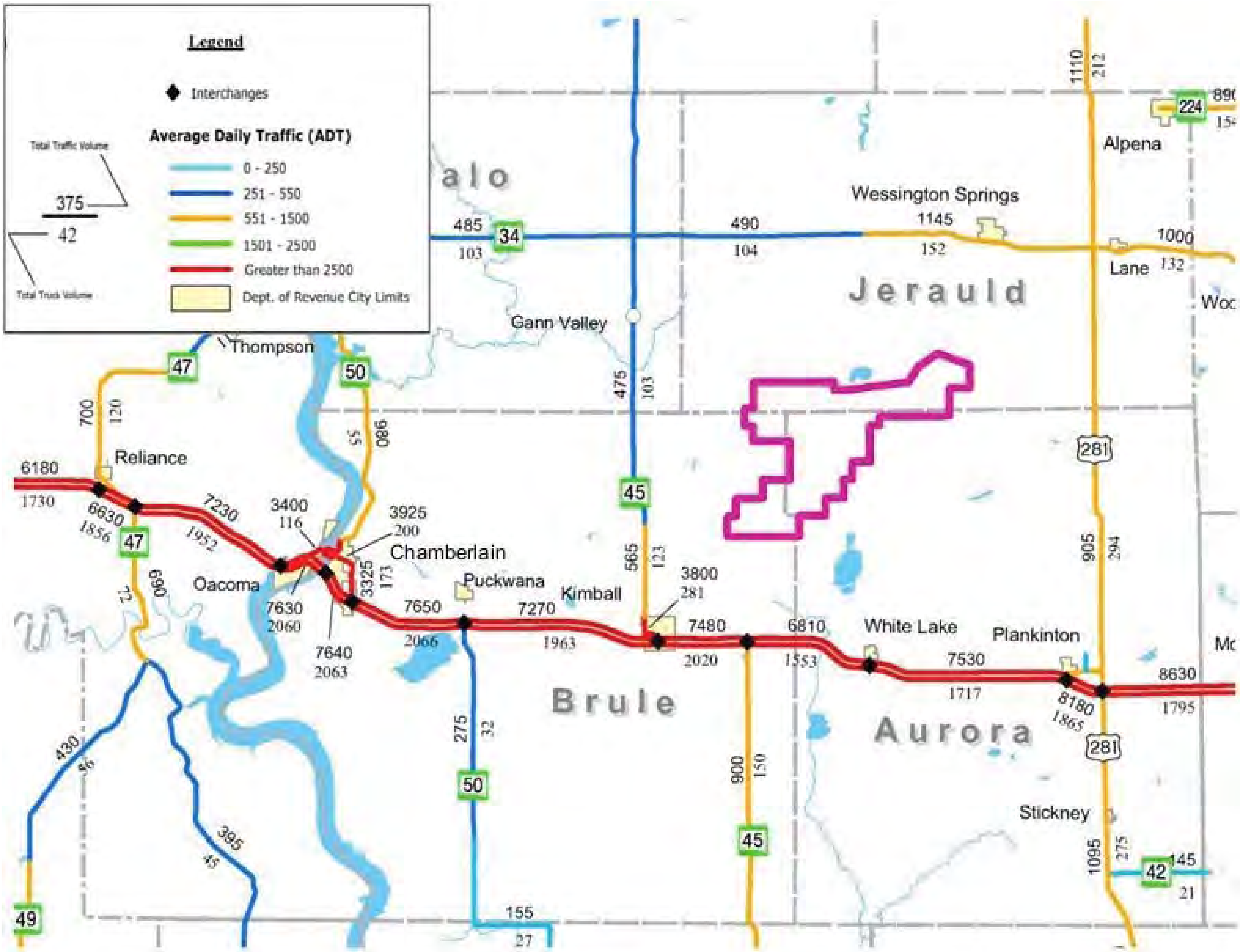
Three airports are within 20 miles of the Crow Lake Alternative. The Wessington Springs Airport and Kimball Municipal Airport are municipal airports serving the local communities, with less than 300 takeoffs/landings per year each (SDDOT Aeronautics 2007). Drake Farm is a farm airfield used for local agricultural purposes (annual reporting of takeoffs/landings was unavailable for this airfield).

- Wessington Springs Airport: Public airport near the Town of Wessington Springs, approximately eight miles from the site
- Kimball Municipal Airport: Public airport near the City of Kimball, approximately seven miles from the site
- Drake Farm: Private airport used primarily for agricultural purposes near the City of White Lake, approximately nine miles from the site

### 3.7.2.2 Winner Alternative

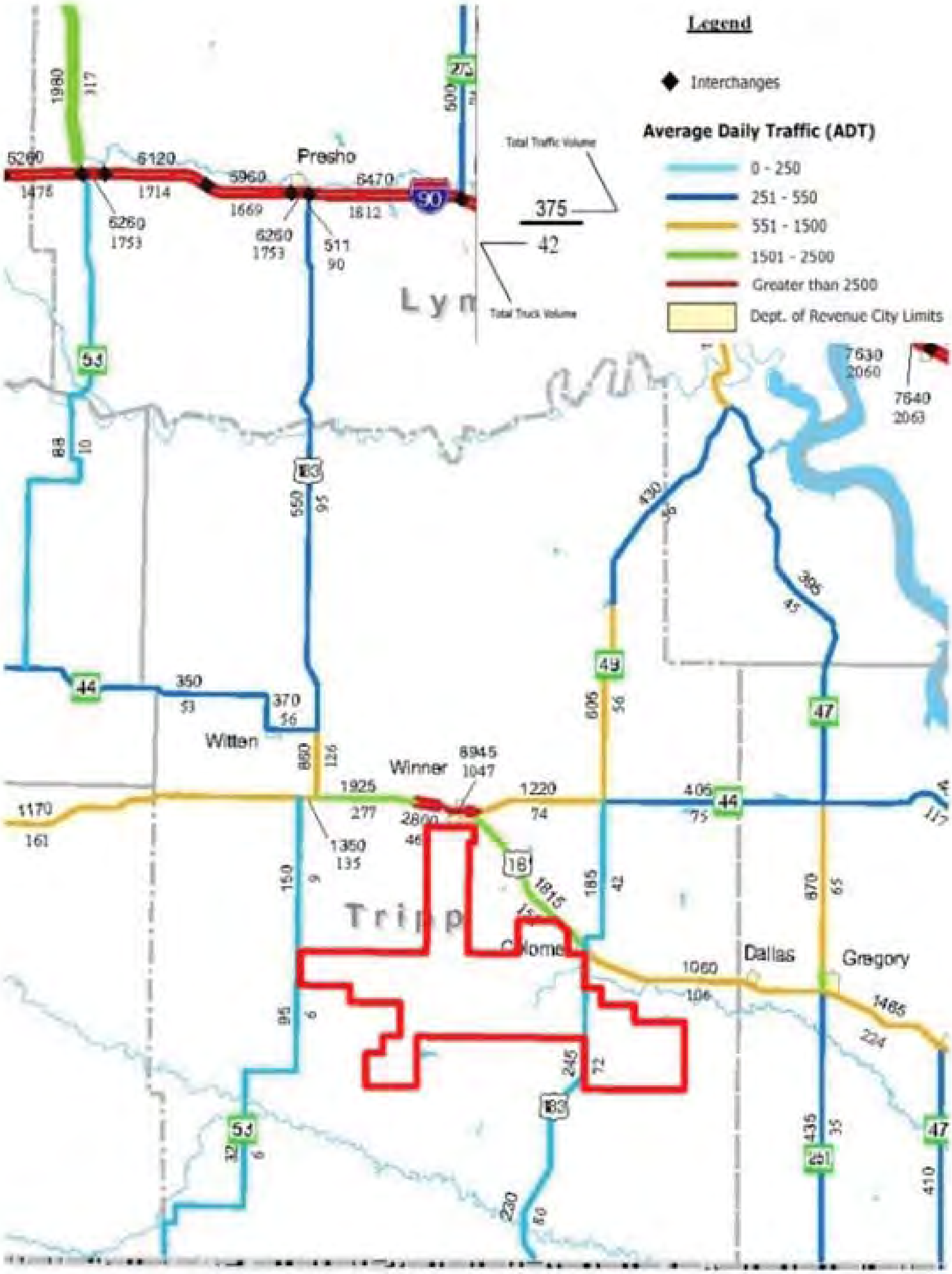
Two airports and one helipad are within 20 miles of the Winner Alternative. The Winner Regional Airport is used for takeoffs/landings over 20,000 times per year, with nearly half of that being local traffic staying within 20 miles; and the Gregory Municipal Airport is less heavily used at 6,500 takeoffs/landings per year, nearly a third of which is local traffic (SDDOT Aeronautics 2009).

- Winner Regional Airport: Public airport near the City of Winner, approximately two miles from the site
- Gregory Municipal Airport, Flynn Field: Public airport near the City of Gregory, approximately nine miles from the site
- Burke Hospital Helipad: Private Helipad used for hospital emergency rescue services, near the City of Burke, approximately 16 miles from the site




Source: SDDOT 2008

**Figure 3.7-1 Crow Lake Alternative Traffic Flow Map**




Source: SDDOT 2008

**Figure 3.7-2 Winner Alternative Traffic Flow Map**

# 3.8 VISUAL RESOURCES

This section evaluates the existing visual setting in the vicinity of the alternatives. The ROI includes areas within and adjacent to the Proposed Project area from which a person may observe changes to the visual landscape resulting from development of the Proposed Project Components. These areas include residences within the alternative site boundaries, nearby population centers and nearby roadways.

## 3.8.1 EXISTING VISUAL SETTING

The following aesthetic values were considered when evaluating the visual setting of the existing landscape:

- Form: topographic variation, mountains and valleys
- Line and pattern: roads and transmission lines
- Color and contrast: brightness and diversity
- Texture: vegetation, buildings and disturbed areas

### 3.8.1.1 Crow Lake Alternative

Topography of the Crow Lake Alternative is characterized by gently rolling hills with low to moderate relief. Elevation ranges from approximately 1,985 to 2,510 feet AMSL. Mixed-grass prairie (including rangeland, pastureland and CRP/prairie) dominates the vegetation. Additional vegetation includes cropland, wetlands (including stock ponds), farmsteads and patches of deciduous trees (mostly shelterbelts) (Tierra EC 2009). Overall, the Crow Lake Alternative is rural in character. The predominant land uses include livestock grazing, farming, sparse farmstead residential development, fencing and a rural road network consisting of paved roads, gravel roads and two-track roads developed primarily on portions of section lines. In addition, the existing Wessington Springs Wind Project, a 51 MW wind energy generating facility, is located adjacent to the northeast edge of the Crow Lake Alternative.

There are 27 farmstead residences located within the boundaries of the Crow Lake Alternative. The Town of Crow Lake is within one mile of the site alternative boundary and had a population of 46 at the time of the 2000 census. Kimball, Wessington Springs and White Lake are the only other population centers located within seven to nine miles of the Crow Lake Alternative.

Roadways described in **Section 3.7.3** from which the area may be viewed include I-90, SR45 and SR50 (see **Figure 3.7-1**). A portion of SR50 has been designated as the Native American Scenic Byway. The Native American Scenic Byway extends approximately 357 miles between North Dakota and South Dakota and provides memorial markers, monuments, museums and sacred sites that commemorate the heritage of the Sioux Nation. Portions of I-90 and SR50 are included in the Lewis and Clark National Historic Trail (NHT) auto tour route. The Lewis and Clark NHT is administered by National Park Service (NPS). The Lewis and Clark NHT auto tour route is a network of roads that generally tracks the Lewis and Clark NHT along the Missouri River and provides vistas as well as historic markers. The Lewis and Clark NHT extends more than 3,700 miles and includes the entire Missouri River from its headwaters in Montana to its confluence with the Mississippi River near St. Louis, Missouri. Under the National Trail System Act and the

Organic Act, NPS is charged with preservation of natural scenes and landscapes for enjoyment by future generations.

#### 3.8.1.2 Winner Alternative

The rolling plains of the Winner Alternative include elevation ranges from approximately 1,644 to 1,985 feet AMSL. Mixed-grass prairie (including rangeland, pastureland and CRP/prairie) dominate the vegetation. Additional vegetation includes cropland, wetlands (including herbaceous wetlands, forested wetlands, stock ponds and lakes), deciduous forests, farmsteads and shelterbelts (Tierra EC 2009). Overall, the Winner Alternative is rural in character. The predominant land uses include livestock grazing, farming, sparse farmstead residential development, fencing and a rural road network consisting of paved roads, gravel roads and two-track roads developed primarily on portions of section lines.

There are 127 farmstead residences within the boundaries of the Winner Alternative. The towns of Winner and Colome are within one mile of the project boundary and had a population of 3,137 and 333, respectively, at the time of the 2000 census. Clearfield, Dallas and Gregory are the population centers within three to nine miles of the Winner Alternative.

Roadways described in **Section 3.7.3** from which the area may be viewed include I-90, SR44, SR47 and US18 (see **Figure 3.7-2**). In the vicinity of the Winner Alternative, portions of SR44 and US18 are included in the Lewis and Clark NHT auto tour route .

### 3.8.2 KEY OBSERVATION POINTS

Key observation points (KOPs) were selected to depict the general visual setting of each of the alternatives and provide a baseline for developing visual simulations (presented in **Section 4.8**). Based on public input received during the EIS scoping process, local (*i.e.*, residents within and near the alternative site boundaries) sensitivity to visual changes as a result of the Proposed Project is low. Therefore, KOPs were selected for each of the alternatives based on topography and the potential to view the Proposed Project Components from the Lewis and Clark NHT auto tour route  and associated interpretive center. The foreground (area within three to five miles) and background (area further than three to five miles) are described for each KOP. **Figure 3.8-1** depicts the locations of the KOPs in relation to the alternatives and Lewis and Clark NHT auto tour route.

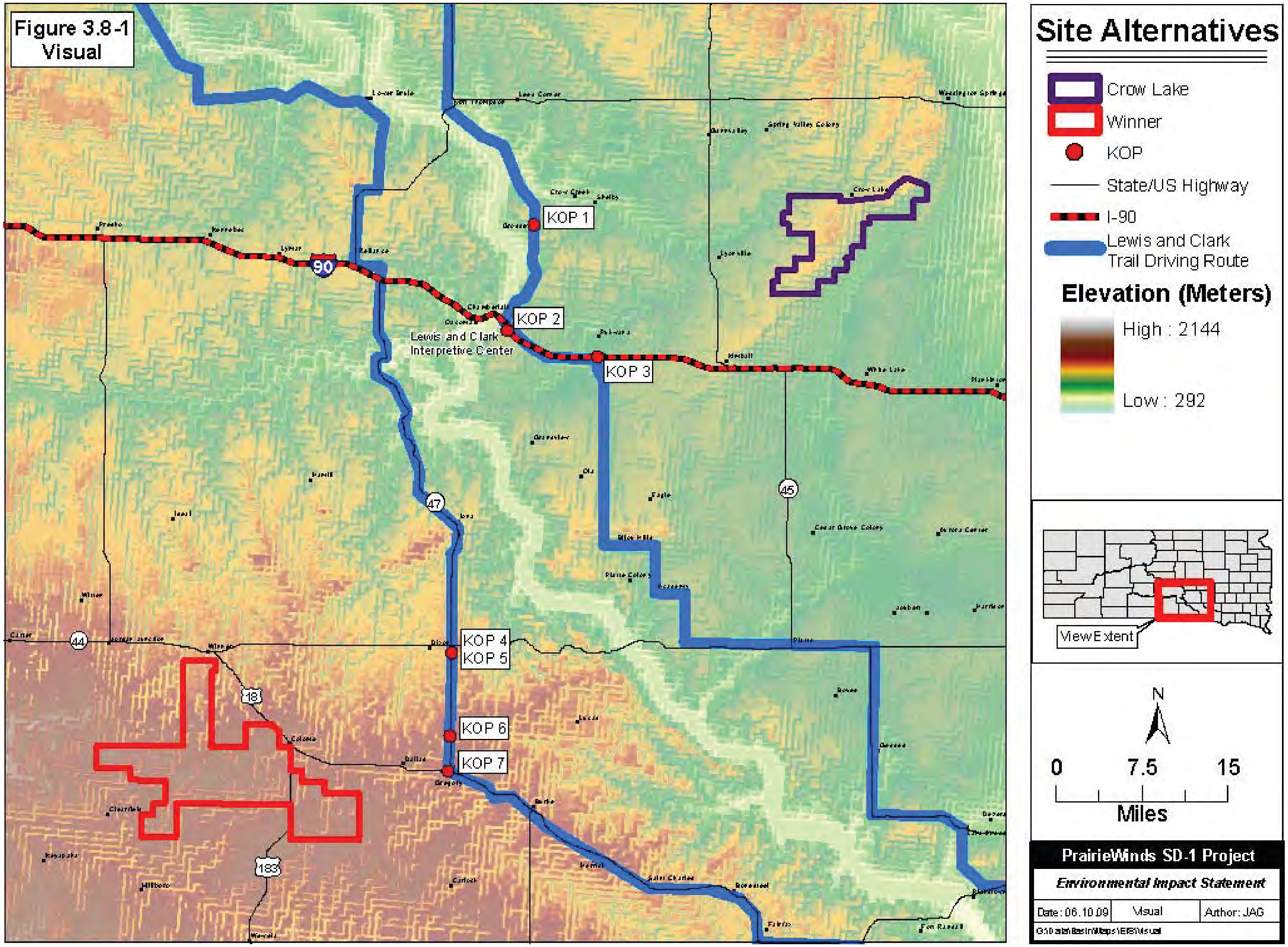



Figure 3.8-1 Key Observation Points

### 3.8.2.1 Crow Lake Alternative

Three KOPs were identified for the Crow Lake Alternative. KOP 1 was identified as one of the areas with the highest elevation along SR50 that could provide a view of the Proposed Project to users of the Lewis and Clark NHT auto tour route . KOP 1 is approximately 22 miles west of the Crow Lake Alternative and is located near Grosse, South Dakota. This KOP is representative of the Crow Lake Alternative and regional area. **Figure 3.8-2** below represents the existing visual condition from KOP 1; the view is to the east. The foreground includes property fencing, gravel road, mixed grasses, individual trees and agriculture. The background includes the gravel road, mixed grasses and a shelter belt (*i.e.*, trees planted in a row to create a wind and/or snow break). An existing transmission line is visible on the horizon.


**Figure 3.8-2 KOP 1 Existing Condition**

KOP 2 is the Lewis and Clark Interpretive Center (LCIC), located in the Chamberlain Rest Area on I-90 between exits 263 and 265. The LCIC is approximately 24 miles west of the closest point of the Crow Lake Alternative. KOP 2 depicts the view to the northeast from the LCIC. **Figure 3.8-3** below shows the existing visual condition from KOP 2. The foreground includes mixed grasses, I-90, shrubs, trees, billboards and two buildings. The background includes mixed grasses, shrubs and trees. One building, one communication tower and stadium lights are visible on the horizon.


**Figure 3.8-3 KOP 2 Existing Condition**

KOP 3 is the view northeast from near the intersection of I-90 and SR50, where the Lewis and Clark NHT auto tour route is at its closest point (17 miles) to the Crow Lake Alternative. **Figure 3.8-4** below shows the existing condition from KOP 3. The foreground includes I-90 and grasses. The background includes grasses and trees. An existing transmission line is visible on the horizon.

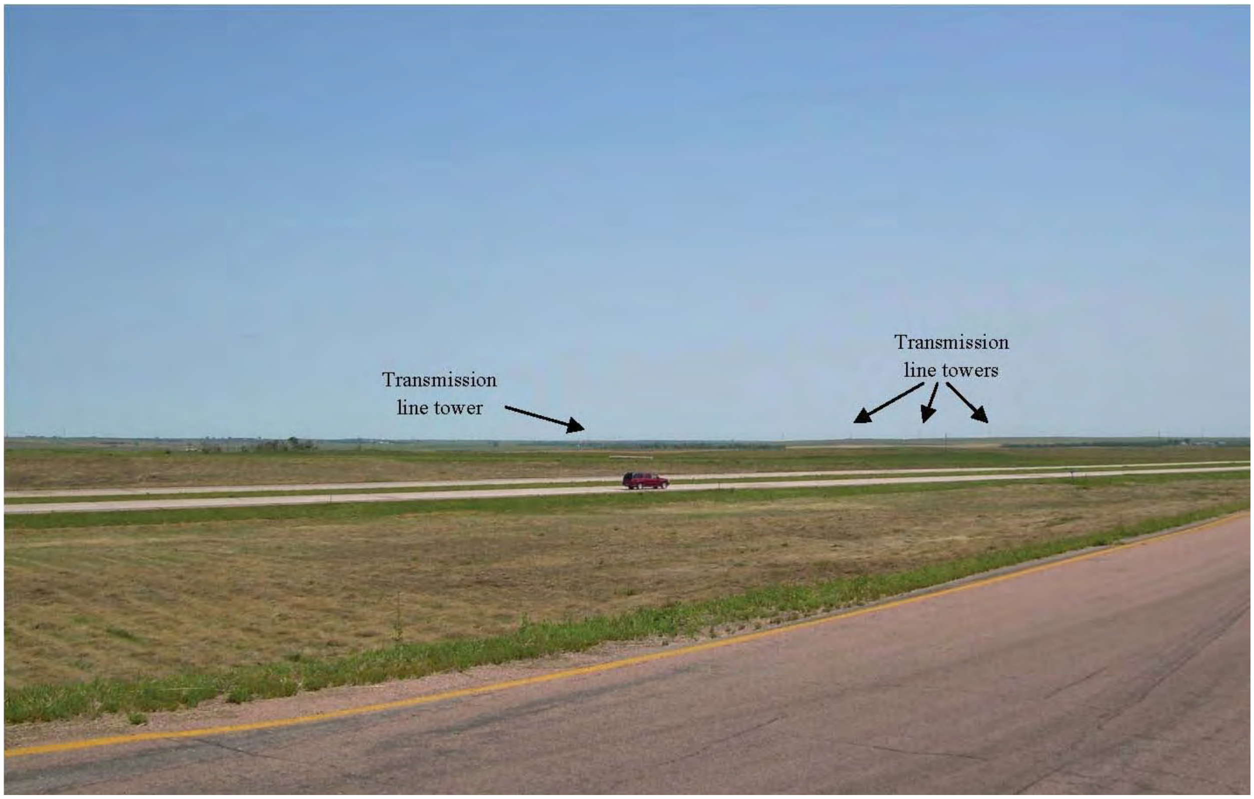



**Figure 3.8-4 KOP 3 Existing Condition**

### 3.8.2.2 Winner Alternative

Four KOPs were identified for the Winner Alternative and are representative of the site and surrounding area. KOPs 4 and 5 provide two views from near the intersection of SR44 and SR47. The closest point of the Winner Alternative is approximately 15 miles from KOP 4 and KOP 5. Two views are provided from this location because the location of the site boundary is irregular and the view when facing west is farther from Proposed Project Components when compared with the view when facing southwest. KOP 4 is the view to the west and is farther from Proposed Project Components as compared to KOP 5, which is the view to the southwest.

KOP 4 represents the view to the west. **Figure 3.8-5** below shows the existing condition from KOP 4. The foreground includes SR47, property fencing, mixed grasses, sparse trees and a telephone line. The background includes mixed grasses, agriculture, a shelter belt and sparse buildings.

**Figure 3.8-5 KOP 4 Existing Condition**

KOP 5 is the view to the southwest. **Figure 3.8-6** below shows the existing condition from KOP 5. The foreground includes SR47, property fencing, hay bales, agriculture, mixed grasses and sparse trees. The background includes mixed grasses, agriculture and hay bales.

**Figure 3.8-6 KOP 5 Existing Condition**

KOP 6 was identified as one of the areas with the highest elevation along SR47 that could provide a view of the Proposed Project to users of the Lewis and Clark NHT auto tour route . KOP 6 is approximately 9.6 miles east of the Winner Alternative boundary; the view is to the west. **Figure 3.8-7** below shows the existing condition from KOP 6. The foreground includes SR47, property fencing, agriculture, mixed grasses and sparse shrubs and trees and a stock pond. The background includes mixed grasses, agriculture and farmstead properties.

**Figure 3.8-7 KOP 6 Existing Condition**

KOP 7 is near the intersection of US18 and SR47, which is located near Gregory, South Dakota. KOP 7 is the nearest point of the Lewis and Clark NHT auto tour route to the Winner Alternative and is approximately eight miles east of the Winner Alternative boundary. **Figure 3.8-8** below shows the existing condition from KOP 7; the view is to the west. The foreground includes US18, property fencing, agriculture, mixed grasses and sparse trees. The background includes mixed grasses, agriculture and shelter belts. A water tower is visible on the horizon.


**Figure 3.8-8 KOP 7 Existing Condition**

# 3.9 NOISE

This section describes the basic measurements used for sound, applicable noise recommendations, and existing sources of noise within the Crow Lake and Winner alternative areas.

## 3.9.1 FUNDAMENTALS OF SOUND

Noise is defined generally as unpleasant, unexpected or undesired sound that disrupts or interferes with normal human activities. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to noise is annoyance. An individual's response to noise is influenced by the type of noise, perceived importance of the noise, appropriateness in the setting, time of day, type of activity during which the noise occurs and the sensitivity of the individual.

Intensity of sound is measured in units of decibels (dB) on a logarithmic scale. The A-weighted decibel (dBA) measures sound in a manner similar to the response of the human ear, so that more weight is given to the frequencies that people hear more easily. Typical ranges of common sounds include approximately 60 to 90 dBA for an automobile at a distance of 50 feet, approximately 76 to 89 dBA for a heavy truck at a distance of 50 feet, approximately 80 to 110 dBA for the driver of a motorcycle and approximately 103 to 115 dBA for the operator of a chainsaw (EPA 1979).

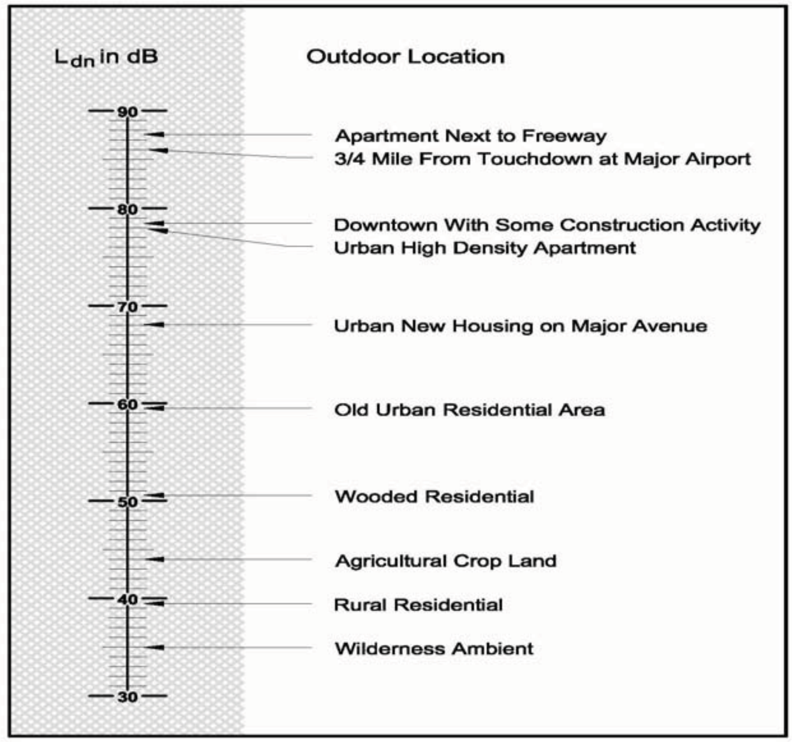
The $L_{dn}$ is the A-weighted average sound level for a 24-hour period. It is calculated by adding a 10 dB "penalty" to sound levels in the night (10 p.m. to 7 a.m.) to compensate for the increased sensitivity to noise during the quieter evening and nighttime hours. Sound levels typical of outdoor areas using the $L_{dn}$ are listed in **Figure 3.9-1**.

## 3.9.2 APPLICABLE RECOMMENDATIONS

In 1974, the EPA established recommendations to help protect public health and welfare. The EPA identified outdoor $L_{dn}$ levels equal to or less than 55 dBA to prevent activity interference and annoyance (EPA 1974). When annual averages of the daily level are considered over a period of 40 years, the EPA identified average noise levels equal to or less than 70 dBA as the level of environmental noise that will prevent any measurable hearing loss over the course of a lifetime. The EPA-identified levels are recommended guidelines, not regulations. There are no noise codes applicable to wind projects in South Dakota (Reindle 2009c; Steele 2009; Westindorf 2009c).

## 3.9.3 EXISTING NOISE SOURCES AND SENSITIVE RECEPTORS

Existing sources of noise are similar for both the Crow Lake Alternative and the Winner Alternative; as such, the following discussion applies to both areas.




Source: EPA 1979.

**Figure 3.9-1 Typical Sound Levels**

The site alternatives are located in rural areas, composed primarily of agricultural land use and prairie. The primary sources of noise include agricultural activity (farming equipment), recreation (primarily hunting), wind and vehicles traveling on county roads and low-traffic gravel roads. Based on **Figure 3.9-1**, typical day-night average outdoor noise levels for rural residential and agricultural areas range from 39 dBA to 44 dBA.

Sensitive noise receptors (*e.g.*, residences, schools, hospitals and offices) include sparse residences within the alternatives. The ROI for noise includes residences located within the site alternatives and residences adjacent to proposed Federal action areas.

### 3.9.3.1 Crow Lake Alternative

Twenty-seven residences were identified within the Crow Lake Alternative. The nearest residence to a proposed turbine location would be located approximately 1,270 feet away. The nearest residence to the proposed transmission corridor centerline would be located approximately 1,900 feet away. The nearest residence to the proposed collector substation would be located approximately 6,700 feet away. The nearest residence to Western's Wessington Springs Substation is 1,500 feet away.

### 3.9.3.2 Winner Alternative

One-hundred and 27 residences were identified within the Winner Alternative. The nearest residence to a proposed turbine location would be located approximately 800 feet away. The nearest residence to the proposed transmission corridor would be located approximately 100 feet away from the proposed transmission corridor. The nearest residence to the proposed collector substation would be located approximately 1,400 feet away. The nearest residence to Western's Winner Substation is 300 feet away.

# 3.10 SOCIOECONOMICS

## 3.10.1 POPULATION TRENDS AND DEMOGRAPHIC CHARACTERISTICS

The socioeconomic analysis for this FEIS evaluated only the counties in which the site alternatives are located. While economic effects could occur to additional counties and regions of the U.S., depending on where the specific Proposed Project Components are manufactured, these effects are impossible to determine at this time. For this reason, the ROI for the Crow Lake Alternative is limited to Aurora, Brule and Jerauld counties. The ROI for the Winner Alternative is limited to Tripp County. This section describes the population demographics within the ROI.

Socioeconomic indicators include characteristic demographics, income levels, employment opportunities and quality of life. These are issues that may be affected by construction and operation of the Proposed Project and Wind Partners' proposed development.

The U.S. Census Bureau, South Dakota Department of Labor (SDDL) and other online databases were used to obtain information on population trends and demographics, housing, education, available community services, income data and employment rates.

### 3.10.1.1 Crow Lake Alternative

**Tables 3.10-1 and 3.10-2** below provide a brief inventory of the status and trends of some of the resources that are used as the basis for assessing socioeconomic impacts for the Crow Lake Alternative. Population trends and demographic data were used to set the regional context for the socioeconomic analysis.

The population in the vicinity of the Crow Lake Alternative is small compared to the overall population within South Dakota or the U.S. as a whole.

The nearest population centers to the Crow Lake Alternative area are White Lake, approximately 15 miles south with a 2008 population of 378, and Wessington Springs, approximately 17 miles northeast with a 2008 population of 846. These towns have services including hotels, restaurants and public schools; there is a hospital in Wessington Springs. The largest city near the Crow

**Table 3.10-1 Crow Lake Alternative Population**

| Year | Description | United States | South Dakota | Aurora County | Brule County | Jerauld County |
|---|---|---|---|---|---|---|
| Population | | | | | | |
| 2008 | Total population estimates | 304,059,724 | 804,194 | 2,867 | 5,205 | 1,982 |
| 2000 | Total population estimates | 281,421,906 | 755,657 | 3,060 | 5,351 | 2,279 |
| 2008 | Population in two largest cities | Aurora County: Plankinton-569, White Lake- 378<br>Brule County: Chamberlain –2,264, Kimball – 692<br>Jerauld County: Wessington Springs – 846, Alpena – 225 | | | | |
| 2000 | Population in two largest cities | Aurora County: Plankinton-601, White Lake- 405<br>Brule County: Chamberlain – 2338, Kimball – 745<br>Jerauld Count: Wessington Springs – 1011, Alpena – 265 | | | | |

Source Data: U.S. Census 2008

**Table 3.10-2 Crow Lake Alternative Age and Gender Demographics**

| Year | Description | South Dakota | Aurora County | Brule County | Jerauld County | Source Data* |
|---|---|---|---|---|---|---|
| 2008 | Total population estimates | 804,194 | 2,867 | 5,205 | 1,982 | 1 |
| Age | | | | | | |
| 2006 | Under 5 years | 52,218 | 158 | 307 | 105 | 2 |
| 2006 | 5 to 13 years | 90,502 | 336 | 701 | 162 | 2 |
| 2006 | 14 to 17 years | 45,550 | 254 | 398 | 115 | 2 |
| 2006 | 18 to 24 years | 86,114 | 223 | 464 | 162 | 2 |
| 2006 | 15 to 44 years | 319,559 | 993 | 1,892 | 668 | 2 |
| 2006 | 45 to 64 years | 192,194 | 750 | 1,319 | 627 | 2 |
| 2006 | 65 years and over | 110,530 | 612 | 885 | 553 | 2 |
| Sex | | | | | | |
| 2006 | Male | 385,620 | 1,494 | 2,474 | 1,065 | 2 |
| 2006 | Female | 390,313 | 1,407 | 2,713 | 1,071 | 2 |

*Source Data: 1 = U.S. Census 2008, 2 = U.S. Census 2006

Lake Alternative is Chamberlain, approximately 23 miles away with a 2008 population of 2,264; additional community populations are provided in the table for comparison.

## 3.10.1.2 Winner Alternative

**Tables 3.10-3 and 3.10-4** provide a brief inventory of the status and trends of some of the resources that are used as the basis for assessing the socioeconomic impacts for the Winner Alternative. Population trends and demographic data were used to set the regional context for the socioeconomic analysis.

The population in the vicinity of the Winner Alternative is small compared to the overall population within South Dakota and the U.S. as a whole, with slightly more females than males.

The nearest cities to the Proposed Project area are Winner, directly north approximately 8 miles, with a 2008 population of 2,744; and Colome, approximately 11 miles southeast, with a 2008 population of 291. These cities have services including hotels, restaurants and public schools; there is a hospital in Winner.

**Table 3.10-3 Winner Alternative Population**

| Year | Description | United States | South Dakota | Tripp County |
|---|---|---|---|---|
| Population | | | | |
| 2008 | Total population estimates | 304,059,724 | 804,194 | 5,681 |
| 2000 | Total population estimates | 281,421,906 | 755,657 | 6,386 |
| 2008 | Population Top Two Largest Cities | Colome-291, Winner-2,744 | | |
| 2000 | Population Top Two Largest Cities | Colome-340, Winner-3,137 | | |

Source Data: U.S. Census 2008

**Table 3.10-4 Winner Alternative Age and Gender Demographics**

| Year | Description | South Dakota | Tripp County |
|---|---|---|---|
| 2008 | Total population estimates | 804,194 | 5,681 |
| Age | | | |
| 2006 | Under 5 years | 52,218 | 318 |
| 2006 | 5 to 13 years | 90,502 | 718 |
| 2006 | 14 to 17 years | 45,550 | 393 |
| 2006 | 18 to 24 years | 86,114 | 530 |
| 2006 | 15 to 44 years | 319,559 | 2,092 |
| 2006 | 45 to 64 years | 192,194 | 1,587 |
| 2006 | 65 years and over | 110,530 | 1,247 |
| Sex | | | |
| 2006 | Male | 385,620 | 2,964 |
| 2006 | Female | 390,313 | 3,101 |

Source Data: U.S. Census 2006

## 3.10.2 ECONOMIC RESOURCES

### 3.10.2.1 Crow Lake Alternative

**Tables 3.10-5 and 3.10-6** provide a brief inventory of the economic resources within the Crow Lake Alternative. The median income for households in South Dakota increased between 2000 and 2005, as well as for each of the counties to be crossed by the Crow Lake Alternative . This increase ranged from 8 percent in Jerauld County to 21 percent in Aurora County.

The economy of Aurora, Brule and Jerauld counties is comprised of multiple sectors and industries. A significant portion of jobs (15.8 percent to 24 percent) come from agriculture, forestry, fishing and hunting industries. In 2007, the unemployment rate in Aurora County, at 4.3 percent, was the highest of the three counties.

## Table 3.10-5 Crow Lake Alternative Income

| Year | Description | South Dakota | Aurora County | Brule County | Jerauld County | Source Data |
|---|---|---|---|---|---|---|
| 2000 | Total population estimates | 755,657 | 3,060 | 5,351 | 2,279 | 1 |
| 2000 | Median income in 1999 (dollars) for households | 35,282 | 29,783 | 32,370 | 30,690 | 4 |
| 2005 | Median income in 2005 (dollars) for households | 40,096 | 35,953 | 35,412 | 33,152 | 4 |
| 2000 | Median income in 1999 (dollars) for families | 43,237 | 37,227 | 37,361 | 36,076 | 4 |
| 2000 | Per Capita Income (dollars) | 17,562 | 13,887 | 14,874 | 16,856 | 4 |
| 2000 | Median earnings in 1999 of full-time, year-round male workers (dollars) | 29,677 | 25,786 | 26,698 | 24,583 | 4 |
| 2000 | Median earnings in 1999 of full-time, year-round female workers (dollars) | 21,520 | 21,250 | 20,094 | 17,500 | 4 |

*Source Data: 1 = U.S. Census 2008, 4 = U.S. Census 2009

## Table 3.10-6 Crow Lake Alternative Labor Force, Unemployment and Education

| Year | Description | South Dakota | Aurora County | Brule County | Jerauld County | Source Data* |
|---|---|---|---|---|---|---|
| 2000 | Total Population | 754,844 | 3,058 | 5,364 | 2,295 | 4 |
| Labor Force | | | | | | |
| 2000 | Population 16 years old and over, male and female combined labor force | N/A | 1,474 | 2,694 | 1,183 | 4 |
| 2009 | Population 16 years old and over, male and female combined Labor force | N/A | 1,540 | 2,890 | 1,570 | 4 |
| 2009 | Number of actually employed | N/A | 1,475 | 2,790 | 1,530 | 4 |
| Unemployment | | | | | | |
| 2000 | Population 16 years old and over, male and female combined unemployed | N/A | 27 | 183 | 29 | 4 |
| 2009 | Population 16 years old and over, male and female combined unemployed | N/A | 65 | 100 | 40 | 4 |
| 2007 | South Dakota Annual Average Unemployment Rates | N/A | 3.1% | 2.8% | 2.7% | 3 |
| % Distribution by Occupation | | | | | | |
| 2000 | Management, professional and related occupations | 32.6 | 39.7 | 40.5 | 35.4 | 4 |
| 2000 | Service Occupations | 15.6 | 17.2 | 18.2 | 15.0 | 4 |
| 2000 | Sales and Office Occupations | 26.5 | 17.7 | 22.0 | 19.8 | 4 |
| 2000 | Farming, fishing and forestry occupations | 1.9 | 4.0 | 2.8 | 4.8 | 4 |
| 2000 | Construction, extraction and maintenance occupations | 9.1 | 7.7 | 9.0 | 10.0 | 4 |
| 2000 | Production, transportation and material moving occupations | 14.2 | 13.7 | 7.4 | 15.0 | 4 |
| 2000 | % in Agriculture, forestry, fishing and hunting Industries | 7.7 | 24% | 15.8% | 22.6 | 4 |
| 2000 | % in Manufacturing Industry | 11.1 | 6.1% | 2.9% | 9.7 | 4 |
| 2000 | % Government Workers (local, State or Federal) | 15.3 | 15.1% | 14.2 % | 10.2 | 4 |
| Education (Persons 25 and older) | | | | | | |
| 2000 | High School graduate or higher (%) | 84.6 | 79.5 | 81.1 | 79.6 | 4 |
| 2000 | Bachelor's Degree or higher (%) | 21.5 | 12.7 | 20.6 | 12.3 | 4 |

*Source Data: 3 = SDDL 2009, 4 = U.S. Census 2009

### 3.10.2.2 Winner Alternative

**Tables 3.10-7 and 3.10-8** provide a brief inventory of the economic resources within Tripp County. The median income for households in Tripp County increased by 14 percent between 2000 and 2005. The economy of Tripp County consists of multiple sectors and industries. A significant portion of jobs (23.3 percent) come from agriculture, forestry, fishing and hunting industries. In 2007, the unemployment rate in Tripp County was 3.6 percent.

**Table 3.10-7 Winner Alternative Income**

| Year | Description | South Dakota | Tripp County | Source Data* |
|---|---|---|---|---|
| 2000 | Total population estimates | 755,657 | 6,386 | 1 |
| 2000 | Median income in 1999 (dollars) for households | 35,383 | 28,333 | 4 |
| 2005 | Median income in 2005 (dollars) for households | 40,096 | 32,334 | 4 |
| 2000 | Median income in 1999 (dollars) for families | 43,237 | 36,219 | 4 |
| 2000 | Per Capita Income (dollars) | 17,562 | 13,776 | 4 |
| 2000 | Median earnings in 1999 of full-time, year-round male workers (dollars) | 29,677 | 22,588 | 4 |
| 2000 | Median earnings in 1999 of full-time, year-round female workers (dollars) | 21,520 | 18,070 | 2 |

*Source Data: 1 = U.S. Census 2008, 2 = U.S. Census 2006, 4 = U.S. Census 2009

## Table 3.10-8 Winner Alternative Labor Force, Unemployment and Education

| Year | Description | South Dakota | Tripp County | Source Data* |
|---|---|---|---|---|
| 2000 | Total Population | 754,844 | 6,430 | 4 |
| Labor Force / Unemployment | | | | |
| 2000 | Population 16 years old and over, male and female combined labor force | N/A | 4,861 | 4 |
| 2009 | Population 16 years old and over, male and female combined Labor force | N/A | 2,995 | 4 |
| 2009 | Number of actually employed | N/A | 2,890 | 4 |
| Unemployment | | | | |
| 2000 | Population 16 years old and over, male and female combined unemployed | N/A | 133 | 4 |
| 2007 | South Dakota Annual Average Unemployment Rates | N/A | 3.1% | 3 |
| Employment Industry | | | | |
| 2000 | Management, professional and related occupations | 32.6 | 39.5 | 4 |
| 2000 | Service Occupations | 15.6 | 14.1 | 4 |
| 2000 | Sales and Office Occupations | 26.5 | 22.5 | 4 |
| 2000 | Farming, fishing and forestry occupations | 1.9 | 5.7 | 4 |
| 2000 | Construction, extraction and maintenance occupations | 9.1 | 8.9 | 4 |
| 2000 | Production, transportation and material moving occupations | 14.2 | 9.3 | 4 |
| 2000 | % in Agriculture, forestry, fishing and hunting Industries | 7.7 | 23.3 | 4 |
| 2000 | % in Manufacturing Industry | 11.1 | 1.1 | 4 |
| 2000 | % Government Workers (local, State or Federal) | 15.3 | 14.8 | 4 |
| Education (Persons 25 and older) | | | | |
| 2000 | High School graduate or higher (%) | 84.6 | 80.2 | 4 |
| 2000 | Bachelor’s Degree or higher ( percent) | 21.5 | 13.5 | 4 |

*Source Data: 1 = U.S. Census 2008, 3 = SDDL 2009, 4 = U.S. Census 2009

# 3.11 ENVIRONMENTAL JUSTICE

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, states that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations."

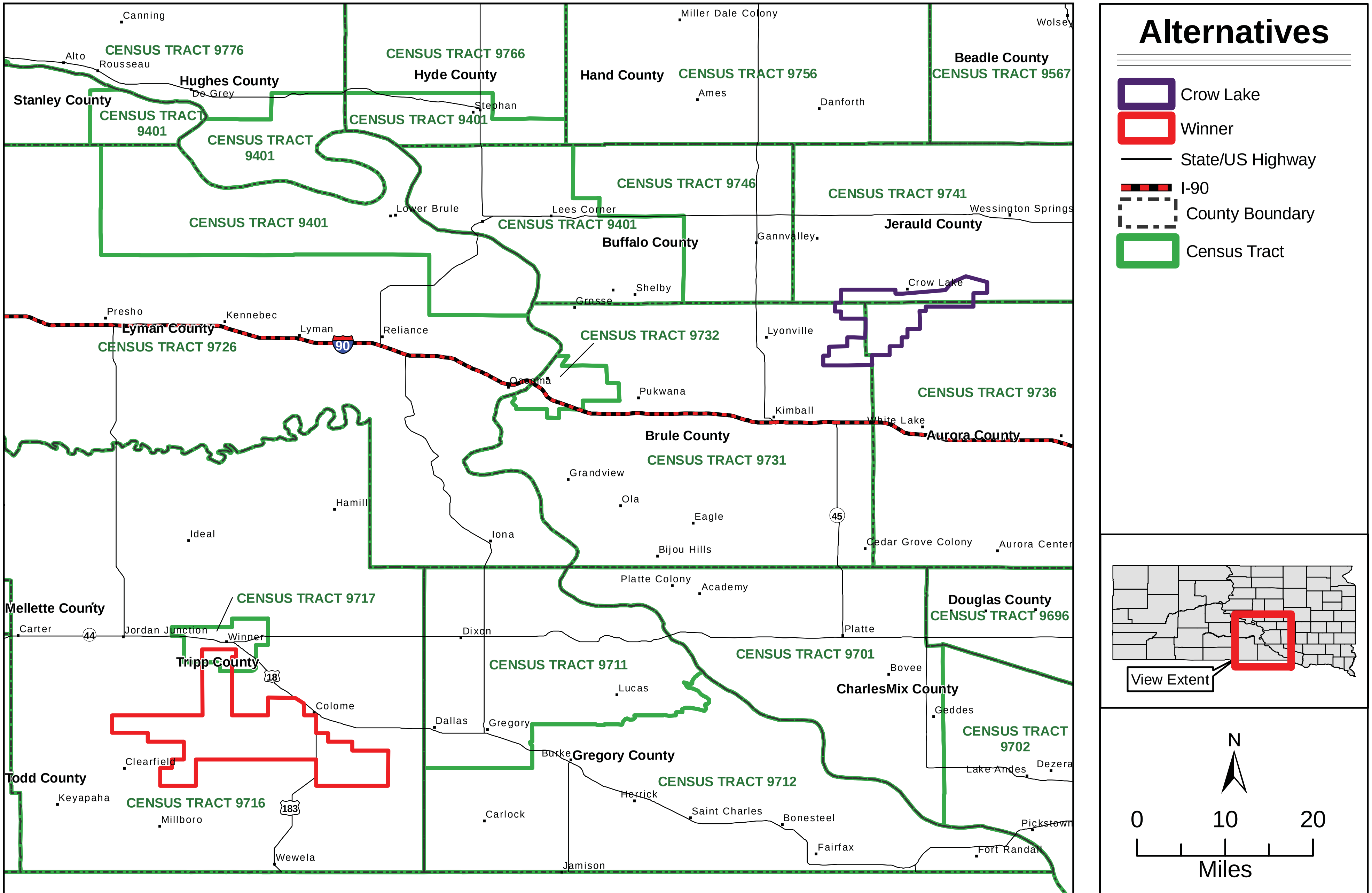
This section identifies existing minority populations, low-income populations and tribal communities, defined as follows:

**Minority:** Individual(s) who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.

**Minority population:** Minority populations are either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. In identifying minority communities, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a geographically dispersed/transient set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect. The selection of the appropriate unit of geographic analysis may be a governing body's jurisdiction, a neighborhood, census tract or other similar unit that is to be chosen so as to not artificially dilute or inflate the affected minority population. A minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds.

**Low-income population:** Low-income populations in an affected area are populations with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports on Income and Poverty. In identifying low-income populations, agencies may use the same criteria used to define a community for minority populations.

The ROI for environmental justice was identified based on census tracts. When first delineated, census tracts were designed to be homogeneous with respect to population characteristics, economic status and living conditions. Census tracts are relatively permanent statistical subdivisions of a county; usually have between 2,500 and 8,000 persons; and are intended to be maintained over a long time so that statistical comparisons can be made from census to census (Census Bureau 2009). The ROI for the Crow Lake Alternative includes the following census tracts: 9731, 9736 and 9746. The ROI for the Winner Alternative includes the following census tracts: 9716 and 9717. Data from the U.S. Census Bureau (U.S. Census 2000a and 200b) was obtained for the identified census tracts to characterize the minority and low income population occupying the ROI near the Proposed Project alternatives, depicted in **Figure 3.11-1**.




**SDPW Project**

**Figure 3.11-1**

| Date: 09.02.09 | Census Tracts | Author: JAG |
|---|---|---|

G:\Data\Basin\Maps\EIS\Census

## 3.11.1 MINORITY AND LOW-INCOME POPULATIONS

### 3.11.1.1 Crow Lake Alternative

Generally, the composition of race in South Dakota is predominantly White, less than 10 percent American Indian and Alaskan Native, and a very small percentage of other races. Within the three counties being considered, nearly all the population is white, with near equal gender representations in the predominantly agricultural region. **Tables 3.10-1, 3.10-2 and 3.10-3** in the prior section show the population and individual and demographics including age and sex for South Dakota, Aurora, Brule and Jerauld counties. As identified in **Table 3.11-1**, approximately 99 percent of the population is White within the area of the Crow Lake Alternative. Although there is not a large American Indian population within the area, there are several tribes with historic ties to the area; for example, the Crow Lake Alternative is located approximately 12.5 miles east of the Crow Creek Reservation.

**Table 3.11-1 Crow Lake Alternative Race Demographics**

| Race | South Dakota | | Census Tract 9736 Aurora County | | Census Tract 9731 Brule County | | Census Tract 9741 Jerauld County | |
|---|---|---|---|---|---|---|---|---|
| | Population | Percent | Population | Percent | Population | Percent | Population | Percent |
| White | 669,404 | 88.7% | 2,926 | 95.7% | 2,591 | 99.6% | 2,272 | 99.0% |
| Black or African American | 4,685 | 0.6% | 9 | 0.3% | 0 | 0% | 0 | 0% |
| American Indian and Alaskan Native | 62,283 | 8.3% | 59 | 1.9% | 32 | 1.2% | 13 | 0.6% |
| Asian | 4,378 | 0.6% | 3 | 0.1% | 17 | 0.6% | 3 | 0.1% |
| Native Hawaiian and Other Pacific Islander | 261 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |
| Some other race | 3,677 | 0.5% | 44 | 1.4% | 0 | 0% | 0 | 0% |
| Two or more races | 10,156 | 1.3% | 17 | 0.6% | 10 | 0.4% | 7 | 0.3% |

Source: U.S. Census 2009

**Table 3.11-2** depicts the poverty levels recorded in the census tracts encompassing the Crow Lake Alternative area. Overall for South Dakota, 13.2 percent of the individuals for whom the poverty status is determined are considered below poverty levels. The percentages of poverty levels in the census tracts crossing the site are lower in Aurora County (associated with census tract 9736), and slightly higher in Brule and Jerauld counties (associated with census tracts 9731 and 9741, respectively).

**Table 3.11-2 Crow Lake Alternative Poverty Levels**

| | South Dakota | Census Tract 9736 Aurora County | Census Tract 9731 Brule County | Census Tract 9741 Jerauld County |
|---|---|---|---|---|
| All individuals for whom poverty status is determined | 727,425 | 2,858 | 2,650 | 2,250 |
| Number below poverty level | 95,900 | 327 | 416 | 464 |
| Percent below poverty level | 13.2% | 11.4% | 15.7% | 20.6% |

Source Data: U.S. Census 2000b

### 3.11.1.2 Winner Alternative

In general, the Proposed Project area is located in a predominantly White, predominantly agricultural region. **Tables 3.10-4, 3.10-5 and 3.10-6** in the prior section show the population and individual and demographics including age, sex and race for South Dakota and Tripp County. As identified in **Table 3.11-3**, approximately 84 percent of the population is White and approximately 15 percent of the population is American Indian and Alaskan Native within the area of the Winner Alternative. The Winner Alternative is located 8.6 miles east of the Rosebud Reservation.

**Table 3.11-3 Winner Alternative Race Demographics**

| Race | South Dakota | | Census Tract 9716 Tripp County | | Census Tract 9717 Tripp County | |
|---|---|---|---|---|---|---|
| | Population | Percent | Population | Percent | Population | Percent |
| White | 669,404 | 88.7% | 2,492 | 92.6% | 3,133 | 83.8% |
| Black or African American | 4,685 | 0.6% | 0 | 0% | 2 | 0.1% |
| American Indian and Alaskan Native | 62,283 | 8.3% | 165 | 6.1% | 555 | 14.8% |
| Asian | 4,378 | 0.6% | 2 | 0.1% | 2 | 0.1% |
| Native Hawaiian and Other Pacific Islander | 261 | 0% | 0 | 0% | 0 | 0% |
| Some other race | 3,677 | 0.5% | 2 | 0.1% | 3 | 0.1% |
| Two or more races | 10,156 | 1.3% | 30 | 1.1% | 44 | 1.2% |

Source: U.S. Census 2009

**Table 3.11-4** depicts the poverty levels recorded in the census tracts encompassing the Winner Alternative area. Overall for South Dakota, 13.2 percent of the individuals for whom the poverty status is determined are considered below poverty levels, comparatively, the percentages of poverty levels in the census tracts crossing the site are higher.

**Table 3.11-4 Winner Alternative Poverty Levels**

| | South Dakota | Census Tract 9716 | Census Tract 9717 |
|---|---|---|---|
| All individuals for whom poverty status is determined | 727,425 | 2,670 | 3,624 |
| Number below poverty level | 95,900 | 553 | 701 |
| Percent below poverty level | 13.2% | 20.7% | 19.3% |

Source Data: U.S. Census 2000b

# 3.12 HUMAN HEALTH AND SAFETY

Existing conditions related to air quality, water quality and noise are discussed in their respective resource sections in this chapter. Aviation is discussed in the transportation section. The following information presents the baseline for which impacts to human health and safety were analyzed. The site alternatives are located in rural, agricultural areas with low population densities. The predominant activities are farm and range related. Access to private land is restricted by landowners. Public safety is provided by local law enforcement or emergency response agencies. Fire services for the site alternative areas are provided by county volunteer fire departments.

While potentially hazardous materials may be associated with areas used for agricultural activities (petroleum products used in farm equipment, pesticides, herbicides and isolated dump sites), a site inspection found nothing to indicate that there were pre-existing hazardous or environmental conditions in areas proposed for development (Terracon 2009a and 2009b).

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# 4 Environmental Consequences

This chapter identifies the potential environmental consequences of implementing the Proposed Project, Wind Partners’ proposed development and the proposed Federal actions (Western’s proposed action is to consider whether to allow interconnection requests; RUS’s proposed action is to consider whether to provide financial assistance for the Proposed Project. The EIS addresses the requirements of applicable laws and regulations including the requirements of NEPA, Section 102(2), the CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), DOE NEPA Implementing Procedures (10 CFR Part 1021), RUS Environmental Policies and Procedures (7 CFR Part 1794), and the following statutes and Executive Orders:

- Agriculture Department Regulation (DR) 5600-2, Environmental Justice
- Agriculture DR 9500-3, Land Use Policy
- Agriculture DR 9500-4, Fish and Wildlife Policy
- Bald and Golden Eagle Protection Act
- USDA, Departmental Policy for the Enhancement, Protection and Management of the Cultural Environment
- Archeological Resources Protection Act
- Clean Air Act
- Clean Water Act
- Endangered Species Act
- Farmland Protection Policy Act
- Migratory Bird Treaty Act
- National Historic Preservation Act
- Native American Graves Protection and Repatriation Act
- Noxious Weed Act
- Presidential Executive Order 11988 (Floodplain Management)
- Presidential Executive Order 11990 (Wetlands Management)
- Presidential Executive Order 12088 (Federal Compliance With Pollution Control)
- Presidential Executive Order 12898 (Environmental Justice)
- Presidential Executive Order 13007 (Indian Sacred Sites)
- Presidential Executive Order 13112 (Invasive Weed Species)
- Presidential Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds)
- Presidential Executive Order 13045 (Protection of Children from Environmental Health Risks and Safety Risks)
- Safe Drinking Water Act
- Wild and Scenic Rivers Act

As described in **Chapter 3**, the affected environment or ROI is the physical area that bounds the environmental, sociological, economic, or cultural feature of interest that could be impacted by implementing the Proposed Project, Wind Partners’ proposed development and the proposed Federal actions. The boundaries of the ROI may vary depending on the resource being analyzed.

Direct and indirect impacts for each of the alternatives are identified for each resource component. Direct effects are “caused by the action and occur at the same time and place.” Indirect effects are “caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems” (40 CFR 1508.8).

Construction, operation and decommissioning of the Proposed Project, Wind Partners’ proposed development and Western’s system modifications at its existing substation were analyzed to determine potential impacts. The Wind Partners’ proposed development would be constructed within the boundaries of the Crow Lake Alternative and share many of the components described for the Proposed Project. For the Crow Lake Alternative, the term “Proposed Project Components” includes the Wind Partners’ proposed development. As identified in **Chapter 2**, the “Proposed Project Components” include:

- Wind Turbine Generators and Foundations
- O&M Building
- Underground Communication System and Electrical Collector Lines
- Collector Substation and Microwave Tower
- Overhead Transmission Line
- Temporary Equipment/Material Storage or Lay-down Areas
- Temporary Batch Plant
- Crane Walks
- New and/or Upgraded Service Roads to Access the Facilities

The significance criteria used for determining potential impacts for each environmental and socioeconomic resource were developed based on scientific information, statute, or in response to public concern. Criteria were only developed for potential impacts identified as issues during the EIS scoping process. For issues not identified during the EIS scoping process, potential impacts are addressed as described in the impact assessment sections for each resource. "Thresholds of significance” were used to determine the level of environmental impact for issues identified during the EIS scoping process. These thresholds of significance establish benchmarks for increasing levels of effects, the highest of which is significant impact. Significance can be viewed in two ways: 1) the effect is environmentally significant; and/or 2) the effect has policy significance. Thresholds of significance were determined by evaluating the expected impacts against the significance criteria for each of the alternatives.

The Applicants and Agencies have included BMPs and APMs for the Proposed Project, Wind Partners’ proposed development and proposed Federal actions to minimize impacts associated with construction; these practices are described in **Chapter 2, Table 2.2** and **Table 2.3,** by resource area, as applicable. The Applicants and Agencies have committed to these included BMPs and APMs prior to the evaluation of environmental impacts. If impacts are determined to be less than significant after application of the included BMPs and APMs, then no additional mitigation is proposed.

The impact analysis was conducted by evaluating potential impacts with BMPs and APMs in place, then weighing any residual impacts against the significance criteria and identifying additional mitigation measures, if necessary. The following thresholds of significance used for this analysis are listed in order of increasing level of impact:

- No Impact
- Less than Significant Impact
- Potentially Significant Impact with Proposed Mitigation

The original analysis in the DEIS was conservative and included the evaluation of 10 contingent turbines and associated facilities. At this time, seven of the contingent turbine locations for the Crow Lake Alternative represent the Wind Partners proposed development (see **Figure 1.3**, **Section 2.3.1 and Table 2.4**); therefore, the Wind Partners' proposed development does not represent a substantial change to the analysis conducted for the DEIS. As such, the Wind Partners' proposed development represents an increment of the impact described for the Crow Lake Alternative for all resources. Impacts specific to each resource have been described in their appropriate sections.

To enable the Agencies to make an informed decision on the proposed Federal actions, the current layout for the Proposed Project Components was updated from what was included in the DEIS. This layout was surveyed for cultural resources and wetlands (including jurisdictional and non-jurisdictional WUS, collectively termed "wetlands"). Wetland delineations were also completed for the layout presented in the DEIS. Wetland delineations, if not previously completed for the proposed layout, would be completed prior to construction. The layout is based on those survey results and other resource and engineering considerations. Additional resource surveys and engineering siting (see **Section 2.3.2 Pre-Construction Activities**) could occur that may further adjust the current locations to avoid or minimize resource impacts. The current locations of the Proposed Project Components have been analyzed and included in the EIS resource discussions below. As stated in **Section 2.8**, the Crow Lake Alternative is the preferred alternative.

# 4.1 GEOLOGY AND SOILS

## 4.1.1 METHODS

The ROI for geology and soils includes areas of immediate disturbance associated with development of the Proposed Project Components and proposed Federal actions. As presented in **Section 3.1**, geologic data has been obtained from the South Dakota Geological Survey (SDGS). Reports prepared for local exploration and expansion of community water supplies provided additional information. Geologic units and physiographic provinces have been cross-checked against GIS data and maps obtained from the USGS and EPA (USGS 2009). Soil characteristics have been obtained from the NRCS database (NRCS 2009). Data obtained from the combination of these sources have been overlain on a GIS map of the Proposed Project Components in order to assess impacts.

### 4.1.2 SIGNIFICANCE CRITERIA

The principal measure of effect on soil resources is the amount and location of soils disturbed during construction and occupied during operations.

A significant impact to geology and soils would occur if:

- The Proposed Project Components and/or the proposed Federal actions would result in erosion, causing long-term impacts to other resources (*e.g.*, water quality)

### 4.1.3 IMPACT ASSESSMENT

For both alternatives, staging and construction activities would require sand and gravel resources. Sand and gravel resources are located in the vicinity of the site alternatives. South Dakota's annual production of sand and gravel is approximately 8,000,000 tons per year (Peterson Hammond 1992). For either site alternative, each turbine base would use approximately 320 cubic yards of concrete, encompassing approximately 33,000 cubic yards total, and would require approximately 46,200 tons of sand and gravel. This amount is less than half of one percent of the sand and gravel annually generated within South Dakota. There could also be potential for additional gravel to be used for road improvements. Use of these resources for the construction activities would not deplete the availability and supply of sand and gravel.

#### 4.1.3.1 Crow Lake Alternative

Development of the Crow Lake Alternative would result in approximately 1,006 acres of temporary disturbance and approximately 190 acres of permanent impacts to soils.

Soils in the Crow Lake Alternative area are considered by NRCS to have a slight to moderate risk of erosion. During construction, existing vegetation would be removed in the areas associated with the Proposed Project Components, potentially increasing the risk of erosion. Once vegetation is removed in the vicinity of the construction areas, soils would be excavated to achieve necessary grades and put into stockpiles. Excavations would likely encounter the Quaternary sediments consisting of nonglacial alluvium, glacial deposits, loess, and colluvium, and near-surface or surface outcrops of Pierre Shale. Included BMPs and APMs (as listed in **Chapter 2, Table 2.2** and **Table 2.3**) and a SWPPP would be implemented for the construction, operation and decommissioning activities for the Proposed Project Components.

Further, geotechnical investigations would identify the stability of the soils and underlying geology to assist with turbine placement, design of foundations and specification of drainage controls. Grading would be designed to manage runoff and achieve long-term stabilization of restored temporary disturbance areas and areas with permanent installations. Foundation designs would consider compaction requirements for backfill, depth to the saturated zone, slope erosion potential and similar factors.

For the aforementioned reasons, implementing the Crow Lake Alternative would result in minimal erosion and would not cause long-term impacts to geology, soils, or water resources (see **Section 4.2**); thus, the impacts would be less than significant.

Development of the Western system modifications at the Wessington Springs Substation would result in less than significant impacts to geologic and soil resources since work would be short-term in duration and confined to a previously disturbed and graded area. Development of the Western system modifications at the Wessington Springs Substation would employ the included BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**), and would adhere to a SWPPP.

#### 4.1.3.2 Winner Alternative

Development of the Winner Alternative would result in approximately 3,188 acres of temporary disturbance and approximately 261 acres of permanent impacts to soils. In general, the impacts associated with the Winner Alternative would be similar to those identified for the Crow Lake Alternative.

Soils in the Winner Alternative area are considered by NRCS to have a slight risk of erosion. As described for the Crow Lake Alternative, included BMPs and APMs (as listed in **Chapter 2, Table 2.2** and **Table 2.3**) and a SWPPP would be implemented. Geotechnical investigations would identify the stability of the soils and underlying geology to assist with turbine placement, design of foundations and specification of drainage controls. Development of the Winner Alternative would result in less than significant impacts to geology, soils or water resources (see **Section 4.2**).

With the included BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**), and adherence to a SWPPP, Western's system modifications proposed for the Winner Substation would result in less than significant impacts, similar to the Wessington Springs Substation proposed for the Crow Lake Alternative.

#### 4.1.3.3 No Action Alternative

Under the No Action Alternative, Western would not approve an interconnection request(s) and RUS would not provide financial assistance for the Proposed Project. For the purpose of impact analysis and comparison in this EIS, it is assumed that the Applicants' Proposed Project (and Wind Partners' proposed development as it pertains to the Crow Lake Alternative) would not be built and the environmental impacts, both positive and negative, associated with construction and operation would not occur. There would be no geology and soils impacts associated with the No Action Alternative.

## 4.2 WATER RESOURCES

### 4.2.1 METHODS

The ROI for water resources encompasses those hydrologic systems that could be impacted by discharges, spills and/or stormwater runoff associated with implementing the Proposed Project

Components and proposed Federal actions. The water resources assessment includes consideration of the compilations of technical memorandums for both alternatives (Terracon 2009a and 2009b). Surface water flows, impaired waters, floodplains, groundwater resources and wetlands data have been cross-checked against data and reports from the DENR, USGS and GIS maps from the EPA, USFWS and USGS. Potential impacts have been identified based on the available resource information, consideration of the elements for evaluation, and in relation to the impact analysis area.

## 4.2.2 SIGNIFICANCE CRITERIA

A significant impact to water resources would occur if:

- The normal flow of a water body or normal drainage patterns and runoff would be substantially altered; or if the Proposed Project Components would be placed within a 100-year flood hazard area that would impede or redirect flood flows
- The quantity and quality of discharges within waters or watercourses would be modified by in-stream construction or accidental contamination to the extent that water use by established users is measurably reduced, or the water quality of already impaired waters is further degraded
- An activity would cause an increase in susceptibility to on-site or off-site flooding due to altered surface drainage patterns or stream channel morphology, per Presidential Executive Order 11988 Floodplain Management
- Surface drainage patterns or stream channel morphology would be altered to the extent that vegetation communities and habitats dependant on current hydrologic conditions are degraded
- An activity would cause a loss or degradation of jurisdictional or non-jurisdictional wetlands (including WUS) in violation of the terms and conditions of a USACE permit

## 4.2.3 IMPACT ASSESSMENT

Field investigations in 2008 and 2009 were conducted to verify NWI wetlands and map the actual location of wetlands. Wetlands that were field-verified (not NWI wetlands) were used in the impact analysis because 1) they were identified in the field as opposed to NWI wetlands that are identified on maps and not field-verified, and 2) field-verified wetlands accounted for a larger, more conservative, acreage than NWI wetlands. In addition, wetlands (including jurisdictional, non-jurisdictional and WUS, collectively termed “wetlands”) were delineated for the Crow Lake Alternative (WEST 2009a), but not for the Winner Alternative. Proposed Project Components in the Crow Lake Alternative have been adjusted based on engineering and resource issues in some areas since the survey was completed; therefore, additional wetland delineations would be completed within Proposed Project Component impact areas after final design such that all wetlands would be identified and avoided. Water resource factors which may affect the locations of individual turbines include, but are not limited to, a wetland delineation and other resource and engineering considerations. Under the included BMPs and APMs, further coordination would occur between the Applicants and the USACE if wetlands cannot be avoided, although the Applicants have committed to avoiding wetlands. As necessary, the

Applicants would obtain the necessary permit(s) under Section 404 of the CWA prior to construction; permits may not be acquired before the completion of the EIS. As currently designed, the project would have no temporary or permanent impacts; therefore, it is assumed for the following impact analyses that there would be no wetland impacts. Depending on final design and/or unforeseen circumstances during construction where wetlands impacts may be unavoidable, the Applicant would obtain permits and mitigate for impacts to USACE jurisdictional wetlands. Potential permanent impacts to wetlands would be less than significant, in accordance with USACE requirements for each of the alternatives.

### 4.2.3.1 Crow Lake Alternative

The majority of both temporary and permanent disturbances would be on land currently used for rangeland and agriculture and on soils with low representative slopes. However, the excavation and exposure of soil during construction of the Proposed Project Components could cause sediment runoff during rain events. Alteration of flow patterns is not anticipated and would be avoided wherever possible. Potential impacts in these areas that result from construction, operation and decommissioning activities would be minimized through implementing and adhering to regulations and permits governing storm water pollution prevention and sediment control, such as a General Construction Storm Water Permit, SWPPP, 404 permit, FEMA and county regulations. The SWPPP would outline BMPs for construction, operation and decommissioning of the site to protect water resources (including downstream impaired waters) and adjacent wetlands and minimize the potential for soil erosion and sediment transport. Implementation of the included BMPs and APMs (as listed in **Chapter 2, Table 2.2 and Table 2.3**) and permits would ensure that potential impacts to surface water flows, drainage patterns, quantity and quality are less than significant during construction, operation and decommissioning activities.

On-site or off-site flooding would not result from construction, operation or decommissioning of the Proposed Project Components. Flood hazard zones have not been identified in the Crow Lake Alternative; as needed, the final engineering design would evaluate site conditions and the BMPs and APMs would be implemented to address potential flooding. Thus, development of the Crow Lake Alternative would result in less than significant impacts to floodplains.

Additionally, excavations for foundation installations may have the potential to encounter shallow groundwater resources. If shallow groundwater is encountered during construction or decommissioning, the Applicants would obtain a Dewatering Permit from DENR. Water extraction during potential dewatering operations would be conducted in a manner to protect water quality, and would be of minimal volume. Potential effects on groundwater would be isolated and small-scale, resulting in short-term, localized water table depressions that would not remain following construction or decommissioning. Thus, development of the Proposed Project would result in less than significant impacts to water supplies.

Development of the Crow Lake Alternative would not result in temporary or permanent impacts to field-verified or delineated wetlands. Wetlands within USFWS easements on private property are under USFWS jurisdiction. As included in the BMPs and APMs, the Applicants would site the Proposed Project Components to avoid wetlands and if wetlands cannot be avoided, the Applicants would work with the USFWS and/or USACE to obtain permits and minimize impacts to wetlands. Therefore, impacts to wetlands would be less than significant.

Development of the Western system modifications at the Wessington Springs Substation would not result in any impacts to water resources since drainage from the site is controlled by the site's SWPPP. Based on construction of the existing substation, groundwater is not expected to be encountered during foundation excavation activities. If groundwater is encountered, Western would address this in accordance with BMPs, APMs (**Chapter 2, Tables 2.2** and **2.3**), and other regulatory requirements.

#### 4.2.3.2 Winner Alternative

The impacts associated with the Winner Alternative would be similar to those for the Crow Lake Alternative. Development of the Winner Alternative would not result in temporary or permanent impacts to field-verified or delineated wetlands. This would be applicable regardless of the transmission line option selected. Wetlands within USFWS easements on private property are under USFWS jurisdiction. Potential impacts to wetlands would be avoided. The Applicants have committed to avoiding wetlands. If wetlands cannot be avoided, the Applicants' would work with the USFWS and USACE to obtain permits and minimize unavoidable impacts; therefore, impacts to wetlands would be less than significant.

Western's system modifications at Winner Substation would result in impacts similar to the Wessington Springs Substation. Development of the Western system modifications would employ the included BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**).

#### 4.2.3.3 No Action Alternative

Under the No Action Alternative, Western would not approve an interconnection request(s) and RUS would not provide financial assistance for the Proposed Project. For the purpose of impact analysis and comparison in this EIS, it is assumed that the Applicants' Proposed Project (and Wind Partners' proposed development as it pertains to the Crow Lake Alternative) would not be built and the environmental impacts, both positive and negative, associated with construction and operation would not occur. There would be no water resource impacts associated with the No Action Alternative.

## 4.3 CLIMATE CHANGE AND AIR QUALITY

### 4.3.1 METHODS

The ROI for climate change and air quality includes areas of immediate disturbance associated with the Proposed Project Components and the proposed Federal actions, in association with the regional conditions. This analysis evaluates environmental impacts to air resources as a result of the construction, operation and decommissioning of the Proposed Project Components and the proposed Federal actions. DENR data have been researched to verify current State regulations regarding the guideline levels for criteria pollutants. In addition, South Dakota's Ambient Air Quality Standards (SDAAQS) have been identified under the SDCL, Chapter 34A-1. This public policy of the State serves to achieve and maintain reasonable levels of air quality as well as support local and regional air pollution control programs. Climate data has been obtained from the Chamberlain, South Dakota weather station. GHG and climate change information has been obtained from the interactive Green Power Equivalency Calculator available from the EPA for purposes of broader analysis and climate change analysis (EPA 2009a), see **Chapter 5 Section 5.4.1** for additional discussion).

## 4.3.2 SIGNIFICANCE CRITERIA

A significant impact to air quality would occur if:

- An activity would result in violation to any local, State, or Federal air quality standard due to increased fugitive dust emissions

## 4.3.3 IMPACT ASSESSMENT

### 4.3.3.1 Crow Lake Alternative

The Crow Lake Alternative is not in a non-attainment area for any criteria pollutant under any applicable air quality standard. Fugitive dust emissions from the Proposed Project Components would be within standards set forth by DENR and NAAQS. Increased fugitive dust emissions would be temporary and minor during construction or decommissioning of the Proposed Project Components, and would not exceed SDAAQS particulate standards.

Further, operation of the Proposed Project and Wind Partners' proposed development would offset emission sources when compared to similarly-sized electric generating facilities using carbon-based fuel sources. Wind-generating stations do not emit $CO_2$ (which is a GHG that contributes to climate change); it is estimated that the Proposed Project and Wind Partners' proposed development would avoid 726,600 metric tons of $CO_2$ emissions per year (EPA 2009b) compared to the average emissions of fossil fueled generating stations employed in South Dakota. This amount avoided is equal to the annual carbon dioxide emissions of approximately 130,000 average passenger cars (EPA 2009b). The greatest advantage of wind power is electricity generation without air emissions, including $CO_2$. Some emissions would be generated from construction and maintenance activities, primarily from vehicle exhaust.

Impacts would be restricted to short periods during construction or decommissioning at small, individual sites. Included BMPs and APMs (as listed in **Chapter 2, Table 2.2 and Table 2.3**) would be employed during ground disturbing activities. Therefore, development of the Crow Lake Alternative would not result in a violation to any local, State, or Federal air quality standard and therefore would result in less than significant impacts.

Western's Wessington Springs Substation currently has $SF_6$ gas-filled circuit breakers, and Western would install additional $SF_6$ breakers to interconnect the Proposed Project. During operation of the new substation additions, authorized Western personnel would conduct periodic inspections and service equipment as needed. Properly trained maintenance personnel would monitor and manage the use, storage and replacement of $SF_6$ to minimize any releases to the environment. $SF_6$ gas used in substation circuit breakers is contained in sealed units that are factory-certified not to leak. During inspections, equipment would be monitored for detection of leaks, and repairs would be made as appropriate. Western's system modifications at Wessington Springs Substation would incorporate BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**); therefore, impacts to air quality from fugitive dust would be less than significant.

#### 4.3.3.2 Winner Alternative

Impacts of the Winner Alternative would be similar to those identified for the Crow Lake Alternative; therefore, impacts to air quality would be less than significant.

$SF_6$ breakers would be installed at the Winner Substation to accommodate the interconnection, and the same practices proposed for Wessington Springs would be employed at Winner Substation. Western's system modifications at Winner Substation would incorporate BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**); therefore, impacts to air quality from fugitive dust would be less than significant.

#### 4.3.3.3 No Action Alternative

Under the No Action Alternative, Western would not approve an interconnection request(s) and RUS would not provide financial assistance for the Proposed Project. For the purpose of impact analysis and comparison in this EIS, it is assumed that the Applicants' Proposed Project (and Wind Partners' proposed development as it pertains to the Crow Lake Alternative) would not be built and the environmental impacts, both positive and negative, associated with construction and operation would not occur. There would be no climate change and air quality impacts associated with the No Action Alternative.

## 4.4 BIOLOGICAL RESOURCES

### 4.4.1 METHODS

The impact assessment for biological resources was conducted by evaluating impacts to vegetation communities, suitable or occupied habitats and/or known species occurrences within the Crow Lake and Winner alternatives. If suitable or occupied habitats would be impacted by development of either alternative, the level of impact was determined and significance criteria (described in **Section 4.4.2**) were applied to each community, habitat or species.

### 4.4.2 SIGNIFICANCE CRITERIA

Significance criteria for biological resources are different for vegetation, common wildlife and special-status species. These criteria are used to disclose whether biological resources would be impacted by the Proposed Project and Wind Partners' proposed development to assist the Agencies with their final determinations.

***Vegetation***

A significant impact to vegetation resources would occur if:

- An activity resulted in the long-term loss of riparian or grassland vegetation
- An activity resulted in uncontrolled expansion of noxious weeds (Presidential Executive Order 13112 – Invasive Weed Species)

***Wildlife***

A significant impact to wildlife resources would occur if:

- An activity affected the biological viability of a local, regional or national population of wildlife species
- An activity violated Federal or State wildlife conservation policy or law and affected the biological viability of a local, regional or national population of wildlife species. For birds not Federally-listed, the applicable policy is the MBTA or BGEPA

***Special Status Species: Endangered, Threatened, Proposed, Candidate and Other Sensitive Species***

A significant impact to endangered, threatened, proposed, candidate and other sensitive species would occur if:

- An activity resulted in take of a protected species beyond that authorized by permit
- An activity affected the biological viability of a local, regional or national population of a State-listed wildlife species or one of concern/interest resulting in the increase in severity of listing status (*e.g.*, from threatened to endangered)
- An activity violated Federal or State wildlife law (SDCL 34A-8) and affected the biological viability of a local, regional or national population of a species of State-listed wildlife species or one of concern/interest resulting in the increase in severity of listing status. For birds not Federally-listed, the applicable law is the MBTA and/or BGEPA. For listed species, the applicable law is ESA.

A BA was prepared under Section 7 of the ESA for Federally-listed species (**Appendix G**). Findings of the BA are summarized in this EIS. While SDCL 34A-8 does not require agency consultation for State-listed threatened and endangered species, SDGFP has been active in the preparation of this EIS.

## 4.4.3 IMPACT ASSESSMENT

### 4.4.3.1 Crow Lake Alternative

***Vegetation***

Construction of the Proposed Project Components would result in temporary and permanent impacts to existing vegetation within the Crow Lake Alternative. The majority of these impacts would be in the mixed-grass prairie and cropland vegetation communities. Any damage to field crops on cultivated lands during construction would be compensated by the Applicants. Within non-cultivated lands, mixed-grass prairie (mostly rangeland and pasture) and wetlands are the vegetation communities most sensitive to disturbance. Areas of direct and indirect impacts within each vegetation class are based on vegetation community mapping for the Proposed Project Components (Tierra EC 2009), as presented in **Table 4.4-1**.

The Proposed Project Components would result in the temporary disturbance of approximately 691 acres of mixed-grass prairie, 306 acres of cropland, and 3 acres of shelterbelts. The Proposed Project Components would result in the permanent disturbance of approximately 141 acres of mixed-grass prairie, 46acres of cropland, and 1 acre of shelterbelts. No wetlands would be temporarily or permanently disturbed. Mixed-grass prairie is principally rangeland and pasture. Impacts that would occur to cultivated lands are not considered biologically significant because these lands are frequently disturbed by tilling, planting and harvesting activities associated with crop production.

The Crow Lake Alternative would permanently remove approximately 141 acres of mixed-grass prairie. These losses would be widely dispersed across the Crow Lake Alternative which has approximately 23,016 acres of mixed-grass prairie, amounting to a very small percentage of the total area (0.8 percent). Access roads would increase fragmentation of native rangeland, in some cases resulting in smaller patches of the remaining grassland types (**Figure 3.4-1**).

The Crow Lake Alternative would result in the temporary disturbance of 68 acres and the permanent disturbance of 15 acres within USFWS grassland easements. It would also result in the temporary disturbance of 120 acres and the permanent disturbance of 22 acres within USFWS wetland easements. These acreages are included within, not in addition to, the total areas cited in the previous paragraph. As currently proposed, location of turbines in grassland easements would comply with the permit conditions for those easements. Within areas proposed for easements, turbines would be placed at low densities so as not to substantially alter habitat quality.

**Table 4.4-1 Summary of Disturbance Areas within Vegetation Communities in the Crow Lake Alternative**

| Vegetation Type | Total Temporary Disturbance (acres) | Total Permanent Disturbance (acres) |
|---|---|---|
| Mixed-grass prairie | 691 | 141 |
| Cropland | 306 | 46 |
| Wetlands | 0 | 0 |
| Farmstead | 2 | 1 |
| Shelterbelt | 3 | 1 |
| Deciduous forest | 2 | 1 |
| Total area | 1,006 | 190 |

Note: Discrepancy in total values is due to exclusion of mine/quarry land use and rounding.

Permanent vegetation loss would result from removal of vegetation at turbines, collector and interconnection substations, the O&M building, underground and overhead collection lines and access roads. Temporary disturbance would result from turbine work areas, crane walks, temporary lay down areas, the underground and overhead collection system, the temporary batch plant, and areas along the access roads. Permanent loss of vegetation would be minimized by limiting the area of physical ground disturbance through the use of existing roads and by reseeding all temporarily disturbed areas with native mixtures of grasses upon completion of construction activities. Impacts in these areas that occur as a result of construction, operation and decommissioning activities would not substantially increase disturbance levels compared with existing, non-project-related disturbances such as roads and agriculture. Impacts to temporarily disturbed rangeland and pasture would be short-term, and the disturbed areas would revegetate quickly after re-seeding.

Physical ground disturbance and construction vehicles, and possibly increased public access, could facilitate the establishment and spread of noxious weeds. Noxious weeds compromise native biodiversity and create financial burdens. South Dakota has 27 documented noxious weed species, 11 of which occur in Aurora, Brule and Jerauld counties (see **Table 3.4-2**). The establishment of noxious/invasive vegetation could be limited by early detection and eradication. State law requires that listed weeds be controlled by the landowner, and the Applicants would comply with local and State requirements for noxious weed control during construction of the Proposed Project Components.

To prevent the possible introduction of noxious weed seed, heavy equipment from other geographic regions used during construction would be washed prior to departure from the equipment storage facility. Washing equipment prior to transport from one work site to another is not recommended. On-site equipment washing increases the chance of weed seed dispersal by drainage of water off the site, across an area greater than the size of the work site. Instead, accumulations of mud would be “knocked off”. This method promotes containment of weed seeds on the work site.

Follow-up monitoring of the presence, distribution and density of noxious weeds would be conducted for three years post-construction by the Applicants to ensure the success of control measures. Surveys would be conducted as early in the year as feasible to control noxious weeds before they produce seed. Control methods would be based on the available technology and the weed species present. Methods used to control weeds may include mowing or handpulling; in extreme cases of noxious weed infestation, an approved herbicide may be applied.

Fugitive dust generated during clearing, grading and vehicle travel could adversely affect vegetation, but any effects would be short-term and localized to the immediate area of construction. Control measures would be implemented to minimize fugitive dust emissions from construction-related traffic and ground disturbance (see **Chapter 2, Tables 2.2 and 2.3**). Access road construction could result in increased public access depending on the amount of access permitted by the landowners. If public access is increased, there could be an increase in wildfires ignited by catalytic converters and careless cigarette use. The risk for wildfires would be greatest in summer and autumn when native grasses have gone dormant and fuel loads are at their peak. To limit new or improved access into the area, all new access roads not required for maintenance would be closed. Due to the private ownership of the leased lands, the majority of roads would be gated, further limiting public access and thus minimizing noxious weed spread and wildfire ignition.

These impacts would not affect the biological viability of any local, regional or national plant species. Because the footprint of the Proposed Project Components is relatively small compared with the overall size of the Crow Lake Alternative and habitats present, and 33 percent of the area is tilled annually for agricultural production, direct impacts to vegetation would be minimal.

As included in the BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**), the Applicants and Wind Partners would locate the Proposed Project Components to avoid wetlands; if wetlands cannot be avoided, the Applicants and Wind Partners would work with the USFWS and/or USACE to obtain permits and minimize impacts. Therefore, impacts to wetlands would be less than significant. As currently designed, the project would have no temporary or permanent impacts; therefore, it is assumed that there would be no wetland impacts. Depending on final design and/or unforeseen circumstances during construction where wetlands impacts may be unavoidable, the Applicant and Wind Partners would comply with USACE mitigation requirements.

Based on the minimal impacts to vegetation resources described above, impacts to Vegetation Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded, and impacts to vegetation resources due to construction, operation and decommissioning of the Proposed Project Components would be less than significant.

### *Wildlife*

<u>Mammals (excluding bats)</u>

Most impacts to mammal species would be temporary and associated with the construction phases. Development of the Proposed Project Components would temporarily and permanently remove habitat. The Crow Lake Alternative would result in the temporary disturbance of 1,006 acres of habitat, while 190 acres would become permanently unavailable. The areas of temporary disturbance would be reclaimed and reseeded with an approved native seed mix. It would likely take two growing seasons before these areas would be restored to the pre-construction condition. The area of habitat permanently lost represents a relatively small amount of habitat available regionally (less than 1 percent). This small loss (less than 0.4 percent) of moderate quality habitat (grasslands are currently grazed) would not disrupt breeding, rearing or wintering behavior and would not influence the viability of local populations.

Noise, excavation and other forms of disturbance during construction would likely temporarily displace wildlife species within or adjacent to the disturbed areas for a short period. Upon completion of construction, wildlife species would become accustomed to operation and maintenance activities and would be expected to resume use of the Crow Lake Alternative, although some areas may be avoided permanently. Mammal movement within and through the wind facility would not be impeded once the project is constructed because most facilities would not be fenced. Given the small amount of habitat loss and low level of human activity during the operation and maintenance of the project, avoidance impacts are not expected to affect the biological viability of a local, regional or national population of wildlife species, leading to a less than significant impact. Permanent vegetation loss could destroy small mammal habitat, but population level effects are not expected because less than 0.4 percent of the area would be permanently disturbed.

The risk for direct mortality of species resulting from construction activities or vehicle collision is limited. Adults are typically mobile and would be able to avoid construction equipment or vehicles (unless they were traveling at high rates of speed). Operation of the wind facility would not result in excessive increases in traffic or human presence and are not anticipated to significantly impact mammals.

Based on the minimal impacts to mammals described above, Wildlife Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded, and impacts to mammals would be less than significant.

<u>Bats</u>

Construction of the Proposed Project Components could affect bats through direct mortality, habitat loss and fragmentation and disturbance effects (SDBWG and SDGFP 2009). Bat surveys for the Crow Lake Alternative were completed in October, 2009 (Derby *et al.* 2010a). There are no known roosts within or adjacent to the area. The probability of construction-related bat mortality is low given their mobility and the absence of any roosts. Habitat loss and fragmentation effects to bats are also expected to be minimal, mainly because roosting habitat (trees) loss would be minimal and existing fragmentation of these habitats would not be increased. The permanent loss of approximately 141acres of mixed-grass prairie foraging habitat would not represent an adverse effect to bats given the large adjacent tracts of similar habitat. No wetland shrub or forested riparian habitats or other areas of concentrated bat use would be affected. A total of 1.18 acres of shelterbelt representing less than 0.2 percent of potential daytime roosting habitat may be permanently removed. Construction would generally occur during daylight hours and would not disturb these nocturnal animals.

Operation and maintenance impacts to bats include disturbance and displacement, habitat fragmentation and direct mortality. As noted above, general disturbance and displacement effects would be minimal given the small percentage of potential daytime roost tree removal within or adjacent to the Crow Lake Alternative. Maintenance activities would be conducted during daylight hours when bats are not active, and noise associated with operating turbines are not likely to affect bats. Wind turbines and access roads could fragment foraging habitat for bats.

The level of bat activity documented at the Crow Lake Alternative was similar to bat activity at facilities in Minnesota and Wyoming, where bat mortality was low (0.76 to 10.27 fatalities/MW/year). Assuming that a relationship between bat activity and bat mortality exists, relatively low levels of bat mortality would be expected to occur in the Crow Lake Alternative; most likely during August. Based on fatality rates at wind-energy facilities in the Midwest, the bat use observed at this site, and habitat of the site, it is expected that the potential risk to bats from turbine operations would be low compared to the rates observed at other Midwest facilities (Derby *et al.* 2010a).

Assessing the potential impacts of wind energy development to bats at the Crow Lake Alternative is complicated because the proximate and ultimate causes of bat fatalities at turbines are poorly understood (Kunz *et al.* 2007, Baerwald *et al.* 2008, Cryan and Barclay 2009 [in Derby *et al.* 2010a]) and because monitoring elusive, night-flying animals is inherently difficult (O'Shea *et al.* 2003 [in Derby *et al.* 2010a]). While construction of wind facilities has increased rapidly in recent years, the availability of publically available bat information from existing projects lags behind (Kunz *et al.* 2007). To date, monitoring studies of wind projects suggest that:

a) bat mortality shows a rough positive correlation with bat use
b) the majority of fatalities occur during the post-breeding or fall migration season (roughly August and September)
c) migratory tree-roosting species (eastern red, hoary, and silver-haired bats) account for almost 75 percent of reported bats killed, and
d) the highest reported fatalities occur at wind-energy facilities located along forested ridge tops in the eastern and northeastern US. However, recent studies in agricultural regions of Iowa and Alberta, Canada, report relatively high fatalities as well

Based on these patterns, current guidance to estimate potential mortality levels at proposed wind projects involves evaluation of the on-site bat acoustic data in terms of activity levels, seasonal variation, and species composition (Kunz *et al.* 2007), as well as comparison to regional fatality patterns.

Collision-related bat mortality has been documented at most wind farms in the western U.S. (Erickson *et al.* 2002). Annual bat mortality rates have ranged between 0.74 and 2.3 fatalities per turbine at wind farms in Wyoming, Oregon and Minnesota (Young *et al.* 2003a). Researchers have concluded that observed mortality rates do not have population-level effects, and no significant difference has been noted in mortality rates at lit and unlit turbines (Johnson *et al.* 2003). However, bat populations in the northeastern United States have been experiencing recent declines due to a fungus (white-nose syndrome) that is found in caves. If bat populations living in caves in South Dakota that migrate through the Crow Lake Alternative have been infected with this fungus, wind turbine mortalities could have a more cumulative impact on these populations. However, little is known about bat populations in South Dakota. Most mortality has involved migrant or dispersing bats rather than residents (Johnson 2005; Johnson *et al.* 2003; Keeley 2001). Bat mortality from collisions with turbines at the Crow Lake Alternative would likely occur. Bat fatality monitoring is ongoing at the adjacent Wessington Springs wind facility; however, data from these studies were not available at the time of publication of this FEIS.

Bat use recorded by ground detectors within the Crow Lake Alternative during the fall was similar to activity recorded at wind facilities in Minnesota and Wyoming, where fatality rates were relatively low (0.76 to 10.27 fatalities/MW/year). Thus, based on the expected relationship between pre-construction bat use and post-construction fatalities, bat mortality rates at the Crow Lake Alternative would be expected to be similar to the 2.4 bat fatalities/MW/year reported at Buffalo Ridge Minnesota (Derby *et al.* 2010a).

Bat mortality studies at wind-energy facilities across North America show a vast range of bat mortality rates, ranging from zero to 39.70 bat fatalities/MW/year. In general, fatality rates are highest in the Northeast and lowest in the Northwest, although a high degree of variation in fatality rates is present for most regions. To date, no fatality data have been made public for the Southwest or Southeast regions. Based on the results of fatality surveys elsewhere in the Midwest region, fatalities at the Crow Lake Alternative would range between 0.76 and 10.27 bat fatalities/MW/year (Derby *et al.* 2010a). It should be noted that these are only estimates based on the number of bat calls recorded during bat surveys with acoustical equipment. Population data are difficult to obtain, and the available literature does not provide population data at wind facilities. The Crow Lake Alternative was sited in an area that is likely to minimize impacts to bats.

Based on the expected impacts to bats described above, Wildlife Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded, and impacts to bats would be less than significant.

<u>Reptiles/Amphibians</u>

Impacts to reptiles and amphibians would be similar to those described for mammals (**Section 4.4.3.1** Wildlife, Mammals), although they are not as mobile as many mammals. Activities associated with construction, operation and decommissioning could result in the direct mortality of reptiles and amphibians if they are not able to move away from equipment and other vehicles. These impacts would be less than significant based on the small amount of habitat that would be temporarily and permanently removed and the low likelihood for direct mortality of individuals. Wildlife Significance Criteria 1 and 2 would not be exceeded, and impacts to reptiles/amphibians would be less than significant.

<u>Birds</u>

The 2008 PII study (**Appendix G**) evaluated possible impacts to biological resources in accordance with USFWS guidelines. A reference site was chosen (Lake Andes National Wildlife Refuge) in an area with good habitat values for birds for comparison purposes. High scores indicate good general habitat value, and that biological resource impacts would be more likely if the area was to be disturbed. The Crow Lake Alternative PII score of 239 is considerably lower than that of the Lake Andes reference area (PII of 331). The high score at the reference site can be attributed to the presence of more, and probably higher quality, wetland and grassland areas. The results of ongoing migratory and breeding bird surveys at the Crow Lake Alternative have been incorporated into this assessment of possible impacts to avian species.

Construction impacts common to all avian species include direct mortality, habitat alteration (fragmentation) or loss, disturbance related to noise, the presence of large structures on the landscape and increased human presence resulting in displacement of individual birds. Mortality is associated with destruction of eggs or abandonment of active nests due to disturbance. Migratory and breeding bird surveys in 2009 indicate that the Crow Lake Alternative supports populations of grassland birds, including a number of species protected under the MBTA and included in the USFWS list of BCC (Derby *et al.* 2010c).

Construction would not last longer than one nesting season, but could occur during the nesting period for many bird species. Ground nesting species such as ferruginous hawk, northern harrier, greater prairie chicken, and sharp-tailed grouse along with low vegetation nesting songbirds would be at higher risk for impacts from disturbance. Although construction activities may result in some level of egg loss and nest abandonment, measures would be implemented to minimize these impacts. The Applicants would attempt to do as much grading and other ground disturbance as possible before the start of the breeding season. If construction is to take place during the migratory bird breeding or nesting season, avian nest surveys, including grouse lek surveys, would be conducted within all non-cropland areas subject to temporary or permanent disturbance immediately prior to construction in that area (refer to **Table 2.3**). All active nests and leks would be marked as avoidance areas. A prairie grouse survey and monitoring plan has been designed and approved in consultation with SDGFP to evaluate potential impacts to leks (WEST 2010a). While the design and application of the included BMPs, APMs, OMP (WEST 2010b), and habitat offsets (Plank 2010) (as listed in **Chapter 2, Table 2.2 and Table 2.3**) would further reduce fatalities related to nest abandonment, avian mortality would occur. Wildlife Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded. The MBTA would be violated if nest abandonment occurs; however, based on the anticipated low level of mortality and short term of construction, impacts to birds would be less than significant.

The Proposed Project Components would result in the permanent loss of approximately 181 acres of mixed-grass prairie habitat (**Table 4.4-1**), which represents a small proportion of this habitat (0.7 percent). The spacing of turbines and access roads could contribute to habitat fragmentation in the Crow Lake Alternative at a small scale, although much of the site area and adjacent areas are currently highly fragmented by roads, farmsteads, and agricultural lands. The Crow Lake Alternative is not expected to increase fragmentation to a larger scale than currently exists because only 0.4 percent of the existing mixed-grass prairie habitat would be permanently disturbed, habitat patch size would remain essentially the same, and traffic would not be substantially increased. Permanent access roads would be 16-feet wide and existing roads would be used where possible (30-40 miles of new road; 25-35 miles of existing road) and turbine pads would be 37-feet in diameter. It is anticipated that, even with this small amount of fragmentation of this habitat type, it would still provide the greatest amount of grassland bird habitat in the vicinity of the Crow Lake Alternative.

Construction noise and associated human activity could temporarily disturb or displace individual birds and may interfere with migration, foraging, breeding and nesting. Studies have suggested that noise from construction and human activities disturb upland bird species, displacing birds from traditional habitats, reducing use of leks and causing nest abandonment (Young *et al.* 2003a). Disturbance would be limited to the duration of construction activities. Construction-related disturbance would be limited to a single migratory (both spring and fall) and breeding-nesting season; however, survival and reproductive success would be temporally reduced. Impacts would be less than significant, because Wildlife Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded.

The types of impacts associated with operation and maintenance of the Proposed Project Components are different than those described for construction activities. Bird fatalities resulting from collisions with turbines have been documented at most operational wind farms and have involved a variety of bird species, including passerines, raptors, waterfowl and shorebirds (Erickson *et al.* 2003). Data indicate bird vulnerability to collisions with turbines is species-specific, habitat-specific and facility-specific (Erickson *et al.* 2001), with mortality rates being most highly correlated with the number of turbines (EFSEC 2003). Other factors that influence avian mortality include the arrangement of turbines (*i.e.*, end turbines have higher collision rates), proximity to migration corridors and rim edges, structure type (*e.g.*, lattice structures provide perches within the Rotor Sweep Area [RSA]), tower height (*i.e.*, blades are closer to the ground on shorter turbines), conditions that reduce visibility (*i.e.* fog), and attractants such as abundant prey resources and certain FAA marker lights (Johnson *et al.* 2003; NWCC 2003; Gehring and Kerlinger 2007).

U.S. wind farm facilities average 2.19 avian fatalities per turbine per year (Erickson *et al.* 2001). The average is reduced to 1.83 fatalities per turbine per year if the Altamont Pass wind farm in California is excluded from calculations (Altamont Pass has experienced high mortality rates due to facility design and siting factors). Passerines make up more than 80 percent of all bird fatalities at wind farms (Erickson *et al.* 2001), and mortality rates at wind farms have not created population-level effects for any species (Young and Erickson 2003). Waterfowl and shorebird mortality at wind farms has been minimal (Erickson *et al.* 2003; Koford 2005). Avian use studies showed level of use based on habitat type to be similar to other wind facilities (Derby *et al.* 2010c); therefore, avian fatalities are expected to be around 198 per year at the Crow Lake Alternative. This is a relatively low number when compared to the 7,785 individual birds observed during the 2009 avian surveys. Based on these data, population impacts at the local level are not anticipated. Avian fatality monitoring is ongoing at the adjacent Wessington Springs wind facility; however, data from these studies were not available at the time of publication of this FEIS.

Average raptor mortality rates are 0.03 raptor per turbine per year overall, and 0.006 raptors per turbine per year excluding Altamont Pass (Erickson *et al.* 2001). Raptor mortality has been absent to very low at most newer generation wind facilities (NWCC 2003). Based on the results from other wind farms, a ranking of seasonal mean raptor use was developed. Mean raptor use in the Crow Lake Alternative during spring, summer, and fall of 2009 was low (0.38, 0.13, and 0.43 raptors/plot/20-minute survey, respectively), ranking thirty-first relative to 44 other wind resource areas with spring data, forty-first relative to 41 other wind resource areas with summer data, and twenty-third relative to 38 other wind resource areas with fall data (Derby *et al.* 2010c); therefore, raptor mortalities are expected to be relatively low (0.006 raptors per turbine per year). If raptor mortalities occur at this rate, it is estimated that 0.65 raptor mortalities per year may occur at the Crow Lake Alternative. Based on these data, population impacts at the local level are not anticipated.

Mean raptor use is determined by dividing the total number of raptors observed by the total number of 800-meter plots and the total number of surveys. Based upon these data, raptor use of the Crow Lake area is not greater than that observed at most existing and proposed wind farms (Derby *et al.* 2010c). Higher raptor concentrations are known along the Missouri River corridor 30 miles west of the Crow Lake area (South Dakota Birds 2009).

As part of the Proposed Project Components, BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**) have been included to reduce avian mortality associated with turbine operation. Tubular structures and newer generation turbines (GE 1.5sle; see **Section 2.3.1**) would eliminate the creation of perching sites within the area and decrease the risk of avian collisions (Erickson *et al.* 2002). A post-construction monitoring program to assess avian mortality was designed and would be implemented in coordination with the USFWS, Western, RUS and SDGFP (WEST 2010b). Additionally, the Applicants' would provide funding for habitat offsets for migratory birds (Plank 2010). Data obtained through baseline avian use surveys and local habitat characterization suggest that avian mortality rates are likely to be similar to or lower than those experienced at other wind farms. While the design and application of the included BMPs, APMs, OMP (WEST 2010b), and habitat offsets (Plank 2010) (as listed in **Chapter 2, Table 2.2 and Table 2.3**) would further reduce fatalities, avian mortality would occur. Wildlife Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded. The MBTA would be violated; however, based on the anticipated low level of mortality, impacts to birds would be less than significant. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Crow Lake Alternative, bird fatalities are expected to be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations.

Noise and human activities associated with operation and maintenance of the Proposed Project Components would result in temporary disturbance similar to those discussed for construction, but at reduced intensity. Regional roads may experience increased traffic due to interest in seeing the operational turbines, although traffic would generally be restricted to public roads, thereby minimizing potential impacts. New roads would be constructed for access to the turbines, but the majority of these roads would be gated and located on private land, minimizing or eliminating increased public access.

The presence of turbines and operation and maintenance activities could result in longer-term effects, including avoidance and abandonment of habitats in proximity to the Proposed Project Components. Research has indicated that displacement effects associated with wind turbines are specific to the project location and individual bird species. Studies have identified reduced avian use in habitats within 164 to 656 feet of turbines for certain species and no avoidance by other species (Johnson *et al.* 2000; Erickson *et al.* 2007; Shaffer and Johnson 2009), and grassland species specifically decreased use of habitats near turbines (Erickson *et al.* 2007, Leddy *et al.* 1999). Displacement could result in reduced breeding success, productivity and survival. Baseline surveys were conducted to assess pre-construction avian abundance and habitat use in the Crow Lake Alternative. Reference sites have been established outside of potential impact areas within the Crow Lake Alternative boundary for comparison. Post-construction monitoring would continue surveys for a minimum of three years to evaluate species-specific changes in abundance, habitat use and displacement effects associated with operation of the Proposed

Project Components compared to general avian communities (**Chapter 2, Tables 2.2 and 2.3**). In addition, whooping crane and sandhill crane monitoring would occur concurrently for a minimum of three years. Both of these studies would improve the understanding of species-specific disturbance and displacement effects associated with development of the Proposed Project Components. Based on very limited data, displacement effects may be in the range of 1.9 acres to 31 acres per turbine (although this may vary by species and does not represent a 100 percent exclusion), or 205 to 3,348 acres in the Crow Lake Alternative (out of 23,016 acres of grassland habitat) (Johnson *et al.* 2000; Erickson *et al.* 2007; Shaffer and Johnson 2009). The Applicants have committed to habitat offsets (Plank 2010) that would be used to purchase and protect in-kind habitats to offset potential impacts. Based on the small acreage that may be impacted by displacement effects and proposed habitat offsets, impacts would be less than significant, and Wildlife Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded.

Operation and maintenance activities and the presence of turbines could also fragment habitat for grassland species. The Crow Lake Alternative mixed-grass prairie ecosystem is relatively fragmented, mainly due to the presence of cropland, roads, and farmsteads. Human activity, turbines and access roads could further fragment habitats for avian species; however, the amount of fragmentation expected from the Crow Lake Alternative would be small and may only slightly increase the current level of fragmentation. The actual fragmentation effects are difficult to quantify, but would likely be species-specific and could disrupt movement between seasonal habitats. In the worst case, these effects would lead to some reduction of breeding success, productivity and survival. The post-construction monitoring program would help determine fragmentation effects (**Chapter 2, Tables 2.2 and 2.3**).

Based on the localized impacts to birds described above and implementation of the included BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**), OMP (WEST 2010b), and habitat offsets (Plank 2010), Wildlife Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded. The MBTA would be violated; however, based on the anticipated low level of mortality, impacts to birds would be less than significant. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Crow Lake Alternative, bird fatalities are expected to be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations.

***Special Status Species***

Federal-Listed Species

Whooping Crane: Suitable habitat for the whooping crane in the Crow Lake Alternative includes stopover, roosting and foraging habitats. The Crow Lake Alternative is within the Aransas-Wood Buffalo Population migration corridor. Previous sightings in the region, large numbers of sandhill cranes (a surrogate species of the whooping crane), and the presence of suitable habitat make it possible that whooping cranes occasionally fly over and land in the Crow Lake Alternative during seasonal migrations, and operating turbines could pose a threat. Whooping crane occurrence increases closer to the Missouri River, the approximate centerline of the migration corridor, 30 miles west of the Crow Lake Alternative. Suitable habitat is present throughout the migration corridor and the Crow Lake Alternative, and use of the entire corridor is likely during any migratory cycle. Inclement weather, predation and human disturbance may cause whooping cranes to stray considerable distances from the centerline of the corridor. Structures, such as wind turbines and transmission lines, pose a collision risk for whooping cranes due to poor visibility during inclement weather and poor flying agility of cranes. To date, there are no documented occurrences of whooping crane collisions with wind turbines; however, it is theoretically foreseeable. The entire length of the new transmission line would be marked and maintained in perpetuity with line marking devices according to manufacturer specifications and the Applicant's engineering specifications to reduce the risk to whooping cranes.

*Direct Effects*

Examples of direct effects to whooping cranes include permanent and temporary loss of habitat and mortality associated with collisions. This section considers both the temporary and permanent impacts to various land cover types and the risk of mortality from turbine blade strikes and transmission line strikes.

*Permanent and Temporary Impacts to Land Cover*

If construction were to occur during the migration season, the disturbance would likely result in avoidance of the site area by whooping cranes and a temporary reduction in available migration habitat. During placement of the turbines and construction of associated infrastructure, approximately 1,006 acres of suitable habitat would be temporarily disturbed (**Table 4.4-1**), the majority occurring on mixed-grass prairie and cropland (99 percent). **Table 4.4-1** indicates that no wetlands would be temporarily impacted; roads would be routed around wetlands and collector lines would be directionally drilled to avoid wetland impacts. Additionally, there would be no direct disturbance to or permanent loss of wetland areas. Habitats that are temporarily disturbed would be reclaimed and are expected to return to their former condition. The amount of land lost permanently would be substantially less than the land temporarily disturbed; approximately 141acres of mixed-grass prairie, 46 acres of cropland, and minimal amounts of other cover types would be lost (**Table 4.4-1**).

Many landowners have easements on their properties. All of the easements within the Crow Lake Alternative area are administered by the USFWS, and include wetland and grassland easements. There are approximately 2,718 acres of wetland easements and 2,130 acres of grassland easements in the site area (**Figure 3.4-2**). Construction of the turbines and associated infrastructure would impact these areas both temporarily and permanently. **Table 4.4-1** shows the disturbance to easements and other areas. The NRCS administers CRP easements but does not disclose locations of CRP land, therefore, these acreages are not included in **Table 4.4-1**.

*Direct Mortality*

In their 2004 review, the National Wind Coordinating Committee (NWCC) did not find wind facility-related mortalities of any crane species from publicly available data (NWCC 2004). Specifically, collision mortality with turbines has not been documented for the whooping crane; however, the species is considered vulnerable (Langston and Pullan 2003). If whooping cranes utilize habitat within or near the site area after the construction of the wind facility, it is presumed that they would be vulnerable to collision mortality due to their large size, low maneuverability, and known vulnerability to other structures on the landscape, such as power lines. A number of factors may affect that vulnerability. Age/experience of individual birds may play a role as may weather conditions, light levels, locations of feeding and roosting areas relative to the turbines and transmission lines, locations of updraft areas relative to the turbines and transmission lines, operation of the turbines when cranes are present, and other possible unidentified factors. It is anticipated that the level of direct collision mortality, if it occurs, is likely to be extremely low. The reason for this is that whooping cranes do not travel in large flocks, but rather individually or in small family groups and they generally fly at altitudes higher than turbines. Also, if they avoid the wind facility altogether direct mortality would not occur. Monitoring during and after construction would result in immediate reporting in the unlikely event of crane mortality, and curtailment of turbine operations when whooping cranes are observed in the project area or within 2 miles of operating turbines until the cranes leave the area (**Appendix G**).

*Indirect Effects*

The primary indirect effect is the potential for complete avoidance by whooping cranes of the stopover habitat located within the area of the proposed facilities (turbines, transmission lines, access roads, substations, O&M building). It is currently unknown whether the presence of turbines would deter cranes from utilizing the area. It has been suggested that, based on anecdotal observations, sandhill cranes appear to avoid wind project areas. Birds observed in the past using habitat that is now occupied by wind farms appear to be using other suitable sites away from the wind farms; however, that could also be due to annual changes in habitat conditions. It is uncertain whether whooping cranes would react to wind farms similarly to sandhill cranes (USFWS 2008b). There are 76 wetlands (295 acres) within a half-mile of turbines in the Crow Lake Alternative. Based on the anecdotal observations that sandhill cranes appear to avoid wind project areas, whooping cranes may also avoid these 76 wetlands.

Loss of migration habitat is a growing concern regarding the AWBP. As previously discussed, the indirect effects of the Crow Lake Alternative could reduce the amount of available stopover habitat in the site area, and also present the threat of increased energy expenditure required while birds search for suitable stopover habitat, or increase the exposure to hazards as birds are required to fly low for longer distances in search of suitable habitat. The possibility exists for this disturbance to affect the physical condition of the birds, placing energy demands and stressors on individuals at a critical point in their life cycle (migration). The increased disturbance could also place the cranes at greater risk of exposure to other hazards encountered during migration such as power lines, hunters, disease, and predation.

Based on current information and the possibility for avoidance of the Crow Lake Alternative by the species during migration, it is unlikely, although possible, that the proposal would result in the direct mortality of a whooping crane. There would be a relatively small permanent loss of suitable stopover habitat. Avoidance of the Crow Lake Alternative area by whooping cranes could result in indirect effects as described above. The entire length of the new 11-mile transmission line would be marked as a voluntary conservation measure. The Applicant would also provide funding for the purchase and permanent protection of stopover habitat (habitat offsets) (Plank 2010), and implement the OMP described in the BA (**Appendix G**). With the proposed avoidance, minimization, and voluntary conservation measures in place, Special Status Species Criteria 1, 2, and 3 would not be exceeded and potential impacts to the whooping crane would be less than significant, provided no take occurs. Western and RUS would also follow USFWS conditions provided in the BO.

Topeka Shiner: Direct effects to the Topeka shiner would not occur; no stream crossings are proposed to tributaries to West Branch Firesteel Creek. Further, there would be no water withdrawals from this watershed for construction, operation or maintenance activities. Indirect impacts, such as sedimentation, would be precluded through the implementation of the BMPs and APMs (**Chapter 2, Tables 2.2. and 2.3**).

Implementation of the Crow Lake Alternative would result in a less than significant impact because Special Status Species Criteria 1, 2, and 3 would not be exceeded.

Piping Plover: It is possible, although highly unlikely, that piping plovers could collide with turbines or overhead lines. Such collisions would be highly unlikely due to the lack of suitable habitat in the area and low potential that this species would migrate through the area. Nesting activities occur along the Missouri River and alkaline shores; therefore, it is unlikely that piping plover occur in the Crow Lake Alternative.

Implementation of the Crow Lake Alternative would be less than significant because Special Status Species Criteria 1, 2, and 3 would not be exceeded. Please refer to the BA in **Appendix G** for a more detailed analysis.

State-Listed Species

Bald Eagle: The bald eagle may occur in the Crow Lake Alternative during winter months as a transient resident, although it is not likely that they use the area regularly. The Proposed Project Components could affect the bald eagle as a result of temporary disturbance or displacement associated with construction, operation and decommissioning activities, minor losses of foraging habitat, and mortality of individuals via collision with turbines and transmission lines. Traffic, noise and human presence during construction, operation and decommissioning could displace individual Bald Eagles foraging in the vicinity. However, the Crow Lake Alternative contains a limited amount of suitable foraging habitat, so construction, operation and decommissioning activities would have minimal effect on bald eagles. The included BMPs and APMs (as listed in **Chapter 2, Tables 2.2 and 2.3**), including the OMP, would be implemented as part of the Proposed Project Components to minimize disturbance and displacement effects. Construction activities would be modified or curtailed when bald eagles are present to reduce disturbance. Also, construction crews would be instructed to avoid disturbing or harassing wildlife (including bald eagles) and to report any bald eagle sightings to the appropriate agencies as dictated by the project-specific OMP.

The Proposed Project Components are not likely to result in bald eagle mortality. Raptor mortality has been relatively low at wind farms and, prior to 2010, there were no reported bald eagle fatalities at any wind facilities in the western U.S. (Erickson *et al.* 2002; Johnson *et al.* 2000; Young *et al.* 2003). One bald eagle was recently killed at a wind facility in Wyoming where the nest was close to the facility (Gates 2010). The probability of bald eagle mortality would be further minimized because there are very few roosting trees and no known nests in the

Crow Lake Alternative. The collection system would be underground, eliminating the risk of collision and electrocution from those lines. Overhead transmission lines would be constructed using Avian Power Line Interaction Committee (APLIC) guidelines to reduce the potential for collision or electrocution (APLIC 2006). As included in the BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**), the new transmission line would be marked with line marking devices. Impacts would be less than significant, because Special Status Species Significance Criteria 1, 2, and 3 (**Section 4.4.2**) would not be exceeded. If an eagle take occurs, the BGEPA and MBTA would be violated. In that case, consultation and mitigation of take with the USFWS would be required; however, impacts to bald eagle would be less than significant based on the anticipated low level of mortality. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the BGEPA and MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Crow Lake Alternative, bald eagle fatalities are not expected or would be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations.

<u>State and Federal Species of Concern</u>

<u>Greater Prairie Chicken and Sharp-tailed Grouse:</u> As discussed above, suitable habitat for greater prairie chickens and sharp-tailed grouse is present in the Crow Lake Alternative.

Construction effects would be similar to those previously described for grassland species. To minimize effects upon Greater Prairie Chickens and Sharp-tailed Grouse, no construction activities would be permitted within a pre-determined radius of a known active lek between March 1 and May 1. Impacts would be less than significant, because Special Status Species Significance Criteria 1, 2, and 3 (**Section 4.4.2**) would not be exceeded.

Possible operation and maintenance impacts for prairie chickens and sharp-tailed grouse are similar to those described for grassland species, although collision-related mortality of prairie chickens and sharp-tailed grouse has been relatively rare at wind farms (Erickson *et al.* 2002). Grouse and greater prairie chickens could fly within the turbine's RSA, which puts them at risk for collision with turbine blades. While the chance for collision-related mortality of Greater prairie chicken and sharp-tailed grouse is low, post-construction monitoring of avian mortality would help to evaluate fatalities and identify turbines causing disproportionate mortality rates (**Chapter 2, Tables 2.2 and 2.3**). The turbine design would prevent the creation of raptor perches that can result in increased predation upon sharp-tailed grouse and greater prairie chickens. If increased predation does occur and the cause is identifiable, onsite mitigation (*i.e.* raptor or raven deterrent devices) would be developed to correct the issue. Impacts would be less than significant, because Special Status Species Significance Criteria 1, 2 and 3(**Section 4.4.2**) would not be exceeded.

Noise and human activities associated with operation and maintenance would result in temporary disturbances to sharp-tailed grouse and greater prairie chickens similar to those previously discussed for construction, although to a lesser extent. Although no studies have been conducted to evaluate the effects of turbine presence on greater prairie chickens and sharp-tailed grouse, there is anecdotal evidence that these species exhibit avoidance of tall structures (Braun 1998; Bidwell *et al.* 2004). For example, lesser prairie chickens avoid even high-quality habitat within

656 feet of a single oil or gas well pump, within 1,968 feet of an improved road and within 3,280 feet of a transmission line (Bidwell *et al.* 2004). Greater prairie chickens in Oklahoma have been shown to avoid areas within 1,600 feet of transmission lines (Pruett *et al.* 2009). Accordingly, the presence of turbines and transmission lines could displace greater prairie chickens and Sharp-tailed Grouse from habitats in the vicinity of these facilities. Turbines could also fragment Greater Prairie Chicken and Sharp-tailed Grouse habitat by disrupting movement between seasonal habitats. While difficult to quantify, it is likely that the Proposed Project Components would result in the effective loss of a small portion of suitable Greater Prairie Chicken and Sharp-tailed Grouse habitat and could adversely affect individual reproduction and survival, although population level impacts are not anticipated. As included in the BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**), pre- and post-construction avian use surveys would help document habitat effects associated with the presence of turbines, and habitat offsets for protection of grassland habitat (Plank 2010). The Applicant prepared a Grouse Survey and Monitoring Protocol and OMP (WEST 2010a) that was approved by SDGFP and includes up to 10 years post-construction monitoring of prairie grouse at the Crow Lake Alternative. Impacts would be less than significant, because Special Status Species Significance Criteria 1, 2, and 3 (**Section 4.4.2**) would not be exceeded.

<u>Grassland Bird Species (Le Conte's sparrow, chestnut-collared longspur, grasshopper sparrow, western meadowlark, upland sandpiper, marbled godwit, long-billed curlew, lark bunting, red-headed woodpecker, McCown's longspur, dickcissel, loggerhead shrike):</u> Grassland species of concern occur in the Crow Lake Alternative as migratory and/or breeding residents, and several were observed during spring and summer surveys. Adverse impacts associated with construction, operation and decommissioning would be similar to those described in **Section 4.4.3.1, Wildlife, *Birds*** and would be reduced through implementation of the included BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**), OMP (WEST 2010b), and habitat offsets for protection of grassland habitat (Plank 2010). Impacts would be less than significant because Special Status Species Significance Criteria 1, 2 and 3 (**Section 4.4.2**) would not be exceeded. The MBTA would be violated; however, based on the anticipated low level of mortality, impacts to grassland birds would be less than significant. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Crow Lake Alternative, bird fatalities are expected to be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations.

<u>Wetland Bird Species (American bittern, Wilson's phalarope, black-crowned night heron, black tern, American white pelican):</u> Wetland bird species may occur in the Crow Lake Alternative as summer residents since suitable breeding habitat is present. Black-crowned night herons were observed during spring or summer surveys; the other three species were not observed. Pre-construction nest surveys would identify nesting species and nest disturbance would be avoided.

Construction activities could temporarily disturb wetland species in the vicinity, although direct impacts to wetland habitats would be avoided completely. Operation may result in collisions with turbines, causing injury or death or result in displacement if turbines are constructed near wetlands. Adverse impacts would be reduced through implementation of the included BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**), OMP (WEST 2010b), and habitat offsets for protection of grassland habitat (Plank 2010). Impacts would be less than significant, because Special Status Species Significance Criteria 1, 2, and 3 (**Section 4.4.2**) would not be exceeded. The MBTA would be violated; however, based on the anticipated low level of mortality, impacts to wetland birds would be less than significant. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Crow Lake Alternative, bird fatalities are expected to be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations.

Raptor Species (Northern Harrier, Ferruginous Hawk, Swainson's Hawk, Burrowing Owl, Prairie Falcon): Raptor species may occur in the Crow Lake Alternative as summer residents, and suitable breeding habitat is present (Derby et al. 2010c). Adverse impacts associated with construction, operation and decommissioning of the Proposed Project Components would be the same as those described in **Section 4.4.3.1, Wildlife,** ***Birds***. Pre-construction nest surveys would identify nesting raptors and nest disturbance would be avoided. Adverse impacts would be reduced through implementation of the included BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**), OMP (WEST 2010b), and habitat offsets for protection of grassland habitat (Plank 2010). Impacts would be less than significant, because Special Status Species Significance Criteria 1, 2, and 3 (**Section 4.4.2**) would not be exceeded. The MBTA would be violated; however, based on the anticipated low level of mortality, impacts to raptors would be less than significant. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Crow Lake Alternative, raptor fatalities are expected to be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations..

Regal Fritillary Butterfly: Regal fritillary butterflies may occur in the area and suitable habitat is assumed to be present. Adverse impacts associated with construction include habitat loss and mortality. Habitat loss would be directly proportional to the amount of ground disturbance and would be minimal when compared to suitable habitat in the region. Regal fritillary butterflies were not observed during spring or summer avian use surveys, but there has been no survey specifically designed to determine the presence or absence of this species. No studies have evaluated the effects of wind farms on regal fritillary butterflies, and it is difficult to predict the disturbance and displacement effects. General studies of butterfly mortality attributed to turbine strikes indicate that it is likely low due to wind currents generated from turbine rotation (Grealey and Stephenson 2007). Construction activities would temporarily disturb regal fritillary butterflies in the vicinity and could result in habitat loss. Operation could result in collisions with turbines, resulting in injury or death. These impacts would be less than significant because Special Status Species Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded.

***Western's Proposed Federal Action***

Development of the Western system modifications at its Wessington Springs Substation would not cause the loss of habitat for wildlife species since any changes would be confined to a previously disturbed and graded area. Construction, operation and decommissioning activities could result in the direct mortality of wildlife species if they are not able to move away from equipment and vehicles traveling to the substation. There is a potential for wildlife-electrical equipment interactions during the operation of the proposed substation additions, but it is expected that the frequency of these interactions would be low. The substation additions would be designed in accordance with the latest APLIC guidelines (APLIC 2006), and would employ the included BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**). The effects of any interactions would be less than significant.

### 4.4.3.2 Winner Alternative

***Vegetation***

Construction of the Proposed Project Components would result in temporary and permanent impacts to existing vegetation within the Winner Alternative. The majority of these impacts would be in the mixed-grass prairie and cropland vegetation communities. The area of direct and indirect impacts within each vegetation class based on vegetation community mapping for the Proposed Project Components (Tierra EC 2009) is presented in **Table 4.4-2.** Additionally, the Winner Alternative would not result in temporary or permanent disturbance within USFWS grassland easements.

The Winner Alternative would result in the temporary disturbance of approximately 2,330 acres of mixed-grass prairie, 741 acres of cropland, 0 acres of wetlands, 63 acres of farmstead and already disturbed areas, 31 acres of shelterbelts, and 22 acres of deciduous forest. Construction at the Winner Alternative would result in the permanent disturbance of approximately 185.8 acres of mixed-grass prairie, 62 acres of cropland, 0 acres of wetlands, 8.2 acres of farmstead and already disturbed areas, 3.6 acres of shelterbelts and 0.9 acres of deciduous forest. Mixed-grass prairie is principally rangeland and pasture. Impacts that would occur to cultivated lands are not considered biologically significant because these lands are frequently disturbed by tilling, planting and harvesting activities associated with crop production.

The Winner Alternative would permanently remove approximately 185.8 acres of mixed-grass prairie (rangeland and pasture). These losses would be widely dispersed across the area which has 53,925 acres of mixed-grass prairie, amounting to a very small percentage of the total area (0.3 percent). Access roads would increase fragmentation of native rangeland, in some cases resulting in smaller patches of the remaining grassland types, although the Winner Alternative is currently a mosaic of mixed-grass prairie and cropland (**Figure 3.4-3),** more so than the Crow Lake Alternative.

**Table 4.4-2 Summary of Disturbance Areas within Vegetation Communities in the Winner Alternative**

| Vegetation Type | Total Temporary Disturbance (acres) | Total Permanent Disturbance (acres) |
|---|---|---|
| Mixed-grass prairie | 2,330 | 185.8 |
| Cropland | 741 | 62 |
| Wetlands | 0 | 0 |
| Farmstead | 63 | 8.2 |
| Shelterbelt | 31 | 3.6 |
| Deciduous forest | 22 | 0.9 |
| Total area | 3,187 | 261 |

Note: Discrepancies may exist in total values due to rounding.

The types of permanent and temporary loss of vegetation would be similar to those described in **Section 4.4.3.1, Vegetation**, although temporary and permanent disturbance areas would be more than double that for the Crow Lake Alternative, mainly due to the need for more access roads, longer underground collection lines and more crane walks.

Physical ground disturbance, construction vehicles and possibly increased public access could facilitate the establishment and spread of noxious weeds. South Dakota has 27 documented noxious weed species, 12 of which occur in Tripp County (see **Table 3.4-4**). The types of impacts would be similar to those described in **Section 4.4.3.1, Vegetation** for noxious weeds, although impacts may be higher at the Winner Alternative because more than twice the area would be disturbed.

Fugitive dust impacts would be similar to those described in **Section 4.4.3.1, Vegetation**, although more fugitive dust would be generated during construction, operation and decommissioning activities due to the larger temporary and permanent disturbance areas at the Winner Alternative.

The construction of more access roads could result in a greater increase in public access than that described in **Section 4.4.3.1, Vegetation**, although most new roads would be on private land and access would be limited.

These impacts would not affect the biological viability of any local, regional or national plant populations. Because the footprint of the Proposed Project Components is relatively small compared with the overall size of the Winner Alternative and much of the area is tilled annually for agricultural production, direct impacts to vegetation would be minimal.

Wetland delineations were not completed because this alternative was not chosen as the preferred alternative; however, delineations would be completed after final design if the alternative is selected. Wetland impacts would be avoided. If the Applicants cannot avoid wetland impacts, a Section 404 permit under the Clean Water Act would be obtained through the USACE.

Based on the minimal impacts to vegetation resources described above, impacts to Vegetation Significance Criteria 1 and 2 (**Section 4.4.2**) would not occur, and impacts to vegetation resources due to construction and operation of the Proposed Project Components would be less than significant.

***Wildlife***

<u>Mammals (excluding bats)</u>

The types of impacts to mammal species would be similar to those described in **Section 4.4.3.1, Wildlife, *Mammals,*** although the impacts would occur on a larger scale. The Winner Alternative would result in the temporary disturbance of 3,188 acres of habitat, while 261 acres would become permanently unavailable. The area permanently disturbed represents a relatively small amount (0.3 percent) of habitat available regionally. This small loss of habitat would not disrupt breeding, rearing or wintering behavior and would not influence the viability of local populations.

Noise, excavation and other forms of disturbance during construction could potentially temporarily displace more wildlife species than at the Crow Lake Alternative within or adjacent to the disturbed areas. Upon completion of construction, wildlife species would become accustomed to operation and maintenance activities and would be expected to resume utilization of the area. Permanent vegetation loss could destroy small mammal habitat, but population level effects would be negligible because only 0.3 percent of the area would be permanently disturbed.

The probability for direct mortality of species resulting from construction activities or vehicle collision is low at the Winner Alternative, although it is higher than at the Crow Lake Alternative. Based on the minimal impacts to mammals described above, Wildlife Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded, and impacts to mammals would be less than significant.

<u>Bats</u>

Construction could affect bats through direct mortality, habitat loss and fragmentation and disturbance effects (SDBWG and SDGFP 2009). Bat use surveys for the Winner Alternative are ongoing. There are no known roosts within or adjacent to the area. The probability of construction-related bat mortality is extremely low given their mobility and the absence of any roosts. Habitat loss and fragmentation effects to bats are also expected to be minimal. The permanent loss of approximately 184 acres of mixed-grass prairie foraging habitat would not represent an adverse effect to bats given the large adjacent tracts of similar habitat. No shrub or forested riparian habitats or other areas of concentrated bat use would be affected. A total of 3.6 acres of shelterbelt and 0.9 acres of deciduous forest, representing less than 0.2 percent of potential daytime roosting habitat, may be permanently removed. Construction would generally occur during daylight hours and would not result in any disturbance effects for these nocturnal animals.

Operation and maintenance impacts to bats would be similar to those described in **Section 4.4.3.1, Wildlife, *Bats***, although the increase in access roads could further fragment foraging habitat for bats.

Collision-related bat mortality would be similar to that described in **Section 4.4.3.1, Wildlife, *Bats***. However, bat call studies in 2009 indicate lower bat activity in the Winner Alternative area so the frequency of collisions may be low.

The level of bat activity documented at the Winner Alternative was similar to bat activity at facilities in Minnesota and Wyoming, where bat mortality was low. Assuming that a relationship between bat activity and bat mortality exists, relatively low levels of bat mortality would be expected to occur in the Winner Alternative; most likely during August and September given that there appears to be some migration through the region. Based on fatality rates at wind-energy facilities in the Midwest, the bat use observed at this site, and habitat of the site, it is expected that the potential risk to bats from turbine operations would be similar to the rates observed at other Midwest facilities (Derby *et al.* 2010b).

Collision-related bat mortality has been documented at most wind farms in the western U.S. (Erickson *et al.* 2002). Annual bat mortality rates have ranged between 0.74 and 2.3 fatalities per turbine at wind farms in Wyoming, Oregon and Minnesota (Young *et al.* 2003a). Researchers have concluded that observed mortality rates do not have population-level effects, and no significant difference has been noted in mortality rates at lit and unlit turbines (Johnson *et al.* 2003). However, bat populations in the northeastern United States have been experiencing recent declines due to a fungus (white-nose syndrome) that is found in caves. If bat populations living in caves in South Dakota that migrate through the Winner Alternative have been infected with this fungus, wind turbine mortalities could have a more significant cumulative impact on these populations. However, little is known about bat populations in South Dakota. Most mortality has involved migrant or dispersing bats rather than residents (Johnson 2005; Johnson *et al.* 2003; Keeley 2001). Bat mortality from collisions with turbines at the Winner Alternative would likely occur.

Bat use recorded by ground detectors within the Winner Alternative during the fall was similar to activity recorded at wind facilities in Minnesota and Wyoming, where fatality rates were relatively low. Thus, based on the expected relationship between pre-construction bat use and post-construction fatalities, bat mortality rates at the Crow Lake Alternative would be expected to be similar to the 2.1 bat fatalities/MW/year reported at Buffalo Ridge Minnesota or 340 bat fatalities per year (based on 162 MW project), and much lower than the 34.9 fatalities/MW/year (Derby *et al.* 2010b). Based on the results of fatality surveys elsewhere in the Midwest region, fatalities at the Winner Alternative would range between 0.76 and 10.27 bat fatalities/MW/year (Derby *et al.* 2010b), or 123 to 1,664 bat fatalities per year (based on 162 MW project).

Based on the expected impacts to bats described above, Wildlife Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded, and impacts to bats would be less than significant.

<u>Reptiles/Amphibians</u>

The types of impacts to reptiles and amphibians would be similar to those described in **Section 4.4.3.1, Wildlife, *Amphibians/Reptiles***, although impacts may be higher at the Winner Alternative because there would be more than twice the area disturbed. These impacts would be minimal based on the small amount of habitat that would be temporarily and permanently removed and the low likelihood for direct mortality of individuals. Wildlife Significance Criteria

1 and 2 would not be exceeded, and impacts to reptiles/amphibians would be less than significant.

Birds

The 2008 PII study (**Appendix G**) evaluated possible impacts to biological resources in accordance with USFWS guidelines. The Winner PII score of 269 is lower than that of the Lake Andes National Wildlife Refuge reference area (PII of 331) but higher than that of the Crow Lake Alternative (PII of 239). The higher score can be attributed to the presence of more wetlands and grassland areas. WEST, Inc. is conducting additional migratory and breeding bird surveys in the site area. These data have been incorporated into this assessment of potential impacts to avian species.

Construction impacts common to all avian species include direct mortality, habitat alteration (fragmentation) or loss and disturbance related to noise and increased human presence resulting in the displacement of individual birds. The types of construction impacts would be similar to those described in **Section 4.4.3.1, Wildlife, *Birds*** for avian species, although impacts may be higher at the Winner Alternative because there would be more than twice the area of disturbance. While the design and application of the included BMPs, APMs, OMP (WEST 2010b), and habitat offsets (Plank 2010) (as listed in **Chapter 2, Table 2.2 and Table 2.3**) would further reduce fatalities related to nest abandonment, avian mortality would occur. Wildlife Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded. The MBTA would be violated if nest abandonment occurs; however, based on the anticipated low level of mortality, impacts to birds would be less than significant.

The Proposed Project Components would result in the permanent loss of 184 acres of mixed-grass prairie habitat (**Table 4.4-2**), which represents a small proportion of the area (0.2 percent). The spacing of turbines and access roads could contribute to habitat fragmentation and may be higher at the Winner Alternative because of the need for more access roads; however, the amount of fragmentation expected from the Winner Alternative would be small and may only slightly increase the current level of fragmentation. Construction noise and associated human activity could temporarily disturb or displace individual birds, and may interfere with migrating, foraging, breeding and nesting; these impacts are expected to be higher for the Winner Alternative. Construction-related disturbance would be limited to a single migratory (both spring and fall) and breeding-nesting season; however, survival and reproductive success would be temporally reduced. While the design and application of the included BMPs, APMs, OMP (WEST 2010b), and habitat offsets (Plank 2010) (as listed in **Chapter 2, Table 2.2 and Table 2.3**) would further reduce fatalities, avian mortality would occur. Wildlife Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded. The MBTA would be violated; however, based on the anticipated low level of mortality, impacts to birds would be less than significant. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Crow Lake Alternative, bird fatalities are expected to be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations.

Operation and maintenance of the Proposed Project Components could affect avian species through direct mortality, disturbance and displacement and habitat fragmentation, as described in **Section 4.4.3.1, Wildlife, *Birds***.

Avian use studies showed level of use based on habitat type to be similar to other wind facilities (Derby *et al.* 2010d); therefore, avian fatalities are expected to be around 198 per year at the Winner Alternative. This is a relatively low number when compared to the 6,226 individual birds observed during the 2009 avian surveys. Based on these data, population impacts at the local level are not anticipated.

Based on the results from other wind farms, a ranking of seasonal mean raptor use in the Winner Alternative during spring, summer, and fall of 2009 was low (0.23, 0.13, and 0.27 raptors/plot/20-min survey, respectively) relative to other existing and proposed wind-energy facilities with spring, summer, or fall data (Derby *et al.* 2010d)(**Table 3.4-10**). The Winner Alternative ranked fortieth compared to 44 other wind-energy facilities with spring data, forty-first compared to 41 other wind-energy facilities with summer data, and twenty-seventh compared to 38 other wind-energy facilities with fall data. Based upon these data, raptor use of the Winner area is lower than that observed at most existing and proposed wind farms (Derby et al. 2010d), and it is lower than that observed at the Crow Lake Alternative. Raptor mortalities are expected to be relatively low (0.006 raptors per turbine per year). If raptor mortalities occur at this rate, it is estimated that 0.65 raptor mortalities per year may occur at the Winner Alternative. Based on these data, population impacts at the local level are not anticipated.

As described in **Section 4.4.3.1, Wildlife, *Birds*** and through implementation of the included BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**), measures have been included to reduce avian mortality. Data obtained through baseline avian use surveys and habitat characterization suggest that avian mortality rates are likely to be similar to or lower than those experienced at other wind farms. While the design and application of the included BMPs, APMs, OMP (WEST 2010b), and habitat offsets (Plank 2010) (as listed in **Chapter 2, Table 2.2 and Table 2.3**) would further reduce fatalities, avian mortality would occur. Wildlife Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded. The MBTA would be violated; however, based on the anticipated low level of mortality, impacts to birds would be less than significant. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Crow Lake Alternative, bird fatalities are expected to be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations..

Noise and human activities associated with operation and maintenance of the Proposed Project Components would result in temporary disturbance similar to those discussed for construction, but at reduced intensity. Regional roads may experience increased traffic due to interest in seeing the operational turbines; traffic would generally be restricted to public roads, thereby minimizing potential impacts. New roads would be constructed for access to the turbines, but the majority of these roads would be gated and located on private land, minimizing or eliminating increased public access.

The presence of turbines and operation and maintenance activities could result in longer-term effects, including avoidance and abandonment of habitats in proximity to the turbines (see **Section 4.4.3.1, Wildlife, *Birds***). Baseline surveys were conducted to assess pre-construction avian abundance and habitat use in the Winner Alternative. Reference sites have also been established outside of potential impact areas within the Winner Alternative boundary for comparison. Post-construction monitoring would continue pre-construction baseline surveys for three years to evaluate species-specific changes in abundance, habitat use and displacement effects associated with operation of the Proposed Project Components compared to general avian communities (**Chapter 2, Tables 2.2 and 2.3**). In addition, whooping crane and sandhill crane monitoring would occur concurrently for a minimum of three years. Both of these studies would improve the understanding of species-specific disturbance and displacement effects associated with development of the Proposed Project Components. Based on very limited data, displacement effects may be in the range of 1.9 acres to 31 acres per turbine (although this may vary by species and does not represent a 100 percent exclusion), or 205 to 3,348 acres in the Winner Alternative (out of 53,925 acres of grassland habitat) (Johnson *et al.* 2000; Erickson *et al.* 2007; Shaffer and Johnson 2009). The Applicants have committed to habitat offsets that would be used to purchase and protect in-kind habitats to offset potential impacts (Plank 2010). Based on the small acreage that may be impacted by displacement effects and proposed habitat offsets, impacts would be less than significant, and Wildlife Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded.

Operation and maintenance activities and the presence of turbines could also fragment habitat for grassland species. The Winner mixed-grass prairie ecosystem is relatively fragmented, mainly due to the presence of cropland, roads, and farmsteads, although it is more intact than the Crow Lake Alternative. Human activity, turbines and access roads could further fragment habitats for avian species; however, the amount of fragmentation expected from the Winner Alternative would be small and may only slightly increase the current level of fragmentation. The actual fragmentation effects are difficult to quantify, but would likely be species-specific and could disrupt movement between seasonal habitats. In the worst case, these effects would lead to some reduction of breeding success, productivity and survival. The post-construction monitoring program would help determine fragmentation effects.

Based on the localized impacts to birds described above and implementation of the included BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**), OMP (WEST 2010b), and habitat offsets. (Plank 2010), Wildlife Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded. The MBTA would be violated; however, based on the anticipated low level of mortality, impacts to birds would be less than significant. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Crow Lake Alternative, bird fatalities are expected to be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations. Special Status Species

### *Special Status Species*

Federal-Listed Species

Whooping Crane: Suitable habitat for the whooping crane in the Winner Alternative includes stop over, roosting and foraging habitats. The Winner Alternative is within the Aransas-Wood Buffalo Population migration corridor. Previous sightings in the region, large numbers of sandhill cranes (a surrogate species of the whooping crane), and the presence of suitable habitat make it possible that whooping cranes occasionally fly over and land in the Winner Alternative during seasonal migrations. Operating turbines could pose a threat. Whooping crane occurrence increases closer to the Missouri River, the approximate centerline of the migration corridor 25 miles east of the Winner Alternative. Suitable habitat is present throughout the migration corridor, and whooping cranes have been documented in the Winner Alternative. Use of the entire corridor is likely during any migratory cycle. Inclement weather, predation and human disturbance may cause whooping cranes to stray from the centerline of the migration corridor. Structures, such as wind turbines and transmission lines, pose a collision risk for whooping cranes due to poor visibility during inclement weather and poor flying agility of cranes. Transmission line collisions are the most common source of mortality for fledged whooping cranes. To date, there are no documented occurrences of whooping crane collisions with wind turbines; however, it is theoretically foreseeable. As included in the BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**), the entire length of the new transmission line would be marked and maintained in perpetuity with line marking devices according to manufacturer specifications and the Applicants' engineering specifications to reduce the risk to whooping cranes.

*Direct Effects*

Examples of direct effects to whooping cranes include permanent and temporary loss of habitat and mortality associated with collisions. This section considers both the temporary and permanent impacts to various land cover types and the risk of mortality from turbine blade strikes and transmission line strikes.

*Permanent and Temporary Impacts to Land Cover*

If construction were to occur during the migration season, the disturbance would likely result in avoidance of the site by whooping cranes and a temporary reduction in available migration habitat. During placement of the turbines and construction of associated infrastructure, approximately 3,071.0 acres of suitable habitat would be temporarily disturbed (**Table 4.4-2**), the majority occurring on mixed-grass prairie and cropland (99 percent). **Table 4.4-2** indicates that no wetlands would be temporarily impacted; roads would be routed around wetlands and collector lines would be directionally drilled to avoid wetland impacts. Additionally, there would be no direct disturbance to or permanent loss of wetland areas. Habitats that are temporarily disturbed would be reclaimed and are expected to return to their former condition. The amount of land lost permanently would be significantly less than the land temporarily disturbed; approximately 185.8 acres of mixed-grass prairie and 62.0 acres of cropland (**Table 4.4-2**).

Many landowners have conservation easements on their properties. All of the easements within the site area are administered by the USFWS, and include grassland easements. There are approximately 220 acres of grassland easements in the site (**Figure 3.4.4**). Construction of the turbines and associated infrastructure would not impact those grassland easements temporarily and permanently. The NRCS administers CRP easements but does not disclose locations of CRP land, therefore, these acreages are not included in **Table 4.4.2**.

*Direct Mortality*

Potential impacts resulting from direct mortality are the same as discussed for the Crow Lake Alternative in **Section 4.4.3.1, Special Status Species, *Federally-listed Species*, Whooping Crane**. It is anticipated that the level of direct collision mortality, if it occurs, is likely to be extremely low. Also, if they avoid the wind facility altogether direct mortality would not occur. Monitoring during and after construction would result in immediate reporting in the unlikely event of crane mortality, and curtailment of turbine operations (**Appendix G**).

*Indirect Effects*

Potential impacts related to avoidance of the stopover habitat located within the area of the proposed facilities (turbines, transmission lines, access roads, substations, O&M building) by whooping cranes are the same as discussed for the Crow Lake Alternative in **Section 4.4.3.1, Special Status Species, *Federally-listed Species*, whooping crane**. However, there are 27 wetlands (143.6 acres) within a half-mile of turbines in the Winner Alternative. Based on the anecdotal observations that sandhill cranes appear to avoid wind project areas, whooping cranes may also avoid these 27 wetlands, indicating more of a potential impact than the Crow Lake Alternative.

Based on current information and the possibility for avoidance of the Winner Alternative by the species during migration, it is unlikely, although possible, that the proposal would result in the direct mortality of a whooping crane. There would be a relatively small permanent loss of suitable stopover habitat. Avoidance of the site by whooping cranes could result in indirect effects as described above. The entire length of the new 11-mile transmission line would be marked as a voluntary conservation measure. The Applicant would also provide funding for the purchase and permanent protection of stopover habitat (habitat offsets) and implement the OMP described in the BA (**Appendix G**). The Winner Alternative was not analyzed in the BA; however, the effects determination would likely be the same as for the Crow Lake Alternative. With the proposed avoidance, minimization, and voluntary conservation measures in place, Special Status Species Criteria 1, 2, and 3 would not be exceeded and potential impacts to the whooping crane would be less than significant, provided no take occurs. If the Winner Alternative is chosen  Section 7 consultation would be reinitiated for the Winner Alternative in order to further analyze impacts to this species, and Western and RUS would also follow USFWS conditions provided in the BO.

<u>American Burying Beetle:</u> Suitable habitat for the American burying beetle occurs within most of the Winner Alternative and the beetle has been documented in the area. Suitable habitat could include mixed-grass prairie, deciduous forest and shelterbelts (56,650 acres). It is difficult to estimate the population with the area, although temporary and permanent disturbance could result in disturbance and loss of 2,367 acres and 189 acres of habitat, respectively.

Because so little is known about the distribution of the American burying beetle, it is plausible that local population level impacts could occur with implementation of the Winner Alternative although impacts are expected to be less than significant because Special Status Species significance criteria 1, 2, and 3 would not be exceeded. If this alternative is chosen, Section 7 consultation would be reinitiated in order to further analyze impacts to this species.

State-Listed Species

Bald Eagle: The bald eagle occurs in the Winner Alternative during winter months as a transient resident, although it is not likely that they use the area regularly. The Winner Alternative could affect the bald eagle as a result of temporary disturbance or displacement associated with construction, operation and decommissioning activities, minor losses of foraging habitat, and mortality of individuals via collision with turbines and transmission lines. Traffic, noise and human presence during construction, operation and decommissioning could displace individual bald eagles foraging in the vicinity. However, the Winner Alternative contains a limited amount of suitable foraging habitat, so construction, operation and decommissioning activities would have minimal effect on bald eagles. The included BMPs and APMs (as listed in **Chapter 2, Tables 2.2 and 2.3**), including the OMP, would be implemented as part of the wind facility to minimize disturbance and displacement effects. Construction activities would be modified or curtailed when bald eagles are present to reduce disturbance. Also, construction crews would be instructed to avoid disturbing or harassing wildlife (including bald eagles) and to report any bald eagle sightings to the appropriate agencies as dictated by the project-specific OMP.

The Winner Alternative is not likely to result in bald eagle mortality. Raptor mortality has been relatively low at wind farms and, prior to 2010, there were no reported bald eagle fatalities at any wind facilities in the western U.S. (Erickson *et al.* 2002; Johnson *et al.* 2000; Young *et al.* 2003). One bald eagle was recently killed at a wind facility in Wyoming where the nest was close to the facility (Gates 2010). The probability of bald eagle mortality would be further minimized because there are very few roosting trees and no known nests in the Winner Alternative. The collection system would be underground, eliminating the risk of collision and electrocution from those lines. Overhead transmission lines would be constructed using Avian Power Line Interaction Committee (APLIC) guidelines to reduce the potential for collision or electrocution (APLIC 2006). As included in the BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**), the new transmission line would be marked with line marking devices. Impacts would be less than significant, because Special Status Species Significance Criteria 1, 2, and 3 (**Section 4.4.2**) would not be exceeded. If an eagle take occurs, the BGEPA and MBTA would be violated. In that case, consultation and mitigation of take with the USFWS would be required; however, impacts to bald eagle would be less than significant based on the anticipated low level of mortality. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the BGEPA and MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Winner Alternative, bald eagle fatalities are not expected or would be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations.

Peregrine Falcon: The peregrine falcon occurs in the Winner Alternative during winter months as a transient resident and migrant, although it is not likely that they use the area regularly. The

Winner Alternative could affect the peregrine falcon as a result of temporary disturbance or displacement associated with construction, operation and decommissioning activities, minor losses of foraging habitat, and mortality of individuals via collision with turbines and transmission lines. Traffic, noise and human presence during construction, operation and decommissioning could displace individual peregrine falcons foraging in the vicinity or migrating through the area. However, the Winner Alternative contains a limited amount of suitable foraging habitat, so construction, operation and decommissioning activities would have minimal effect on peregrine falcons. The included BMPs and APMs (as listed in **Chapter 2, Tables 2.2 and 2.3**), including the OMP, would be implemented as part of the Winner Alternative to minimize disturbance and displacement effects.

The Winner Alternative is not likely to result in peregrine falcon mortality. Raptor mortality has been relatively low at wind farms (Erickson *et al.* 2002; Johnson *et al.* 2000; Young *et al.* 2003). The probability of peregrine falcon mortality would be further minimized because there are very few roosting trees and no nesting habitat in the Winner Alternative. The collection system would be underground, eliminating the risk of collision and electrocution from new transmission lines. Overhead transmission lines would be constructed using APLIC guidelines to reduce the potential for collision or electrocution (APLIC 2006). As included in the BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**), the new transmission line would be marked with line marking devices. Impacts would be less than significant, because Special Status Species Significance Criteria 1, 2, and 3 (**Section 4.4.2**) would not be exceeded. If a falcon take occurs, the MBTA would be violated; however, impacts to peregrine falcons would be less than significant based on the anticipated low level of mortality. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Winner Alternative, peregrine falcon fatalities are not expected or would be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations.

<u>Fish Species (blacknose shiner, northern redbelly dace, pearl dace):</u> Direct impacts on the blacknose shiner, northern redbelly dace and pearl dace would be unlikely because turbines would be placed in upland areas. There is the possibility for indirect impacts due to the construction of stream crossings for access roads and collection lines introducing sedimentation into stream channels. Increased sedimentation can result in the loss of spawning substrate, which may reduce recruitment. Siltation of gravel substrate may also greatly reduce invertebrate populations, thereby affecting the food source for these species. Access roads would be designed as low-water, at-grade gravel crossings, or culverts would be installed, reducing impacts to fish habitat. The roadbed would be designed to allow water to percolate through the gravel overlay. Construction would not involve any dewatering practices or disruption of the streambed. No damming effect would occur. Any increases in sedimentation would be short term during the construction phase. Sedimentation is not expected to increase as a result of operation and maintenance activities.

Other possible indirect impacts to fish species include the introduction of hazardous waste into stream channels through accidental spilling. This risk would be minimized by maintaining refueling areas and hazardous waste storage areas away from the stream channels.

Stormwater and erosion and sediment control BMPs and APMs would be used during construction and operation of the Proposed Project Components including the use of directional boring under all streams with flowing water, silt traps, stream bank stabilization and revegetation of disturbed areas adjacent to perennial streams. Impacts to this species would be less than significant because Special Status Species Significance Criteria 1, 2 and 3 (**Section 4.4.2**) would not be exceeded.

State and Federal Species of Concern

Greater Prairie Chicken and Sharp-tailed Grouse: Suitable habitat for greater prairie chickens and sharp-tailed grouse is present in the Winner Alternative, and active leks are known in the area (Derby et al. 2010d). Construction effects would be similar to those described in **Section 4.4.3.1, Wildlife, *Birds*** for grassland species, although more leks were confirmed at the Winner Alternative, so impacts may be higher. To minimize effects upon Greater prairie chickens and sharp-tailed grouse, no construction activities would be permitted within a pre-determined radius of known, active leks between March 1 and May 1, and the Applicants would provide habitat offsets for protection of grassland habitat. The Applicant prepared a Grouse Survey and Monitoring Protocol and OMP (WEST 2010b) that was approved by SDGFP and includes up to 10 years post-construction monitoring of prairie grouse at the preferred alternative, if this were to be selected. Impacts would be less than significant because Special Status Species Significance Criteria 1, 2, and 3 (**Section 4.4.2**) would not be exceeded.

Possible operation and maintenance impacts for greater prairie chickens and sharp-tailed grouse are similar to those described in **Section 4.4.3.1, Wildlife, *Birds***, although more leks were confirmed (Derby et al. 2010d) so impacts to these species may be higher. Impacts would be less than significant, because Special Status Species Significance Criteria 1, 2, and 3 (**Section 4.4.2**) would not be exceeded.

Noise and human activities associated with operation and maintenance would result in temporary disturbances to greater prairie chickens and sharp-tailed grouse similar to those previously discussed in **Section 4.4.3.1, Wildlife, *Birds***. These temporary disturbances and would represent a less than significant impact, because Special Status Species Significance Criteria 1, 2, and 3 (**Section 4.4.2**) would not be exceeded.

Grassland Bird Species (Chestnut-collared longspur, grasshopper sparrow, western meadowlark, upland sandpiper, marbled godwit, long-billed curlew, lark bunting, orchard oriole, prairie falcon, red-headed woodpecker, loggerhead shrike, dickcissel): Grassland species of concern occur in the Winner Alternative as migratory and breeding residents. Suitable non-breeding and breeding habitat is present for these species, and several were observed during spring and summer surveys. Adverse impacts associated with construction, operation and decommissioning would be similar to those described in **Section 4.4.3.1, Wildlife, *Birds.***

Adverse impacts associated with construction, operation and decommissioning would be similar to those described in **Section 4.4.3.1, Wildlife, *Birds*** and would be reduced through implementation of the included BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**), OMP (WEST 2010b), and habitat offsets for protection of grassland habitat (Plank 2010). Impacts would be less than significant because Special Status Species Significance Criteria 1, 2, and 3

(**Section 4.4.2**) would not be exceeded. The MBTA would be violated; however, based on the anticipated low level of mortality, impacts to grassland birds would be less than significant. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Crow Lake Alternative, bird fatalities are expected to be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations.

<u>Wetland Bird Species (American bittern, Wilson's phalarope, black tern, trumpeter swan, American white pelican):</u> Wetland bird species may occur in the Winner Alternative as summer residents, since suitable breeding habitat is present. Wilson's phalaropes were observed during spring or summer surveys; the other four species were not observed (Derby et al. 2010d). Pre-construction nest surveys would identify nesting species and nest disturbance would be avoided.

Construction activities would temporarily disturb wetland species in the vicinity. Operation may result in collisions with turbines, causing injury or death. Adverse impacts would be reduced through implementation of the included BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**), OMP (WEST 2010b), and habitat offsets for protection of grassland habitat (Plank 2010). Impacts would be less than significant, because Special Status Species Significance Criteria 1, 2, and 3 (**Section 4.4.2**) would not be exceeded. The MBTA would be violated; however, based on the anticipated low level of mortality, impacts to wetland birds would be less than significant. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Crow Lake Alternative, bird fatalities are expected to be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations..

<u>Raptor Species (northern harrier, ferruginous hawk, Swainson's hawk, burrowing owl):</u> Raptor species may occur in Winner Alternative as summer residents, and suitable breeding habitat is present (Derby et al. 2010d). Adverse impacts associated with construction, operation and decommissioning would be similar to those described in **Section 4.4.3.1, Wildlife, *Birds.*** Adverse impacts would be reduced through implementation of the included BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**), OMP (WEST 2010b), and habitat offsets for protection of grassland habitat (Plank 2010). Impacts would be less than significant, because Special Status Species Significance Criteria 1, 2, and 3 (**Section 4.4.2**) would not be exceeded. The MBTA would be violated; however, based on the anticipated low level of mortality, impacts to raptors would be less than significant. This reasoning is based on the fact that all wind facilities result in bird fatalities and therefore violate the MBTA; however, fatality rates differ at all facilities and some are higher than others. Based on existing avian use data from the Crow Lake Alternative, raptor fatalities are expected to be low compared with other wind facilities around the United States and are therefore not expected to affect the viability of local, regional, or national populations.

<u>Plains Spotted Skunk:</u> Plains spotted skunks occur in the northern portion of the Winner Alternative just south of Winner (SDNHP 2009). Impacts to this species would be similar to those described in **Section 4.4.3.1, Wildlife, *Mammals***, although they would occur on a larger scale. Overall, 2,314/ 184 acres of mixed-grass prairie and 741/ 62 acres of cropland would be

temporarily/ permanently disturbed, respectively. The area of habitat permanently disturbed represents a relatively small amount (0.3 percent) of habitat available regionally. This small loss of habitat would not disrupt breeding, rearing or wintering behavior and would not influence the viability of local populations. Impact to plains spotted skunk would be less than significant because Special Status Species Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded.

Plains Topminnow: Direct impacts on the Plains topminnow would be unlikely because turbines would be placed in upland areas. There is the possibility for indirect impacts due to the construction of stream crossings for access roads and collection lines introducing sedimentation into stream channels. Increased sedimentation can result in the loss of spawning substrate, which may reduce Plains Topminnow recruitment. Siltation of gravel substrate may also greatly reduce invertebrate populations, thereby affecting the food source for this species. Access roads would be designed as low-water, at-grade gravel crossings or culverts would be installed, reducing impacts to fish habitat. The roadbed would be designed to allow water to percolate through the gravel overlay. Construction would not involve any dewatering practices or disruption of the streambed. No damming effect would occur. Any increases in sedimentation would be short term during the construction phase. Sedimentation is not expected to increase as a result of operation and maintenance activities.

Other possible indirect impacts to fish species include the introduction of hazardous waste into stream channels through accidental spilling. This risk would be minimized by maintaining refueling areas and hazardous waste storage areas away from stream channels.

Stormwater and erosion and sediment control BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**) would be used during construction and operation of the Proposed Project Components including the use of directional boring under all streams with flowing water, silt traps, stream bank stabilization and revegetation of disturbed areas adjacent to perennial streams. Impacts to this species would be less than significant because Special Status Species Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded.

Plains Leopard Frog: Impacts to plains leopard frog could include temporary and permanent loss of grassland dispersal habitat and equipment or vehicle collisions along roads in dispersal habitat. Impacts to breeding habitat are not expected because there are only isolated areas of standing or flowing water in the Winner Alternative and these areas would be avoided by placing access roads and turbines in upland areas. Impacts to this species would be less than significant based on the small amount of habitat that would be temporarily or permanently removed and Special Status Species Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded.

Lesser Earless Lizard: Impacts to lesser earless lizard could include temporary and permanent loss of habitat and equipment or vehicle collisions along roads within suitable habitat. This species prefers sparsely vegetated areas in short grass ecosystems, including prairie dog towns. Unless heavily grazed, grassland habitats in the Winner Alternative do not support high-quality habitat and the prairie dog town would not be impacted by development of the Proposed Project Components; therefore, very little habitat would be impacted. Impacts to this species would be less than significant based on the small amount of habitat that would be temporarily or permanently removed, and Special Status Species Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded.

Western Box Turtle: Preferred habitat for the western box turtle (lakes, rivers and large streams) would not be impacted by the Proposed Project Components. Impacts to this species are not anticipated. Therefore, impacts to this species would be less than significant because Special Status Species Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded.

Regal Fritillary Butterfly: Regal fritillary butterflies are known to occur five miles south of the Winner Alternative and suitable habitat may be present. Adverse impacts associated with construction include habitat loss and mortality. Habitat loss would be directly proportional to the amount of ground disturbance. Regal fritillary butterflies were not observed during spring or summer avian use surveys, but there has been no survey specifically designed to determine the presence or absence of this species. No studies have evaluated the effects of wind farms on regal fritillary butterflies, and it is difficult to predict the disturbance and displacement effects. General studies of butterfly mortality attributed to turbine strikes indicate that it is likely low due to wind currents generated from turbine rotation (Grealey and Stephenson 2007). Construction activities would temporarily disturb regal fritillary butterflies in the vicinity and could result in habitat loss. Operation could result in collisions with turbines, resulting in injury or death. These impacts would be less than significant because Special Status Species Significance Criteria 1 and 2 (**Section 4.4.2**) would not be exceeded.

***Western's Proposed Federal Action***

Development of the Western system modifications at its Winner Substation would not cause the loss of habitat for wildlife species since any changes would be confined to a previously disturbed and graded area. Construction, operation and decommissioning activities could result in the direct mortality of wildlife species if they are not able to move away from equipment and vehicles traveling to the substation. There is a potential for wildlife-electrical equipment interactions during the operation of the proposed substation additions, but it is expected that the frequency of these interactions would be low. The substation additions would be designed in accordance with the latest APLIC guidelines, and would employ the included BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**). The effects of any interactions would be less than significant.

### 4.4.3.3 No Action Alternative

Under the No Action Alternative, Western would not approve an interconnection request for the Proposed Project with the Applicants and/or RUS would not approve financing. For the purpose of impact analysis and comparison in this EIS, it is assumed that the Applicants' Proposed Project (and Wind Partners' proposed development as it pertains to the Crow Lake Alternative) would not be built and that the environmental impacts associated with construction and operation of the Proposed Project would not occur. There would be no biological resource impacts associated with the No Action Alternative.

# 4.5 CULTURAL RESOURCES

The Proposed Project and Wind Partners' proposed development must comply with Federal laws relating to identification, management, and protection of cultural resources. Western and RUS assessed the existing previously recorded cultural resource data for the Proposed Project and Wind Partners' proposed development under the requirements, including those in Section 106 of the NHPA and its implementing regulations (36 CFR Part 800). This EIS is not intended to address all of the requirements of Section 106. Western and RUS have collected information on historic properties in each alternative area through site records searches and public scoping meetings. For the preferred alternative they have completed a comprehensive inventory of the APE. Any minor changes to the APE would be inventoried prior to construction.

Resources listed or eligible for listing in the NRHP are defined by the regulations as "historic properties" and impacts to these resources must be considered. In addition, there may be areas of interest to Native Americans, such as traditional use areas or TCPs that extend outside the geographic boundaries of the site alternative areas. These concerns must be considered through consultation with interested tribes.

## 4.5.1 METHODS

A Class I cultural resources inventory was completed for both the Crow Lake and Winner alternatives. 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 area, and a review of 19th century Public Land Survey maps. Information used in the cultural resources analysis for this EIS includes:

- A Class I survey/records review
- Review of General Land Office maps
- Review of historic atlases
- Review of topography (slope, proximity to water, *etc*.)
- Research on Indian/pioneer/military conflict areas and trails and whether any occur within the Proposed Project alternatives

Areas that typically have a high level of sensitivity include those with the ecological or environmental, ethnohistorical, and historical potential to contain habitation sites and some temporary camps, all cremation and burial sites (and all sites described as containing evidence of human remains), rock art, intaglios, TCPs, and sites of any type that would be eligible to be included on national and State registers. Habitation sites and some temporary camps may hold significant scientific research potential and may also be of traditional cultural significance to Native Americans. Sites with evidence of human remains, rock art, intaglios, and TCPs are of demonstrated significance to Native Americans.

Areas that typically have a moderate level of sensitivity include those with conditions similar to what is described for areas of high sensitivity, but which have been subject to disturbance (such as agricultural activities) or other diminishing conditions; and as a result of these disturbances, the surface expression of the site may be less apparent.

Areas that typically have a low level of sensitivity include those that lack the ecological or environmental, ethnohistorical, and historical potential to contain sites of any type that would be eligible to be included on national and State registers. Isolates and single category sites, such as lithic or ceramic scatters are generally considered to have relatively low sensitivity because of their limited research potential. However, it is acknowledged that even an isolate (for example a Clovis point or a ceremonial object) could be significant to Native Americans and researchers. It should be noted that, when considered alone, many areas with these types of sites may be classified as having low to moderate sensitivity; however, such sites may acquire greater importance when considered part of a district of sites that together contain information relevant to answering important research questions.

Additional studies were conducted for the Crow Lake Alternative including a Class III pedestrian survey, a survey of historic architectural properties within the Proposed Project Components viewshed, and a TCP survey. The Class III pedestrian survey was conducted using parallel zig-zag pedestrian transects spaced at 15 meter intervals. The survey covered 125-foot wide corridors and 101 500 feet by 500 feet turbine blocks. Site boundaries and individual features were recorded with Magellan Professional CX GPS units, and representative electronic photographs were taken of the project area, sites, and individual site features. Appropriate site sketch maps were produced and field notes were maintained. Native American representatives accompanied the archaeological crew during the Class III survey to identify potential TCPs. A survey of historic architectural properties within the Proposed Project Components viewshed was conducted and identified potential viewshed impacts that would result from the Proposed Project and Wind Partners' proposed development. An intertribal TCP survey was conducted for the Crow Lake Alternative, following the Class III survey, and included the efforts of multiple representatives from interested Tribes.

Additional Class III field surveys, surveys of historic architectural properties within the Proposed Project Components viewshed, and TCP surveys would be conducted as needed to evaluate additional areas of disturbance that may be identified as a result of final engineering of the Proposed Project and the Wind Partners' proposed development.

### 4.5.2 SIGNIFICANCE CRITERIA

The threshold of significance for cultural resources is based on whether the resource is listed in, or considered eligible for listing in, the NRHP. There are four criteria under the regulations implementing the NHPA in 36 CFR 60.4 used to evaluate the significance and integrity of a resource. The degree of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or (b) that are associated with the lives of persons significant in our past; or (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or (d) that has yielded, or may be likely to yield, information important in prehistory or history.

Within the context of the NHPA, effects to sites are classified as "no adverse effect" or "adverse effect." Under NEPA, a significant impact to cultural resources would occur if a site of archaeological, tribal, or historical value that is listed or eligible for listing in the NRHP could not be avoided or mitigated during siting and construction of the Proposed Project. In addition, NEPA regulations consider impacts to cultural resources as "direct" or "indirect." Under the regulations implementing Section 106 of the NHPA, the definition of direct or indirect refers to the APE within which the Federal undertaking may directly or indirectly cause alterations in historic properties (36 CFR 800.16[d]). Therefore, avoidance or mitigation of historic properties can ensure that sites are not adversely impacted (NHPA) and that there are no significant impacts (NEPA).

## 4.5.3 IMPACT ASSESSMENT

A portion of the Crow Lake Alternative and the majority of the Winner Alternative would be located on rangeland and agricultural lands, where surface cultural resources may have already been disturbed. Earthmoving activities, such as grading and digging, have the highest potential for disturbing or destroying significant cultural resources; however, pedestrian, animal, and vehicular traffic and indirect impacts of earthmoving activities, such as soil erosion, could also have an effect. The construction and decommissioning of the infrastructure necessary for wind-powered facilities has the greatest potential to impact subsurface cultural resources because of the increased ground disturbance during these phases.

Visual impacts to significant historic properties, such as sacred landscapes, historic trails, and structures could also occur. There are four criteria under the regulations implementing the NHPA in 36 CFR 60.4 used to evaluate the significance and integrity of a resource. The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or (b) that are associated with the lives of persons significant in our past; or (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or (d) that has yielded, or may be likely to yield, information important in prehistory or history. An adverse visual impact, as it applies to built environments, is generally defined (36 CFR 800) as one that occurs when an undertaking carries the potential to directly or indirectly alter any qualifying characteristic of historic properties either listed or eligible for listing in the NRHP. There is no universally accepted yardstick for measuring visual effects, and since those effects do not always damage the defining characteristics of historic properties in any physical manner, assessing them can be difficult, complicated, and is almost always subjective. Furthermore, because an undertaking would be visible from a historic property does not mean it automatically has created adverse visual effect.

### 4.5.3.1 Crow Lake Alternative

Data retrieved from the Class I records review shows that six previously recorded sites and seven historic properties are present within one mile of the Crow Lake Alternative boundary (see **Table**

**3.5-2**). Two historic properties are listed on the NRHP, one site is recommended for listing, and one site is undetermined. One historic foundation (39AU0007) dating to 1861 is recommended eligible for the NRHP by the recording archaeologist with concurrence by the SHPO and Western. The eligibility of an artifact scatter (39JE0001), one rock-lined depression (39JE0037), and one stone circle site (39JE0039) is undetermined. The remaining two historic sites were not recommended eligible by the recording archaeologist. These sites are located outside the current project area would be avoided, and therefore, no impact would occur.

One historic structure, the Patten Consolidated School, is listed on the NRHP under Criterion A as a good example of what old county schoolhouses represented to rural communities in South Dakota. The Underwood United Methodist Church is also listed on the NRHP under Criterion C as an example of an early-twentieth century rural wooden country church. An adverse visual effect (NHPA) or visual impact (NEPA) is one that negatively visual effects the integrity to an historic built environment resource, to the extent significance and eligibility for listing in the NRHP are compromised. In particular, adverse visual effects can be seen as negatively affecting any of the seven characteristics of integrity, to wit: location, design, setting, materials, workmanship, feeling, or association. The Patten Consolidated School is located within the Proposed Project boundary and the Underwood United Methodist Church is located within the one mile buffer.

Two additional historic properties are located within one mile of the Proposed Project boundary and have been recommended eligible for the NRHP by Western (based on recommendations by the recording archaeologist) with concurrence by the SHPO. However, Structure JE01300004 at the Jerry Bennett Farm, and Structure JE01400001 at the Elwood C. Lyle Wind Powered Mill have been mitigated in the Wessington Springs Project through a MOA between the South Dakota SHPO and Western.

The Class III pedestrian survey of the Crow Lake Alternative resulted in the documentation of 69 prehistoric sites, nine historic sites, and seven isolated finds (**Table 4.5-1**). The prehistoric site types include stone cairns (37 occurrences), stone circles (16 occurrences), a depression (1 occurrence), and a combination of these types (13 occurrences).

Eight of the nine historic sites are associated with agricultural activities and include two farmsteads, two depressions, a dump, a rock wall, a foundation, and a farmstead with windmill, foundation, and depression features. The other historic site is the remains of a military bomb target.

Seven isolated finds were recorded within the proposed project boundary and include brown chert flakes (2 occurrences), gray flake (1 occurrence), quartzite flakes (6 occurrences), chert biface (1 occurrence), flint biface (2 occurrences), and flint core fragment (1 occurrences).

Nine prehistoric sites and three historic sites were recorded within the transmission line corridor. The prehistoric sites include five cairns (39JE0047, 39JE0050, 39JE0051, 39JE0057, 39JE0061) two stone circles (39JE0048, 39AU0036), and two combination stone circle / cairn sites (39JE0049, 39JE0058). The eligibility of these sites is currently undetermined; however, there would be no direct impacts to the sites because they would be avoided, or mitigation measures would be applied in addition to the implementation of the BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**).

The three historic sites include a dump (39JE0052), a farmstead (39JE0060), and a foundation (39JE0044). All three historic properties have been evaluated as not eligible for inclusion in the NRHP by Western (based on recommendations by the recording archaeologist) with concurrence by the SHPO; therefore, no impact would occur.

Thirty-one prehistoric sites, one historic site, and two isolate finds were recorded within the 101 500 feet by 500 feet turbine blocks. The prehistoric sites include 14 cairns (39JE0053, 39JE0054, 39AU0017, 39AU0025, 39AU0026, 39AU0031, 39AU0032, 39AU0034, 39AU0039, 39AU0040, 39AU0042, 39AU0058, 39AU0059, 39AU0064), seven stone circles (39JE0063, 39BR0086, 39AU0019, 39AU0038, 39AU0041, 39AU0049, 39AU0050), two lithic scatters (39AU0015, 39AU0016), one depression (39JE0064), and six sites with a combination of these features (39AU0029, 39AU0035, 39AU0047, 39AU0052, 39AU0057, 39AU0065). With the exception of the two lithic scatters, the eligibility of these sites is currently undetermined; however, measures would be taken by the Applicant to ensure that the sites are avoided and protected during construction; therefore, no impact would occur. The two lithic scatters (39AU0015, 39AU0016) have been evaluated for inclusion in the NRHP and both have been recommended as not eligible by Western (based on recommendations by the recording archaeologist) with concurrence by the SHPO; therefore, no impact would occur.

The historic site (39JE0062) is a concrete foundation and bomb target and has been recommended as eligible for nomination to the NRHP under Criterion A primarily for its association with the postwar (World War II) construction boom that swept the country and state between 1945 and 1960 (Dennis 2007: 47, 49). Two isolated finds were also recorded within the turbine blocks and include one find of two brown chert flakes (39BR0085) and another with six quartzite flakes (39BR0078). Isolated finds are recommended as not eligible for inclusion in the NRHP by Western (based on recommendations by the recording archaeologist) with concurrence by the SHPO; therefore, no impact would occur.

Twenty-nine prehistoric sites, five historic sites, and five isolate finds were recorded between the 101 500 feet by 500 feet turbine blocks or between the turbine blocks and the substation footprint. The prehistoric sites include 18 cairns (39AU0018, 39AU0020, 39AU0021, 39AU0022, 39AU0024, 39AU0028, 39AU0030, 39AU0033, 39AU0037, 39AU0043, 39AU0046, 39AU0054, 39AU0061, 39AU0062, 39AU0063, 39BR0080, 39BR0082, 39BR0083), seven stone circles (39AU0044, 39AU0048, 39AU0055, 39AU0056, 39BR0081, 39BR0084, 39JE0056), and four sites with a combination of these features (39AU0023, 39AU0027, 39AU0051, 39JE0059). The eligibility of these sites is currently undetermined; the implementation of the BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**) would occur to ensure that the sites are avoided and protected and therefore, no impact would occur.

The five historic sites include a rock wall (39AU0060), two depressions (39AU0045, 39BR0079), a farmstead (39AU0012), and a farmstead with windmill, foundation, and depression features (39JE0055). All five historic properties have been evaluated as not eligible for inclusion in the NRHP by Western (based on recommendations by the recording archaeologist) with concurrence by the SHPO; therefore, no impact would occur.

Five isolated finds were also recorded between the turbine blocks and include one chert biface (39BR0077), two flint bifaces (39AU0014, 39AU0053), a gray chert flake (39BR0076), and a flint core fragment (39JE0046). Isolated finds are recommended as not eligible for inclusion in the NRHP by Western (based on recommendations by the recording archaeologist) with concurrence by the SHPO; therefore, no impact would occur.

The survey of historic architectural properties within the Proposed Project Components viewshed resulted in the evaluation of 38 historic properties within the Crow Lake Alternative APE. Two of the properties were recommended as eligible for nomination to the NRHP. The Patten Consolidated School and historic bomb target site (39JE0062).

Potential impacts to cultural resources, such as prehistoric properties, historic properties, and cultural landscapes, were identified in the results of the Class III Survey, survey of historic architectural properties within the Proposed Project Components viewshed, and TCP Survey that were completed for the preferred alternative (Crow Lake Alternative). Agreements are being developed to ensure avoidance and/or mitigation of adverse effects to historic properties. These agreements are being developed among Western, RUS, SHPO, affected Federal agencies, Applicants, and all interested Native American Tribes. The preferred treatment of any potential TCPs and archaeological sites that are eligible for listing or remain unevaluated for the NRHP is to avoid these identified sites. Avoidance and monitoring protocol during construction would be included in an agreement. Viewshed impacts may occur on historic architectural or structural properties. Such viewshed impacts would be mitigated through a MOA in accordance with 36 CFR 800.6.

### 4.5.3.2 Winner Alternative

Thirteen previously recorded sites are present within the Winner Alternative (see **Table 3.5-5**), six of which have undetermined NPHP eligibility (**Table 4.5-1**). They include one historic cairn (39TP0019), the North East Washington Rural School foundation with privy depressions (39TP0027), three farmsteads (39TP0026, 39TP0035, 39TP0036), and a concrete barn foundation (39TP0038). The remaining six sites were not recommended eligible for the NRHP by the recording archaeologist; the SHPO and Western concurred with this recommendation. The six unevaluated historic properties require additional review to determine eligibility for the NRHP. In the event these historic properties are determined eligible, avoidance would ensure that no impact would occur, or application of mitigation measures, BMPs and APMs (as listed in **Chapter 2, Tables 2.2 and 2.3**) would ensure that less than significant impacts would occur.

One historic structure within the Winner Alternative, the Manthey Barn, is listed on the NRHP under Criterion C as an example of a variation of the Midwest Three-Portal Barn in South Dakota. The Manthey Barn would be evaluated for visual impacts. Avoidance would ensure that no impact would occur, or application of mitigation measures (to be identified), as well as the implementation of the BMPs and APMs (**Chapter 2, Tables 2.2 and 2.3**); therefore, there would be less than significant impact to cultural resources and historic properties.

Seven additional historic structures or objects that are listed or recommended eligible for the NRHP are located within one mile of the Winner Alternative and include the Key Residence, the Winner Post Office, Winner Drive-In, Immaculate Conception Church, St. Mary's Parish Hall, the Winner Grade School, and the Tripp County Veteran’s Memorial (**Table 4.5-2**). The Key Residence is listed on the NRHP under Criterion C as an example of an early concrete residential structure and as one of the first residences erected in Winner. The Tripp County Veteran's Memorial is also listed on the NRHP under Criterion A. It is a good representation of World War I memorials constructed during this time period. This piece by nationally-renowned sculptor John Paulding was erected in 1924 in front of the Tripp County Courthouse, and conveys the era's shared perception of the noble cause of World War I and the sacrifice of the common soldier. The Winner Grade School is recommended eligible for the NRHP by the recording archaeologist and concurrence with the SHPO and Western under Criterion C as an example of the style developed by Harold Spitznagel and used in several communities in South Dakota during the 1950s and may also be eligible as an example of the building boom in Winner following WWII. The Winner Post Office is recommended eligible for the NRHP by the recording archaeologist and concurrence with the SHPO and Western under Criterion C. The Winner Drive-In, Immaculate Conception Church, and St. Mary's Parish Hall are all recommended eligible for the NRHP by the recording archaeologist and concurrence with the SHPO and Western under Criterion C for their association with post-war (WWII) era building development. In addition, the Immaculate Conception Church may retain sufficient integrity to be eligible for its architecture. These structures would also be evaluated for indirect visual impacts. Avoidance would ensure that no impact would occur, or application of mitigation measures (to be identified), BMPs and APMs (as listed in **Chapter 2, Tables 2.2 and 2.3**) would ensure that less than significant would occur.

Although the Winner Alternative is not the Agencies' preferred alternative, if Western grants an interconnection request at its Winner Substation and RUS provides financing for the Proposed Project at the Winner Alternative, a complete pedestrian survey of the entire APE for cultural resources would be completed prior to construction. A qualitative approach has been developed that incorporated factors that are strong predictors of cultural resources, including climatic zone, slope, access, and water sources to predict site types and densities. The areas are rated as high, moderate or low sensitivity.

The Winner Alternative landscape is characterized by rolling plains of relatively low relief that give way to butte and mesa topography that is typical of the high plains with intermittent streams throughout the Winner Alternative area. The area has been used extensively as hunting grounds for the Sioux tribes, as well as for military excursions. It is expected that site sensitivity in certain areas of this Proposed Project area would be low to moderate.

The low rating is primarily due to the generations of disturbance from agricultural activities since the majority of the Winner Alternative is within agricultural fields. However, subsurface archaeological sites may be encountered during ground disturbing activities. If subsurface sites are encountered during construction, application of cultural resources mitigation measures (to be identified), BMPs and APMs (as listed in **Chapter 2, Tables 2.2 and 2.3**) would ensure that less than significant impacts would occur.

The moderate rating is primarily due to the Winner Alternative's proximity to archaeological regions such as the Fort Randall Archaeological Region. The 39-mile archaeological region that encompasses Fort Randall is less than two miles east of the Winner Alternative, but military excursions may have extended beyond that boundary and further into the Plains. Other archaeological regions that contribute to a higher rating include the Lower White and Sand Hills. The Sand Hills Archaeological Region is located primarily in Nebraska but also extends into south central South Dakota and into the Winner Alternative. These sites are often buried and located along streams and rivers. The Winner Alternative is within the Tertiary tablelands, also known as the Sand Hills; limited archaeological work has been done in the South Dakota area of the Sand Hills Archaeological Region. Since the majority of sites found in the Sand Hills Archaeological Region tend to be buried sites, the likelihood of finding sites is low, but would be more likely to be encountered during construction. This does not preclude displaced surface sites

**Table 4.5-1 Winner Alternative Historic Properties**

| Site | Site Type | NRHP Eligibility | Location |
|---|---|---|---|
| 39TP0019 | Cairn | Unevaluated | Within Proposed Project boundary |
| 39TP0026 | Farmstead | Unevaluated | Within one-mile of Proposed Project boundary |
| 39TP0027 | School Foundation | Unevaluated | Within Proposed Project boundary |
| 39TP0035 | Farmstead | Unevaluated | Within Proposed Project boundary |
| 39TP0036 | Farmstead | Unevaluated | Within Proposed Project boundary |
| 39TP0038 | Foundation | Unevaluated | Within Proposed Project boundary |

**Table 4.5-2 Winner Alternative Historic Structures**

| Site | Site Type | NRHP Eligibility | Location |
|---|---|---|---|
| TP00000010 | Manthey Barn | Eligible – Listed Criterion C | Within Proposed Project boundary |
| TP00000001 | Key Residence | Eligible – Listed Criterion C | Within one-mile of Proposed Project boundary |
| TP00000002 | Winner Post Office | Eligible – Criterion C | Within one-mile of Proposed Project boundary |
| TP00000065 | Winner Drive-In | Eligible – Criterion C | Within one-mile of Proposed Project boundary |
| TP00000066 | Immaculate Conception Church | Eligible – Criterion C | Within one-mile of Proposed Project boundary |
| TP00000069 | St. Mary's Parish Hall | Eligible – Criterion C | Within one-mile of Proposed Project boundary |
| TP00000071 | Winner Grade School | Eligible – Criterion C | Within one-mile of Proposed Project boundary |
| TP00000073 | Tripp County Veteran’s Memorial | Eligible – Listed Criterion A | Within one-mile of Proposed Project boundary |

that may be encountered within agricultural fields where artifacts have been turned up from plowing activities, or sites along creeks, drainages, and cutbanks. The possibility of these types of sites was discussed with the Rosebud Sioux Tribe at the conclusion of their records search; they have not had access to the area since it was removed from reservation status in the early 1900s (**Appendix D**).

In the event that NRHP-eligible properties are encountered the Applicants would make a reasonable effort to design the Proposed Project to avoid the eligible properties. If a NRHP-eligible property could not be avoided, then the application of cultural resources mitigation measures, BMPs and APMs (as listed in **Chapter 2, Tables 2.2 and 2.3**) would ensure that less than significant impacts would occur. If unknown subsurface archaeological sites are encountered during construction, application of cultural resources mitigation measures (to be identified), BMPs and APMs (as listed in **Chapter 2, Tables 2.2 and 2.3**) would ensure that less than significant impacts would occur.

### 4.5.3.3 No Action Alternative

Under the No Action Alternative, Western would not approve an interconnection request(s) and RUS would not provide financial assistance for the Proposed Project. For the purpose of impact analysis and comparison in this EIS, it is assumed that the Applicants' Proposed Project (and Wind Partners' proposed development as it pertains to the Crow Lake Alternative) would not be built and the environmental impacts, both positive and negative, associated with construction and operation would not occur. There would be no cultural resources impacts associated with the No Action Alternative.

# 4.6 LAND USE

## 4.6.1 METHODS

The ROI for land use includes areas of immediate disturbance associated with the Proposed Project Components and the proposed Federal actions. Additionally, adjacent land uses have been considered. Analyses completed for this section evaluate environmental impacts as a result of the Proposed Project Components and the proposed Federal actions. Land use plans for Aurora and Brule counties are currently being revised. Jerauld County's Comprehensive Plan was approved in 1998. No land use plan is available for Tripp County. Reviews of aerial photographs, existing public inventories (*e.g.*, USFWS, NWI, NRCS databases), and field studies have been used to identify the land uses within the alternatives.

The evaluation of impacts to land uses considered potential impacts to existing productive uses of the land, such as agriculture, rangeland and preservation of natural environments, as well as prime farmland and farmland of statewide importance, residential uses and recreational opportunities as a result of the Proposed Project Components and the proposed Federal actions.

## 4.6.2 SIGNIFICANCE CRITERIA

A significant impact to land use would occur if:

- An activity would conflict with any applicable land use policy or regulation of an agency with jurisdiction over those areas

## 4.6.3 IMPACT ASSESSMENT

For either alternative, the Proposed Project Components and proposed Federal actions would not conflict with any applicable policy or regulation of an agency with jurisdiction in the area. The majority of the area is used for rangeland and agriculture. Current land uses would continue, even though some land would be converted to industrial use. Additionally, the Applicants have coordinated with landowners and are establishing lease agreements for the Proposed Project

Components development. BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**) would be employed. Impacts to land use would be less than significant.

### 4.6.3.1 Crow Lake Alternative

Development of the Crow Lake Alternative would result in approximately 11 acres of temporary impact and approximately 1.5 acres of permanent impact to prime farmlands, and approximately 566 acres of temporary impact and approximately 99 acres of permanent impact to farmland of statewide importance. Temporary impacts due to construction would be revegetated with native grasses and/or crops matching the surrounding agriculture landscape. The permanent impacts account for less than 0.1 percent of available respective farmland within the Crow Lake Alternative boundary. In addition, there is a small area of prime farmland, if irrigated, that would be impacted by the Proposed Project Components; however, the land is not being used for agricultural purposes, and therefore would not result in a reduction in active agriculture. It would not substantially alter the use of farmland in areas designated for turbine and access road installations. The FPPA does not authorize the Federal government to affect the property rights of private landowners or regulate the use of private land, so conversion of some prime farmland and farmland of statewide importance to different uses would not conflict with FPPA policy.

The Crow Lake Alternative would result in the temporary disturbance of 68 acres and the permanent disturbance of 15 acres within USFWS grassland easements. It would also result in the temporary disturbance of 120 acres and the permanent disturbance of 22 acres within USFWS wetland easements (additional biological information pertaining to USFWS easements can be found in **Section 4.4**). The Applicants would work with the USFWS to obtain permits for the impact. The Proposed Project Components would not conflict with current USFWS land uses and policies for wetland and grassland easements.

During construction and decommissioning, noise, dust, traffic and the presence of a construction force would temporarily affect the rural to primitive character of the area. No residences are within 1,000 feet of the proposed turbine locations, in accordance with the Applicants' siting parameters. Further, the minimum distance from the centerline of the transmission line corridor to the nearest residence is greater than 1,900 feet, so residential use would not be affected.

People engaging in casual hiking, birding and hunting within the Crow Lake Alternative ROIs could be temporarily affected during the construction and decommissioning activities due to limited access.

System modifications at Western's Wessington Springs Substation would be confined within the existing substation and not alter current uses for the site.

### 4.6.3.2 Winner Alternative

Development of the Winner Alternative would result in approximately 2.1 acres of temporary impact and approximately 0.2 acres of permanent impact to prime farmlands, and approximately 509 acres of temporary impact and approximately 59 acres of permanent impact to farmland of statewide importance. Temporary impacts due to construction of the Proposed Project Components would be revegetated with native grasses and crops matching the surrounding agriculture landscape. The permanent impacts account for less than 0.5 percent of available respective farmland within the Winner Alternative boundary. In addition, there is a small acreage of prime farmland, if irrigated, that would be impacted by the Proposed Project Components; however, the land is not being used for agricultural purposes and therefore would not result in a reduction in active agriculture.

Additionally, the Winner Alternative would not result in temporary or permanent disturbance within USFWS grassland easements.

During construction and decommissioning, noise, dust, traffic and the presence of a construction force would temporarily affect the rural to primitive character of the area. One residence is located within approximately 800 feet from a proposed turbine location. It is anticipated that this turbine location would be eliminated from further consideration, because it does not meet the Applicants' siting criteria. The second nearest residence is 1,050 feet away from a proposed turbine location, and meets the Applicants' siting criteria.

The closest residence to the centerline of the alternative 1 transmission line corridor is approximately 100 feet away, and due to this proximity, does not meet the Applicants' line siting criteria. It is anticipated that the alternative 1 transmission line corridor would be eliminated from further consideration. The closest residence to centerline of the alternative 2 transmission line corridor is at least 900 feet away, and meets the Applicants' siting criteria. Impacts associated with the short-term construction of the transmission corridor would be minimized through the included BMPs and APMs as described in **Chapter 2, Tables 2.2 and 2.3**.

Similar to the Crow Lake Alternative, people engaging in casual hiking, birding and hunting could be temporarily affected during the construction and decommissioning activities due to limited access.

System modifications at Western's Winner Substation would not alter current uses for the site. All additions would be confined within or adjacent to the existing substation.

#### 4.6.3.3 No Action Alternative

Under the No Action Alternative, Western would not approve an interconnection request(s) and RUS would not provide financial assistance for the Proposed Project. For the purpose of impact analysis and comparison in this EIS, it is assumed that the Applicants' Proposed Project (and Wind Partners' proposed development as it pertains to the Crow Lake Alternative) would not be built and the environmental impacts, both positive and negative, associated with construction and operation would not occur. Local landowners would not receive lease payments from the Applicants and could sign leases with another wind power developer. There would be no land use impacts associated with the No Action Alternative.

# 4.7 TRANSPORTATION

## 4.7.1 METHODS

The ROI for roads and highways includes roads near the site alternatives that would be used for delivery of construction equipment, construction worker access and maintenance access. The impact analysis only includes roads and highways within the counties in which the site would be located. The ROI for aviation includes airports within 20 miles. Additionally, information has been reviewed from the Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM Administered Lands in the Western United States (Bureau of Land Management [BLM] 2005).

## 4.7.2 SIGNIFICANCE CRITERIA

A significant impact to transportation would occur if:

- An activity would result in the permanent disruption of regional and local traffic
- An activity would result in the destruction of existing transportation infrastructure
- An activity would result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks; or impact an FAA-designated air safety zone around an existing airport

## 4.7.3 IMPACT ASSESSMENT

In general, a variety of transportation operations are necessary to support wind energy development. A list of representative transportation requirements for each phase of development is provided below. Most of these requirements would involve the transportation of material and equipment necessary for the Proposed Project Components and the proposed Federal actions.

***Roads and Highways***

<u>Construction</u>

The construction and operation of the Proposed Project Components would result in an increase in the ADT on the respective roadway network surrounding the site alternatives. The majority of the additional traffic would be during the initial construction phase.

- Site and road grading and preparation would require heavy earthmoving equipment, typically involving 10 to 40 pieces of heavy machinery
- Road, pad and staging areas would require sand or gravel, delivered by dump trucks
- Tower foundations would require concrete, aggregate, sand and cement to be delivered by dump trucks; typically 15 to 35 truck shipments per foundation
- Tens of thousands of gallons per day of water typically would be obtained locally in the site alternative area that may require a State specific appropriation permit
- Turbines would be brought to the site by specialized equipment; overweight and/or oversized loads may require State and county specific permits and traffic management

- Turbine assembly and installation would require specialized cranes; overweight and/or oversized loads may require State and county specific permits and traffic management
- Turbine interconnections and transmission lines would require trenching or auger equipment and line trucks

Construction hours are expected to be from 6:00 a.m. to 6:00 p.m. on weekdays, and possibly weekends. Some activities may require extended construction hours, and nighttime construction may be necessary to meet the overall schedule. The movement of equipment and materials to the site alternatives would cause a relatively short-term increase in the level of service of local roadways during the construction period. Most equipment (*e.g.*, heavy earthmoving equipment and cranes) would remain at the site for the duration of construction. Shipments of materials, such as gravel, concrete and water, would not be expected to substantially affect local primary and secondary road networks.

Shipments of overweight and/or oversized loads could be expected to cause temporary disruptions on the secondary and primary roads used to access a construction site. The transport vehicles may require defined routes, and by obtaining necessary permits for hauling heavy loads would comply with all Federal, State and local rules and ordinances. Local roads might require fortification of bridges and removal of obstructions to accommodate overweight or oversized shipments. The need for such actions would be determined on a site-specific basis. Access roads may need to be upgraded or constructed to accommodate overweight or oversize shipments. Because of the anticipated weight of the turbine components and electrical transformers that would be brought to the site, maximum grade becomes a critical road design parameter.

<u>Operation</u>

Once the Proposed Project Components are in operation, the expected traffic would be minimal. Minimal support personnel would be needed to maintain and operate the facility. Normally, no heavy or large loads would be expected; pickup or medium-duty trucks would be used for daily operations. Turbine site locations may be attended during business hours by a small maintenance crew of 10 to 12 people that would work in teams of two. Consequently, transportation activities would be limited to about 12 trips from the maintenance building to turbines in a typical day, using pickup trucks, medium-duty vehicles or personal vehicles. Large components may be required for equipment replacement in the event of a major mechanical breakdown. However, such shipments would be expected to be infrequent. Transportation activities during operations would be minimal, similar to those currently occurring, and not be expected to cause noticeable impacts to local road networks.

<u>Decommissioning</u>

Most transportation activities during site decommissioning would be similar to those during site development and construction.

- Foundation removal, site regrading and recontouring would require heavy earthmoving equipment transported to the site using flatbed or goose-neck trailers

- Turbine and tower disassembly would require cranes; overweight and/or oversized loads may require State-specific permits and traffic management
- Equipment and debris removal would require medium- to heavy-duty trucks

Heavy equipment and cranes would be required for turbine and tower dismantlement, breaking up tower foundations, and regrading and recontouring the site to the original grade. With the possible exception of a main crane, oversized and/or overweight shipments are not expected during decommissioning activities because the major turbine components could be disassembled, segmented or size-reduced prior to shipment. Thus, potential disruptions to local traffic during decommissioning would likely be fewer than those during original construction activities; therefore, decommissioning impacts would be less than significant.

Short-term traffic congestion may exist when construction delivery vehicles are on the road, and localized increases in road wear and maintenance may occur. However, the construction, operation and decommissioning of the Proposed Project Components would result in less than significant impacts to permanent, regional and local traffic and transportation infrastructure through the implementation of traffic control measures and other standard construction practices described above.

***Aviation***

The FAA regulates obstructions to navigable airspace (14 CFR 77, or "FAA Part 77"). The Applicants are required to notify the FAA Administrator of any proposed construction "of facilities more than 200 feet in height above the ground level at its site" (Section 77.13[a][1]). The height of towers and length of blades have a combined height of approximately 389 feet, exceeding the FAA notice threshold. The Applicants have provided preliminary information to the FAA regarding the Proposed Project Components. Prior to construction, the Applicants would notify the FAA regarding exact facility heights and latitude and longitude coordinates.

FAA requires that aircraft warning lights be installed on turbines taller than 200 feet. Recently, the FAA drafted new recommendations for lighting of wind-powered facilities. Based on studies prompted by the American Wind Energy Association and DOE, the FAA has developed a new set of recommendations for lighting wind farms that would require fewer lights than needed under its current policy. The new recommendations suggest red or white synchronized flashing strobe lights, at most 0.5 mile apart around the perimeter of wind farms. Daytime lighting and dual lighting of the turbines were both deemed unnecessary. Prior to construction, the Applicants would consult with the FAA to identify applicable lighting requirements.

### 4.7.3.1 Crow Lake Alternative

***Roads and Highways***

The heavy equipment and materials needed for site access, site preparation and foundation construction are typical of heavy construction projects and do not pose unique transportation considerations. Construction, operation and decommissioning of the Proposed Project Components would not result in a permanent disruption of regional and local traffic, nor would these activities result in the destruction of existing transportation infrastructure; therefore development of the Proposed Project Components would result in less than significant impacts.

***Aviation***

The Proposed Project Components would not impact an FAA-designated air safety zone, nor would it result in a change in air traffic patterns, an increase in traffic levels or a change in location that results in substantial safety risks. Therefore, with the included BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**), the construction, operation and decommissioning of the Proposed Project Components would result in less than significant impacts to aviation.

Western's system modifications at its Wessington Springs Substation would require personnel and shipments of materials, such as electrical equipment, gravel, concrete and water. Such shipments would similarly be expected to result in less than significant impacts to transportation.

#### 4.7.3.2 Winner Alternative

Transportation impacts associated with the Winner Alternative would be similar to those described for the Crow Lake Alternative because the Proposed Project Components design requirements are comparable despite the alternative selected; therefore, with the included BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**), impacts would be less than significant.

Shipments to Western's Winner Substation would similarly be expected to result in less than significant impacts.

#### 4.7.3.3 No Action Alternative

Under the No Action Alternative, Western would not approve an interconnection request(s) and RUS would not provide financial assistance for the Proposed Project. For the purpose of impact analysis and comparison in this EIS, it is assumed that the Applicants' Proposed Project (and Wind Partners' proposed development as it pertains to the Crow Lake Alternative) would not be built and the environmental impacts, both positive and negative, associated with construction and operation would not occur. There would be no transportation impacts associated with the No Action Alternative.

## 4.8 VISUAL RESOURCES

### 4.8.1 METHODS

The ROI includes areas within and adjacent to the site alternative area from which a person may be able to observe changes to the visual landscape resulting from constructing the Proposed Project Components. In addition, the ROI includes residences within the alternative boundaries, nearby population centers and nearby roadways from which the Proposed Project Components may be viewed if built. The impact analysis for visual resources evaluates the visual quality of the existing setting, assesses the sensitivity of visual resources, and evaluates modifications that would occur as a result of the Proposed Project Components. The following aesthetic values have been considered when evaluating the visual quality of, and modifications to, the existing landscape:

- Form – topographical variation, mountains, valleys
- Line/Pattern – roads, transmission lines
- Color/Contrast – brightness, diversity
- Texture – vegetation, buildings, disturbed areas

The sensitivity of the existing visual resources to changes associated with the Proposed Project Components and proposed Federal actions are based on a number of factors:

- The extent to which the existing landscape is already altered from its natural condition.
- The number of people within visual range of the area, including residents, highway travelers, and those involved in recreational activities.
- The degree of public concern or agency management directives for the quality of the landscape.

KOPs were selected to depict viewpoints that would be visually sensitive to change as a result of the Proposed Project Components. The KOPs depict the general visual setting of each of the alternatives and provide a baseline for developing visual simulations. As described in **Section 3.8.2**, based on public input received during the EIS scoping process, local (*i.e.*, residents within and near the alternative boundaries) sensitivity to visual changes as a result of the Proposed Project Components is low. The LCTDR and LCIC were identified as sensitive viewpoints for the Proposed Project Components; therefore, KOPs were selected for each of the alternatives based on topography, distance, and elevation to identify locations with the greatest potential to view the site from the Lewis and Clark NHT auto tour route and LCIC, as depicted in **Figure 3.8-1**.

WindPRO version 2.6 (designed by EMD International) was used to prepare a visual simulation for each of the KOPs. To develop the simulation, a photograph and GPS point were taken at each KOP. The camera's height, direction and focal length were recorded along with the date, time of day and weather conditions (*i.e.,* "clear sky" or "overcast"). Then, control points (*e.g.,* power poles, fence posts, street signs) were located and GPS positions and heights of these control points were recorded. This information along with the photograph was loaded into the visual simulation program in WindPRO. The software contains the location of each of the proposed turbines as well as each turbine's height, rotor diameter, color, and ground elevation. The software also contains topographical information between the camera's location and the turbine locations. When the photograph is placed on the topographical map, the control points (*e.g.*, power poles, fence posts, street signs) are matched with their corresponding image on the photograph. The control points control the accuracy of the model. The software then uses the topographical information to locate the horizon of the camera's location. After the control points and horizon are set, the software models the visual simulation and inputs the turbines over the photograph image. This resulting image (*i.e.,* the photograph with the turbine overlay) is presented in the EIS as the visual simulation.

Proposed Project Components have been labeled in the simulations in which they would be visible. If the simulation model has determined that the Proposed Project Components would not be visible, then there is no additional label on the photograph. The existing condition photographs from **Section 3.8** are repeated in this section for side-by-side comparison between the existing condition and the simulation.

## 4.8.2 SIGNIFICANCE CRITERIA

A significant impact to visual resources would occur if:

- An activity would permanently and substantially alter or degrade scenic resources, including, but not limited to, geologic and topographic features, major stands of vegetation and/or trees, and other visual resources within a State scenic highway
- An activity would substantially degrade the existing visual character or quality of the site alternative and its surroundings

## 4.8.3 IMPACT ASSESSMENT

For visual resource analysis, the following impact assessment applies to both alternatives. The KOP analysis is separated for each alternative into **Sections 4.8.3.1** and **4.8.3.2** below. Additionally, potential impacts to historic property settings would be addressed through the NHPA, Section 106 process.

Aboveground facilities for the Proposed Project Components would consist of up to 101 turbines, access roads, overhead electric transmission lines and a new collection substation. Aboveground facilities for the Wind Partners' proposed development would consist of seven turbines and access roads within the Crow Lake Alternative. The most visible component of the Proposed Project Components would be the addition of the turbines to the landscape. Impacts to visual resources from the construction, operation and decommissioning of a wind-powered facility in a rural, agricultural area would occur by altering the physical setting and visual quality of the existing landscape and by effects on the landscape as experienced from sensitive viewpoints, including residential areas and travel routes. The proposed turbines would introduce new or different elements into the landscape and would alter the existing form, line, color and texture that characterize the existing landscape. To avoid or minimize visual impacts, all wind turbines would be uniform in design and color throughout the area. The neutral color of the turbines would minimize contrast against the sky. The turbines would be visible at greater distances on clear days with blue skies compared with cloudy, overcast skies when the neutral turbines have a greater ability to blend with the background. All KOP photographs were taken on clear sky days so that the simulations would represent the conditions of greatest potential contrast between the turbines and landscape. The low-reflectivity finish of the turbines would minimize reflection and glare.

Flickering shadows could be cast by moving rotors. Flickering is the result of alternating changes in light intensity caused by the moving blade casting shadows on the ground and stationary objects, such as a window at a residence. Flickering would be limited to daylight hours when the sun is shining, would be noticeable only in the immediate area, and would vary throughout the day and by season. Flickering shadows would be greatest or longest – up to approximately 1,000 feet – at sunrise and sunset when the sun is shining and shadows are at their longest (WIND Engineers 2003). The uppermost portion of the turbine blades would stand approximately 389 feet above the ground surface. The visual character of the area would be altered from minimally developed agricultural land use to somewhat industrial. Some of the turbines would require lights on top of the nacelle, for aircraft safety, potentially changing the view from nearby rural residences and roadways. Turbines would not be sited near trees or cause trees to be removed. The regional landscape is generally uniform, does not contain highly distinctive or important landscape features, is not densely populated or used, and the local residents' sensitivity to visual changes associated with the Proposed Project Components is low; therefore, impacts to the existing visual character or quality within either of the alternatives from development of the Proposed Project Components would be less than significant.

System modifications at either of Western's substations would be confined within or adjacent to the existing substation, so system additions would not introduce new or different elements into the landscape, or substantially alter the characteristics of the existing landscape.

#### 4.8.3.1 Crow Lake Alternative KOPs

**Figures 4.8-1** and **4.8-2** depict the existing condition and visual simulation, respectively, from KOP 1. KOP 1 is one of the highest elevations on the Lewis and Clark NHT auto tour route from which the Proposed Project Components may be viewed. The nearest turbine to KOP 1 would be approximately 22 miles away and, as demonstrated by the visual simulation, Proposed Project Components would not be visible in the existing landscape (see **Figure 4.8-2**).

**Figures 4.8-3** and **4.8-4** depict the existing condition and visual simulation, respectively, from KOP 2. KOP 2 is the view from the LCIC. The nearest turbine to KOP 2 would be approximately 24 miles away and, as demonstrated by the visual simulation, Proposed Project Components would not be visible in the existing landscape (see **Figure 4.8-4**).

**Figures 4.8-5** and **4.8-6** depict the existing condition and visual simulation, respectively, from KOP 3. KOP 3 is the nearest location on the Lewis and Clark NHT auto tour route from which the Proposed Project Components may be viewed. The nearest turbine to KOP 3 would be approximately 17 miles away and would be barely perceptible on the horizon within the existing landscape (see **Figure 4.8-6**). The turbines (labeled on the simulation) would be a minimal addition to the existing landscape, but would be indistinguishable from the existing transmission line structures.

The KOPs were selected based on topography, distance and elevation to represent the points along the Lewis and Clark NHT auto tour route where the Proposed Project Components would be most visible to users of the route; the simulations represent stationary scenes at these points. The portion of the Lewis and Clark NHT auto tour route along I-90 (in the vicinity of KOP3) is the location at which the site would be most visible to travelers on the route. KOP3 is also the closest point (17 miles) to the Crow Lake Alternative. Given the distance (minimum of 17 miles) and gently rolling terrain, travelers on the route would have minimal viewing opportunities of the site as represented in **Figures 4.8-2, 4.8-4, and 4.8-6**. At the closest point (*i.e.*, KOP3 or I-90) route users would be travelling on the interstate at high speeds and have a minimal viewing time of the Proposed Project Components. Along other portions of the route, viewing duration would be minimized because route users would be travelling at state route speeds and viewing opportunities would be obscured by the distance (minimum of 17 miles) and gently rolling terrain. As represented in **Figure 4.8-6** the turbines would be barely perceptible and indistinguishable from the existing transmission towers. Additionally, the Lewis and Clark NHT is located further west from the alternative and at a lower elevation than the auto tour route, further diminishing the ability to view the Proposed Project Components from the Lewis and Clark NHT.

As illustrated by the photographic simulations, development of the Proposed Project Components would not substantially alter or degrade scenic resources and would not substantially degrade the visual quality of the Crow Lake Alternative as viewed from the Lewis and Clark NHT auto tour route or LCIC; therefore, impacts to visual resources would be less than significant.


**Figure 4.8-1 KOP 1 Existing Condition**


**Figure 4.8-2 KOP 1 Simulation**


**Figure 4.8-3 KOP 2 Existing Condition**

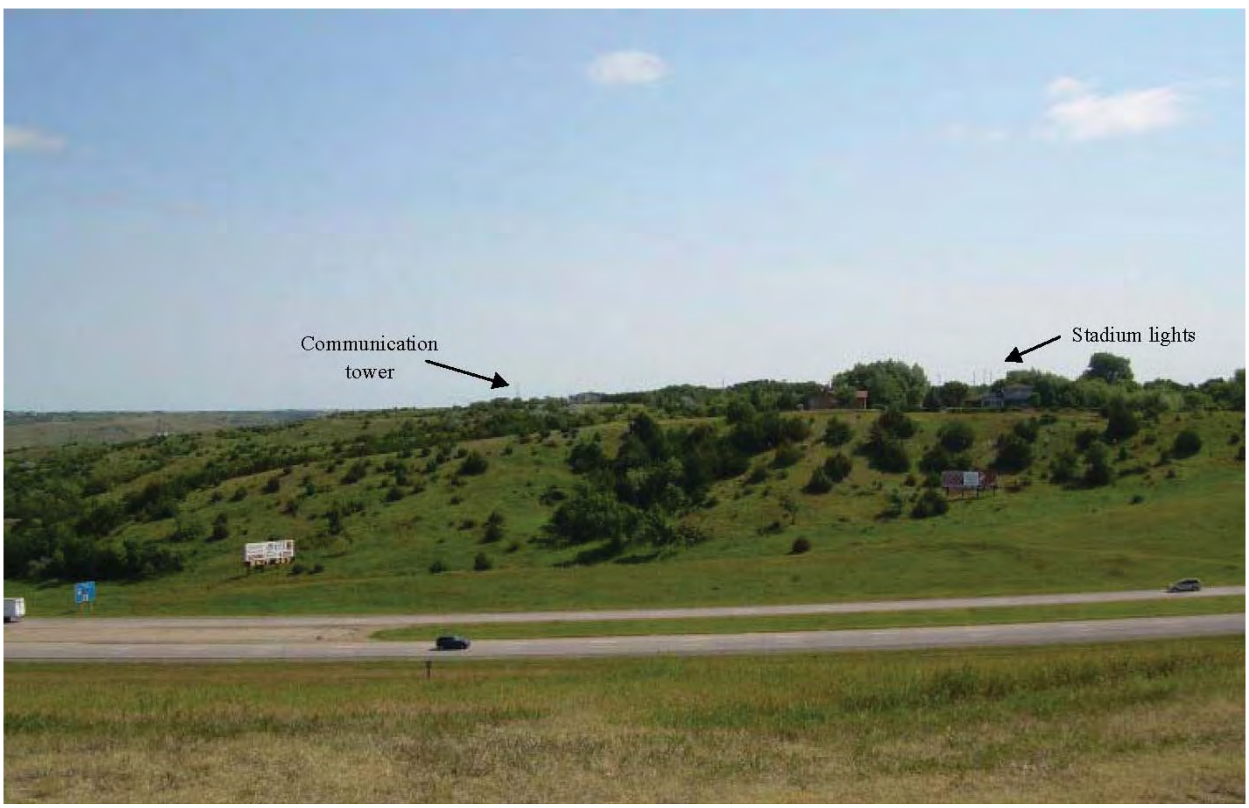


**Figure 4.8-4 KOP 2 Simulation**

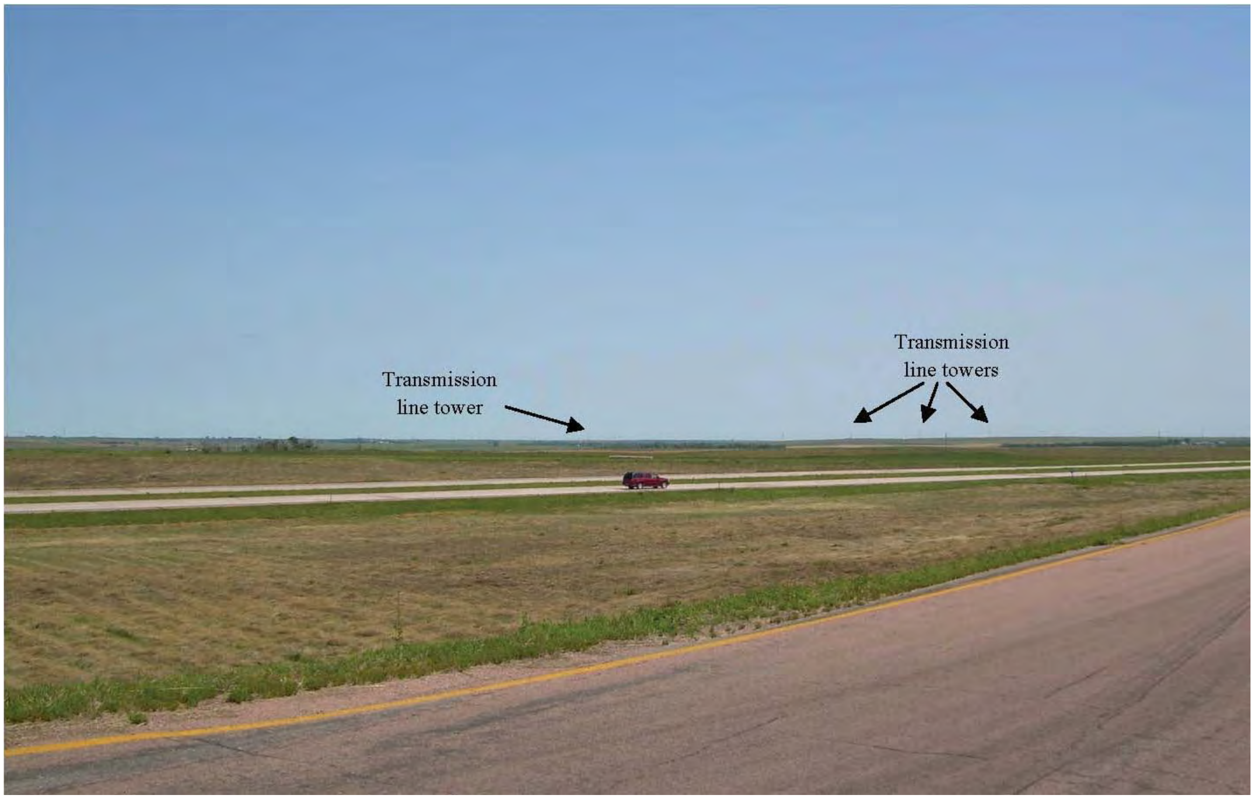


**Figure 4.8-5 KOP 3 Existing Condition**

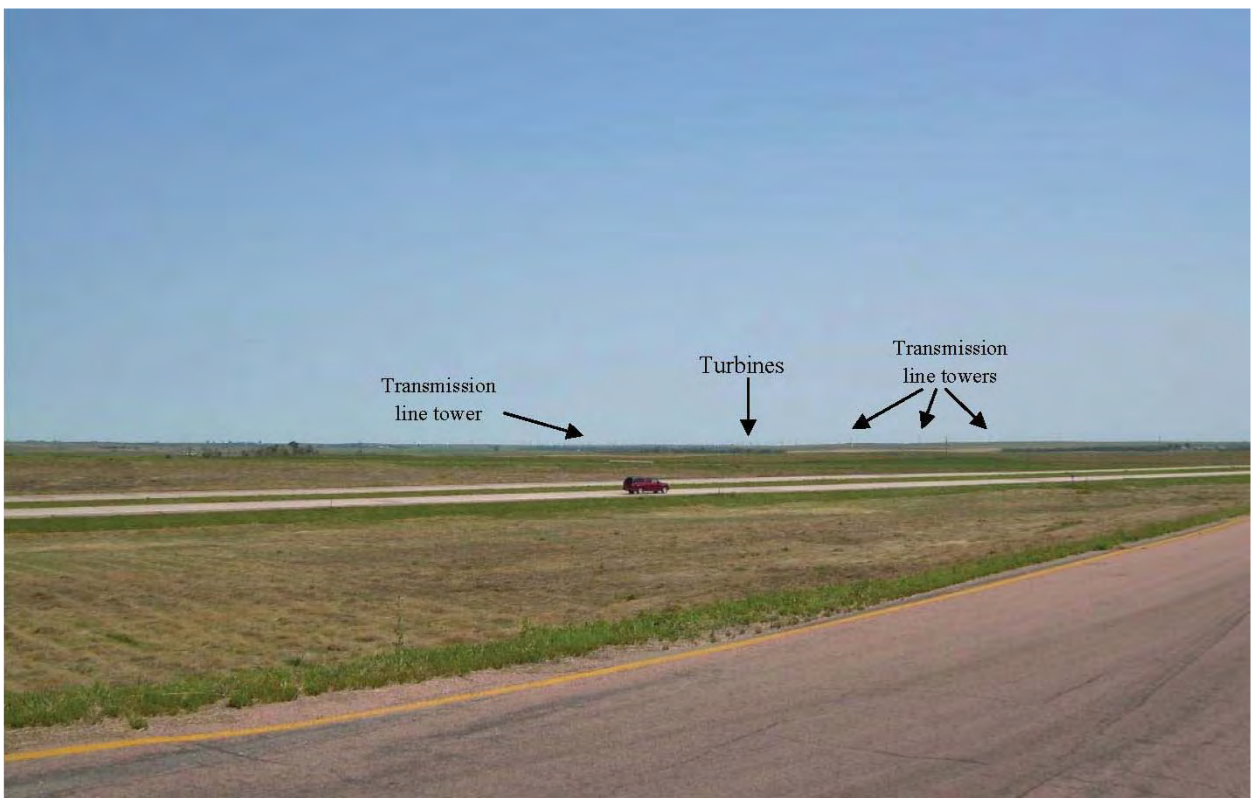


**Figure 4.8-6 KOP 3 Visual Simulation**

### 4.8.3.2 Winner Alternative KOPs

**Figures 4.8-7** and **4.8-8** depict the existing condition and visual simulation, respectively, from KOP 4. KOP 4 is near the intersection of SR44 and SR47. The nearest turbine (labeled on the simulation) within the KOP 4 field of view would be approximately 22 miles away and would be nearly imperceptible on the horizon within the existing landscape (see **Figure 4.8-8**).

**Figures 4.8-9** and **4.8-10** depict the existing condition and visual simulation, respectively, from KOP 5. KOP 5 provides another viewing angle from near the intersection of SR44 and SR47. The nearest turbine (labeled on the simulation) within the KOP 5 field of view would be approximately 15 miles away and would be nearly imperceptible on the horizon within the existing landscape (see **Figure 4.8-10**).

**Figures 4.8-11** and **4.8-12** depict the existing condition and visual simulation, respectively, from KOP 6. KOP 6 is one of the highest elevations on the Lewis and Clark NHT auto tour route from which the Proposed Project Components may be viewed. The nearest turbine to KOP 6 would be approximately 19.5 miles away and, as demonstrated by the visual simulation, Proposed Project Components would not be visible in the existing landscape (see **Figure 4.8-12**).

**Figures 4.8-13** and **4.8-14** depict the existing condition and visual simulation, respectively, from KOP 7. KOP 7 is the nearest location on the Lewis and Clark NHT auto tour route from which the Proposed Project Components may be viewed. The nearest turbine to KOP 7 would be approximately 8.4 miles away and would be barely perceptible on the horizon within the existing landscape (see **Figure 4.8-14**). The turbines (labeled on the simulation) would be a minimal addition to the existing landscape, but would draw less attention than the existing roadway and water tower.

The KOPs were selected based on topography, distance and elevation to represent the points along the Lewis and Clark NHT auto tour route where the Proposed Project Components would be most visible to users of the route; the simulations represent stationary scenes at these points. KOP7 is the closest point (8.4 miles) to the Winner Alternative and is the portion of the Lewis and Clark NHT auto tour route from which the Proposed Project Components would be most visible. Given the distance (minimum of 8.4 miles) and gently rolling terrain, the turbines would not be visible at all locations along the route, as represented in **Figures 4.8-8, 4.8-10, 4.8-12, and 4.8-14;** and when visible, would be barely perceptible on the horizon. Viewing duration would be minimized because route users would be travelling at state route speeds and viewing opportunities would be obscured along the route by the distance (minimum of 8.4 miles) and gently rolling terrain. Additionally, the Lewis and Clark NHT is located further east from the alternative and at a lower elevation than the auto tour route, further diminishing the ability to view the Proposed Project Components from the Lewis and Clark NHT.

As illustrated by the photographic simulations, development of the Proposed Project Components would not substantially alter or degrade scenic resources and would not substantially degrade the visual quality of the Winner Alternative as viewed from the Lewis and Clark NHT auto tour route; therefore, impacts to visual resources would be less than significant.

**Figure 4.8-7 KOP 4 Existing Condition**


**Figure 4.8-8 KOP 4 Simulation**

Figure 4.8-9 KOP 5 Existing Condition


Figure 4.8-10 KOP 5 Simulation

Figure 4.8-11 KOP 6 Existing Condition

Figure 4.8-12 KOP 6 Simulation


**Figure 4.8-13 KOP 7 Existing Condition**


**Figure 4.8-14 KOP 7 Simulation**

#### 4.8.3.3 No Action Alternative

Under the No Action Alternative, Western would not approve an interconnection request(s) and RUS would not provide financial assistance for the Proposed Project. For the purpose of impact analysis and comparison in this EIS, it is assumed that the Applicants' Proposed Project (and Wind Partners' proposed development as it pertains to the Crow Lake Alternative) would not be built and the environmental impacts, both positive and negative, associated with construction and operation would not occur. There would be no visual resource impacts associated with the No Action Alternative.

## 4.9 NOISE

### 4.9.1 METHODS

The ROI for noise includes residences located within the site alternatives and residences adjacent to the areas of the proposed Federal actions. Examples of construction and decommissioning related noise-emitting sources include heavy equipment used in earthmoving, foundation preparation and demolition, structure assembly and other activities. Operational noise-emitting sources include the wind turbines, as well as the low, continuous vibrational hum which can be heard from the completed transmission lines and facilities.

As described in **Section 3.9**, dBA represents the human hearing response to sound for a single sound event. In 1974, the EPA identified safe noise levels that could be used to protect public health and welfare, including prevention of hearing damage, sleep disturbance and communication disruption. Outdoor $L_{dn}$ values of 55 dBA were identified as desirable to protect against activity interference in residential areas. When annual averages of the daily level are considered over a period of 40 years, the EPA identified average noise levels equal to or less than 70 dBA as the level of environmental noise that would prevent any measurable hearing loss over the course of a lifetime. Low-frequency sound is discussed in **Section 4.12**.

***Construction***

Construction noise levels associated with a wind farm vary greatly depending on equipment, operation schedule and condition of the area being worked (BLM 2005). **Table 4.9-1** identifies noise levels for typical construction equipment.

***Operation***

**Table 4.9-2** provides a comparison of wind turbine noise to other noise sources.

The Wessington Springs Wind Project located in Jerauld County, South Dakota, modeled operational noise impacts associated with the same make and model wind turbine as identified for the Proposed Project Components. Based on these results, the anticipated noise level at the base of the wind turbine would be 55 dBA and would be between 50 dBA and 45 dBA at a distance between 660 feet and 1,320 feet from the wind turbine (Western 2007). As a

**Table 4.9-1 Noise Levels at Various Distances from Typical Construction Equipment**

| Construction Equipment | Noise Level $L_{eq(1\text{-}h)}$[a] at Distances [dBA] | | | | | |
|---|---|---|---|---|---|---|
| | 50 ft | 250 ft | 500 ft | 1,000 ft | 2,500 ft | 5,000 ft |
| Bulldozer | 85 | 71 | 65 | 59 | 51 | 45 |
| Concrete mixer | 85 | 71 | 65 | 59 | 51 | 45 |
| Concrete pump | 82 | 68 | 62 | 56 | 48 | 42 |
| Crane, derrick | 88 | 74 | 68 | 62 | 54 | 48 |
| Crane, mobile | 83 | 69 | 63 | 57 | 49 | 43 |
| Front-end loader | 85 | 71 | 65 | 59 | 51 | 45 |
| Generator | 81 | 67 | 61 | 55 | 47 | 41 |
| Grader | 85 | 71 | 65 | 59 | 51 | 45 |
| Shovel | 82 | 72 | 62 | 56 | 48 | 42 |
| Truck | 88 | 74 | 68 | 62 | 54 | 48 |

Source: Harris Miller Miller & Hanson, Inc. 1995 and BLM 2005

[a] $L_{eq(1\text{-}h)}$ is the equivalent steady-State sound level that contains the same varying sound level during a 1-hour period.

**Table 4.9-2 Comparison of Wind Turbine Noise to Other Noise Sources**

| Noise Source | Typical dBA |
|---|---|
| Threshold of pain | 140 |
| Fire engine siren at 100 feet | 130 |
| Flyover of an F-16 aircraft at 500 feet | 104 |
| Average street traffic | 85 |
| Vacuum cleaner | 70 |
| Normal conversation | 55 |
| **Large wind turbine at base of tower** | **55** |
| Soft music, moderate rainfall | 50 |
| Background noise in a rural environment | 48 |
| Typical living room | 40 |
| **Large wind turbine from 0.25 mile** | **35** |
| Whisper, quiet library | 35 |
| Rustling leaves | 20 |
| Threshold of hearing | 0 |

Source: Western 2007

conservative approach, noise levels would be reduced for receptors further removed from the noise source by approximately 6 dBA for each doubling of distance from the source (Harris 1991).

### *Decommissioning*

The decommissioning phase of the Proposed Project Components would be anticipated to require similar types of activities and generate similar noise levels as described in construction.

## 4.9.2 SIGNIFICANCE CRITERIA

The impact analysis for noise is based on the following significance criteria. A significant impact to noise would occur if:

- An activity would expose persons to or generate noise or vibration levels in excess of EPA-recommended levels
- An activity would result in a substantial permanent increase in ambient noise or vibration levels in the vicinity above levels existing without the Proposed Project Components. A 3 dB increase in noise is considered barely noticeable to humans, a 5 dB increase would typically result in a noticeable community response, and a 10 dB increase is considered a doubling of the sound and is generally considered to be substantial

## 4.9.3 IMPACT ASSESSMENT

The following considerations for construction and operation apply to both alternatives. Site specific analysis is provided in the following sections.

***Construction***

Construction equipment would generally not operate at the same time and would be spread throughout the construction area depending on the activity. Construction would occur intermittently at each of the wind turbine locations, typically during normal daytime working hours. Nighttime construction may be necessary to meet the overall Proposed Project Components schedule, and in such cases, residents would be notified of this temporary, short-term activity. Construction would generally occur for one week or less in any given area. As identified in **Table 4.9-1**, between 250 feet and 500 feet from the construction location, the anticipated noise levels would drop below the EPA-recommended noise guideline (70 dBA) to prevent hearing loss. Between 1,000 feet and 2,500 feet from the construction location, the construction noise levels are anticipated to drop below the EPA-recommended noise guideline (55 dBA) for residential areas.

***Operation***

During dry weather conditions, noise from transmission lines (operational “hum”) is generally lost in the background noise at locations beyond the edge of the transmission line right-of-way (DOE 2005). In wet conditions, however, water drops collecting on the lines provide favorable conditions for corona discharges, which can result in a humming noise. During rainfall events, the noise level at the edge of the right-of-way of a 230-kV transmission line would be less than 39 dBA (BPA 1996), which is typical of the noise level at a library or rural residential area. Operation of the transmission line would result in no impact to noise.

### 4.9.3.1 Crow Lake Alternative

***Construction***

The nearest residence to a proposed turbine location would be located approximately 1,270 feet away. On the basis of the noise levels presented in **Table 4.9-1**, it is estimated that noise levels would be 57 to 59 dBA. The minimum distance to a residence from the centerline of the transmission line corridor would be approximately 1,900 feet. On the basis of the noise levels presented in **Table 4.9-1**, it is estimated that noise levels during construction of the transmission line would be 52 to 54 dBA or less at the nearest residence. The nearest residence to the proposed collector substation would be located approximately 6,000 feet away. On the basis of the noise levels presented in **Table 4.9-1**, it is estimated that noise levels would be 41 to 43 dBA. Construction of the turbines, transmission line, and proposed collector substation would result in a temporary increase in background noise to levels near the 55 dBA level, identified as desirable to protect against activity interference. This would be a noticeable, temporary increase over background noise levels. Thus, with the included BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**), construction-related noise impacts would be less than significant.

The nearest residence to Western's existing Wessington Springs Substation is 1,500 feet away. On the basis of the noise levels presented in **Table 4.9-1**, it is estimated that construction noise levels would be approximately 56-58 dBA. Western system modifications at the existing Wessington Springs Substation, would include BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**), and would result in short-term, temporary construction impacts. Therefore, impacts would be less than significant.

***Operation***

Based on noise modeling results of a similar wind project (Western 2007), anticipated noise levels would be between 50 dBA and 45 dBA at a distance between 660 feet and 1,320 feet from the wind turbine; therefore, noise levels associated with the wind turbines at the nearest residence would be near or below 45 dBA. As identified in **Section 3.9.3**, the average outdoor noise levels for rural residential and agricultural areas typically range from 39 dBA to 44 dBA. At the nearest residence, operational noise associated with the Proposed Project Components would likely be between 3 dB and 5 dB greater than existing ambient noise levels. With the included BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**), impacts from operational noise would be less than significant, and operation of the transmission line would result in no impact to noise.

Development of the Western system modifications at the existing Wessington Springs Substation, would include BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**), and would similarly be expected to result in less than significant noise impacts.

***Decommissioning***

The decommissioning phase of the Crow Lake Alternative would be anticipated to result in similar noise effects as described for construction.

### 4.9.3.2 Winner Alternative

***Construction***

The nearest residence to a proposed turbine location would be located approximately 800 feet away. It is anticipated that this turbine location would be eliminated from further consideration, because it doesn't meet the Applicants' siting criteria.

The next nearest residence to a proposed turbine location would be 1,050 feet away from a proposed turbine location, and meets the Applicants' siting criteria. On the basis of the noise levels presented in **Table 4.9-1**, it is estimated that noise levels would be 57 to 59 dBA. Construction of the turbines would result in a temporary increase in background noise to levels above 55 dBA, but below the 70 dBA average level to prevent hearing loss over the course of a lifetime. This would be a noticeable, but temporary increase over background noise levels; with the included BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**), construction-related noise impacts would be less than significant.

The nearest residence to the proposed collector substation would be located approximately 1,400 feet away. On the basis of the noise levels presented in **Table 4.9-1**, it is estimated that noise levels would be 56 to 58 dBA. Construction of the proposed collector substation would result in a temporary increase in background noise to levels above 55 dBA, but below the 70 dBA average level to prevent hearing loss over the course of a lifetime. This would be a noticeable, but temporary increase over background noise levels. With the included BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**), construction-related noise impacts would be less than significant.

The closest residence to the centerline of the alternative 1 transmission line corridor is approximately 100 feet away, and due to this proximity, does not meet the Applicants' line siting criteria. It is anticipated that the alternative 1 transmission line corridor would be eliminated from further consideration.

The closest residence to centerline of the alternative 2 transmission line corridor is at least 900 feet away, and meets the Applicants' siting criteria. On the basis of the noise levels presented in **Table 4.9-1**, it is estimated that construction noise levels would be approximately 59 to 61 dBA. Construction of the alternative 2 transmission would result in a temporary increase above background noise, but would be within the level identified as desirable to protect against activity interference. With the included BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**), construction-related noise impacts would be less than significant.

The nearest residence to Western's existing Winner Substation is 300 feet away. On the basis of the noise levels presented in **Table 4.9-1**, it is estimated that noise levels would be 69 to 71 dBA;

therefore construction noise at the closest point would be near the EPA-recommended level of 70 dBA. However, the EPA-recommended level of 70 dBA applies to an estimated 40-year average exposure. Therefore the short-term, temporary construction impacts would likely be perceived at the nearest residence. With the included BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**), impacts would be less than significant.

***Operation***

Anticipated noise levels would be between 50 dBA and 45 dBA at a distance between 660 feet and 1,320 feet from the wind turbine. The two nearest residences to a proposed turbine location would be located approximately 800 feet away and 1,050 feet away from a proposed turbine location. Noise levels associated with the wind turbines at the two nearest residences would be between 50 dBA and 45 dBA. As identified in **Section 3.9.3**, the average outdoor noise levels for rural residential and agricultural areas typically range from 39 dBA to 44 dBA.

At the nearest residence, operational noise associated with the Proposed Project Components would be closer to 50 dBA and well below the EPA guideline for outdoor noise levels; however, the increase would likely be between 5 dBA and 10 dBA greater than existing ambient noise levels. With the turbine locations currently indicated, the increased noise would likely be noticeable at the nearest residence. However, it is anticipated that the nearest turbine location would be eliminated from further consideration, because it doesn’t meet the Applicants’ siting criteria. With this consideration, impacts from operational noise would be less than significant. Operational noise at the second nearest residence, which meets the Applicants’ siting criteria, would be closer to 45 dBA and would likely be between 3 dB and 5 dB greater than existing ambient noise levels. With the included BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**), impacts from operational noise would be less than significant.

During dry weather conditions, noise from transmission lines (operational “hum”) is generally lost in the background noise at locations beyond the edge of the transmission line right-of-way (DOE 2005). In wet conditions, however, water drops collecting on the lines provide favorable conditions for corona discharges, which can result in a humming noise. During rainfall events, the noise level at the edge of the right-of-way of a 230-kV transmission line would be less than 39 dBA (BPA 1996), which is typical of the noise level at a library or rural residential area. With the included BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**), operation of the transmission line would result in no impact to noise.

The nearest residence to Western’s existing Winner Substation is 300 feet away. Employing the BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**), Western system modifications at its Winner Substation would be expected to result in less than significant noise impacts.

***Decommissioning***

The decommissioning phase of the Proposed Project Components would be anticipated to result in similar noise impacts as described for construction.

### 4.9.3.3 No Action Alternative

Under the No Action Alternative, Western would not approve an interconnection request(s) and RUS would not provide financial assistance for the Proposed Project. For the purpose of impact analysis and comparison in this EIS, it is assumed that the Applicants' Proposed Project (and Wind Partners' proposed development as it pertains to the Crow Lake Alternative) would not be built and the environmental impacts, both positive and negative, associated with construction and operation would not occur. There would be no noise impacts associated with the No Action Alternative.

# 4.10 SOCIOECONOMICS

## 4.10.1 METHODS

The socioeconomic analysis evaluates only the counties in which the site alternatives are located. While economic effects could occur to additional counties and regions of the U.S., depending on where the specific Proposed Project Components are manufactured, these effects are impossible to determine at this time. For this reason, the ROI for the Crow Lake Alternative is limited to Aurora, Brule and Jerauld counties. The ROI for the Winner Alternative is limited to Tripp County. Potential impacts have been identified for each alternative based on the available resource information for the ROI with consideration to the significance criteria.

## 4.10.2 SIGNIFICANCE CRITERIA

A significant impact to socioeconomics would occur if:

- An activity would induce population growth that would impact government and community facilities and services from the in-migration of the workforce
- An activity would result in insufficient existing housing in the ROI within commuting distance sufficient to meet the influx of workers and their families
- An activity would result in a need for new or altered governmental services such as fire protection, police protection, schools, or other governmental services
- An activity would result in a need for new systems, or substantial alterations to utilities including power or natural gas, communications systems, water, sewer or septic tanks, solid waste and disposal

## 4.10.3 IMPACT ASSESSMENT

The below pertinent socioeconomic considerations have been included in the FEIS analysis, although they are not tied to a specific significance criteria.

***Lease and Easement Arrangements***

The Applicants' right-of-way agents have contacted landowners in the site alternative areas and the proposed Federal actions areas and have negotiated with landowners to acquire leasing rights for specific parcels of land. In general, a landowner who provides leasing rights would receive annual rental payments resulting in supplemental income. Potential lease payments would provide a long term supplement to farm and ranch incomes in these rural areas.

***Employment and Secondary Economic Effects***

According to the American Wind Energy Association (AWEA) *Wind Energy and Economic Development: Building Sustainable Jobs and Communities* (AWEA 2009a), the European Wind Energy Association has estimated that in total, every MW of installed wind capacity directly and indirectly creates about 60 person-years of employment and 15 to 19 jobs.

At the local level, new jobs are likely to be created that may involve site preparation and facility construction, maintenance during facility operation (which is typically about 20 years), and crews to perform decommissioning and site restoration work when the facility is closed. Secondary effects of the Proposed Project Components development and the proposed Federal actions on the local economy may also exist through the need for service-sector businesses and jobs (gas stations, motels, restaurants, *etc.*).

Surveying 13 studies of economic impacts (actual and forecast) of wind facilities on rural economies, one NREL report concluded that these facilities have a large direct impact on the economies of rural communities, especially those with few other supporting industries; however, such communities also see greater “leakage” of secondary economic effects to outside areas. In addition, the report concluded that the number of local construction and operations jobs created by the facility depends on the skills locally available (NRC 2007).

***Public Revenues and Costs***

Typically, a wind-energy project generates tax dollars for both the local and State governments. Direct monies are collected through income, excise and property taxes, and indirect monies are generated from sales, use, and income taxes on project created employment. The State of South Dakota does not impose corporate or personal income taxes. However, South Dakota does generate revenue from sales, use, property and contractor excise taxes.

Sales/use tax in South Dakota is a combination of a four percent State tax and a general, municipal tax, which varies from zero to two percent (municipal taxes only apply if sale/use is within city limits). Property taxes in South Dakota are levied by local government (*e.g.* counties and municipalities). Real property taxes are determined by taking the local mill levy and applying it to 85 percent of the market value of a property. The contractors' excise tax (tax imposed upon the gross receipts of contractors who are engaged in construction services or realty improvements in South Dakota collectible from both public and private entities) is two percent.

The South Dakota State Legislature has been active in passing laws that affect the development, taxation and operation of wind-energy facilities in the State.

A number of recent laws have been passed by the State to provide construction rebates and an alternate taxation method on wind-energy facilities exceeding five MW.

### 4.10.3.1 Crow Lake Alternative

Given the short-term duration of construction activities, no significant increase in permanent population to local communities would be expected as a result of construction and operation of the Proposed Project Components. It would not result in significant increased needs for public services, including fire protection. In addition, there would be no discernible impact on local utilities, government, or community services from the construction workforce. Any impacts to social and economic resources would be primarily short-term effects to the local economy. Revenue would likely increase for some local businesses such as hotels, restaurants, gas stations and grocery stores, due to workers associated with construction. Other impacts to community services would be unlikely because of the short-term nature of construction.

The relatively short-term nature of construction and the limited number of workers who would be hired from outside of the local counties would result in limited positive economic impacts to the area in the form of increased spending on lodging, meals and other consumer goods and services. As described in **Chapter 2**, the Applicants would 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. The Applicants have estimated the Crow Lake Alternative would create an average of 225 to 250 temporary jobs and 10 to 12 permanent jobs.

Anticipated labor trades required during construction include electricians, crane operators, heavy equipment operators and other skilled construction laborers. Local businesses such as ready-mix concrete, hardware stores, welding and machine shops, packaging and postal services, and heavy equipment repair and maintenance service providers would also likely benefit from construction of the Proposed Project Components.

Minor employment or population changes are anticipated as a direct result of development of the Crow Lake Alternative. Any increase in population would be for the duration of the construction period, and would be small relative to the total population. Most of the non-local construction workforce would likely reside within a 60-mile commuting distance of the area, so there would be very little demand for additional temporary or permanent housing near the site. There would be no impact to the available supply of housing in Aurora, Brule or Jerauld counties. In the event that construction workers hired from outside the 60-mile radius of the standard commuting distance from the site alternative area, there would likely be sufficient capacity in the existing motel rooms in the local counties. Therefore, less than significant impacts are likely to occur from the influx of the construction workforce.

Benefits would also result from wages paid to the construction workforce. There would be beneficial long-term impacts to the counties' tax base for the life of the Proposed Project as a result of the construction and operation of the facilities. Aurora, Brule and Jerauld counties would receive revenues from property taxes, fees and permits. Additional personal income would be generated for residents in the counties and the State of South Dakota by circulation and recirculation of dollars paid out as business expenditures, and as State and local taxes. The most direct beneficial impact would be the net economic benefit to participating landowners from lease payments, which would provide a supplementary source of income. An increase in Aurora, Brule and Jerauld's county tax base would also provide benefits to all county residents. Indirect economic benefits would accrue to businesses in the area from construction workers purchasing goods and services. There would also be economic benefits for the counties from added taxes paid on real property. Increased tax revenues collected as a result of operation could be utilized to benefit or improve local government or community services.

Western's system modifications at Wessington Springs Substation would similarly be expected to result in beneficial economic impacts. The influx of construction workers to install new electrical equipment would similarly be expected to result in less than significant impacts to housing availability or local services.

#### 4.10.3.2 Winner Alternative

The positive local economic benefits to the Winner Alternative would be similar to those identified for the Crow Lake Alternative. The influx of construction workers for the Proposed Project would similarly be expected to result in less than significant impacts to housing availability or local services.

#### 4.10.3.3 No Action Alternative

Under the No Action Alternative, Western would not approve an interconnection request(s) and RUS would not provide financial assistance for the Proposed Project. For the purpose of impact analysis and comparison in this EIS, it is assumed that the Applicants' Proposed Project (and Wind Partners' proposed development as it pertains to the Crow Lake Alternative) would not be built and the environmental impacts, both positive and negative, associated with construction and operation would not occur. Local landowners would not receive lease payments from the Applicants and could sign leases with another wind power developer. There would be no socioeconomic impacts associated with the No Action Alternative.

## 4.11 ENVIRONMENTAL JUSTICE

### 4.11.1 METHODS

The ROI for the Crow Lake Alternative includes the following census tracts: 9731, 9736 and 9746. The ROI for the Winner Alternative includes the following census tracts: 9716 and 9717. **Section 3.11** identifies minority and low-income populations in the site alternative areas pursuant to Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 FR 7629). This section discusses the potential for impacts to those populations (**Section 3.11**). The environmental justice analysis has been performed in three steps:

- Identify minority and/or low income populations in the ROI (see **Section 3.11**)
- Identify the anticipated impacts from development of the Proposed Project Components and/or the proposed Federal actions
- Determine if the anticipated activity impacts would disproportionately impact the minority and/or low-income populations

The analysis protocol for identifying minority or low-income populations follows the guidelines described in the *Environmental Justice Guidance under the National Environmental Policy Act* (CEQ 1997). Information on locations and numbers of minority and low-income populations for each census tract within the site alternatives was obtained and derived from 2000 Census data. “Minority” refers to people who classified themselves in the 2000 Census as Black or African American, Asian or Pacific Islander, American Indian or Alaskan Native, Hispanic of any race or origin, or other non-White races (CEQ 1997). Environmental justice guidance defines low-income populations using U.S. Census Bureau statistical poverty thresholds. Information on low-income populations was developed from 1999 incomes reported in the 2000 Census. In 1999, the poverty-weighted average threshold for an individual was $8,501 (U.S. Census 2001).

Analyses of potential impacts from the Proposed Project Components and the proposed Federal actions are provided in **Chapter 4** for each resource including: geology and soils, water resources, air resources, biological resources, cultural resources, land use and recreation, transportation, visual resources, noise, socioeconomics, and health and safety, during the construction, operation and decommissioning phases.

An analysis was performed to determine if the anticipated impacts of the Proposed Project Components and the proposed Federal actions would disproportionately affect minority and low-income populations. The basis for making this determination was a comparison of locations predicted to experience human health or environmental impacts with any areas in the ROI known to contain high percentages of minority or low-income populations, as reported by the U.S. Census Bureau and defined by the CEQ. Impacts on minority or low-income populations that could result from the proposed activities were analyzed for the geographic areas in which the site alternatives would be located. Impacts were analyzed within the census tracts containing the alternative sites to determine if minority or low-income populations would have disproportionately high and adverse impacts.

Environmental justice impacts are also analyzed for issues that are unique to and involve Native Americans, in particular, to cultural resource issues. Input from tribal representatives would determine if adverse impacts are likely to occur to cultural resources of importance to the tribes. Potential impacts of the proposed activities related to Native American cultural resources could occur not only to individual resources, but also to the traditional, sacred and historic landscape of the site alternative areas. Impacts to the cultural landscape and individual resources could have an adverse impact on the role of the landscape in tribal traditions and the use of the landscape by tribal members.

The following definitions are excerpted from Executive Order 12898:

**Disproportionately high and adverse human health effects:** When determining whether human health effects are disproportionately high and adverse, agencies are to consider the following three factors to the extent practicable:

(a) Whether the health effects, which may be measured in risks and rates, are significant (as employed by NEPA), or above generally accepted norms. Adverse health effects may include bodily impairment, infirmity, illness, or death

(b) Whether the risk or rate of hazard exposure by a minority population, low-income population, or Indian tribe to an environmental hazard is significant (as employed by NEPA) and appreciably exceeds or is likely to appreciably exceed the risk or rate to the general population or other appropriate comparison group

(c) Whether health effects occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards

**Disproportionately high and adverse environmental effects:** When determining whether environmental effects are disproportionately high and adverse, agencies are to consider the following three factors to the extent practicable:

(a) Whether there is or would be an impact on the natural or physical environment that significantly (as employed by NEPA) and adversely affects a minority population, low-income population, or Indian tribe. Such effects may include ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment

(b) Whether environmental effects are significant (as employed by NEPA) and are or may be having an adverse impact on minority populations, low income populations, or Indian tribes that appreciably exceeds or is likely to appreciably exceed those on the general population or other appropriate comparison group

(c) Whether the environmental effects occur or would occur in a minority population, low income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards

## 4.11.2 SIGNIFICANCE CRITERIA

Significance criteria were developed based on Executive Order 12898. A significant impact to environmental justice would occur if:

- An activity would disproportionately affect a minority, Native American, or low income subsistence population
- An activity would result in high and adverse health or environmental impacts, such as impacts from noise, dust or air emissions, displacement of residences, visual effects,

traffic increases or delays, EMF effects, or other effects to a minority, Native American, or low income population

## 4.11.3 IMPACT ASSESSMENT

### 4.11.3.1 Crow Lake Alternative

Disproportionately high and significant effects to minority populations are unlikely based on three factors: a lower percentage of minority populations in the Crow Lake Alternative area (approximately one to five percent) compared with South Dakota as a whole (approximately 11 percent), a low population density within the site area, and overall low expected impacts from the construction, operation and decommissioning of the Proposed Project Components. Potential impacts to minority residents, like any other resident, are expected to be less than significant.

As identified in **Table 3.11-1**, income for 13.2 percent of the population of South Dakota is considered below the poverty level, whereas the percentage of the population below the poverty level ranges between approximately 11 to 21 percent in the vicinity of the Crow Lake Alternative. The Proposed Project Components may generate positive economic benefits to the local economy, including opportunities for lease agreements, employment and earning potential for local individuals. Overall the Crow Lake Alternative is expected to result in low environmental impacts; therefore, the impacts to low-income populations would be less than significant.

Development of the Western system modifications at Wessington Spring Substation would similarly not be expected to disproportionately affect a minority, Native American, or low income subsistence population.

### 4.11.3.2 Winner Alternative

Year 2000 demographic information from the U.S. Census Bureau characterizes the population in the vicinity of the Winner Alternative as approximately 84 percent White and 15 percent American Indian and Alaskan Natives. The Winner Alternative would be located in an area with a higher percentage of minority population compared to the Crow Lake Alternative; however, disproportionately high and significant effects to minority populations are unlikely given the low population density within the site area, and overall low expected impacts from constructing, operating and decommissioning the Proposed Project Components. Potential impacts to minority residents, like any other resident, are expected to be less than significant.

Income for 13.2 percent of the population of South Dakota is considered below the poverty level, whereas the percentage of the population below the poverty level ranges between approximately 19 to 21 percent in the vicinity of the Winner Alternative. The Proposed Project Components may generate positive economic benefits to the local economy, including opportunities for lease agreements, employment, and earning potential for local individuals; therefore, the impacts to low-income populations would be less than significant.

Developing Western's system modifications at Winner Substation would not be expected to disproportionately affect a minority, Native American, or low income subsistence population.

#### 4.11.3.3 No Action Alternative

Under the No Action Alternative, Western would not approve an interconnection request(s) and RUS would not provide financial assistance for the Proposed Project. For the purpose of impact analysis and comparison in this EIS, it is assumed that the Applicants' Proposed Project (and Wind Partners' proposed development as it pertains to the Crow Lake Alternative) would not be built and the environmental impacts, both positive and negative, associated with construction and operation would not occur. There would be no environmental justice impacts associated with the No Action Alternative.

## 4.12 HUMAN HEALTH AND SAFETY

### 4.12.1 METHODS

The ROI for health and safety includes areas of immediate disturbance associated with the Proposed Project Components and proposed Federal actions. The ROI associated with the proposed transmission line includes the area within the right-of-way. The assessment to human health and safety has been undertaken with the assistance of the previous compilations of technical memoranda (Terracon 2009a and 2009b) and the *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM Administered Lands in the Western United States* (BLM 2005).

### 4.12.2 SIGNIFICANCE CRITERIA

A significant impact to human health and safety would occur if:

- An activity would result in a substantial increase in health and safety risks to area residents and the general public
- An activity would create potential impacts to public health as a result of increased electric and magnetic fields and electrocution hazards
- An activity would violate any local, State, or Federal regulations regarding handling, transport, or containment of hazardous materials

### 4.12.3 IMPACT ASSESSMENT

The *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM Administered Lands in the Western United States* (BLM 2005) evaluates the potential health and safety impacts for a typical wind generation project. A summary of the Programmatic EIS is provided herein.

### *Solid Waste and Hazardous Materials*

Types of hazardous materials that may be used in the construction, operation and decommissioning phases of the proposed activities may include: fuels (*e.g.*, gasoline, diesel), lubricants, cleaning solvents, paints, pesticides and explosives. **Table 4.12-1** lists these hazardous materials associated with a typical wind energy project, their use and typical quantities that may be anticipated in each phase. Handling and disposal of these items fall under Federal, State, and local laws and regulations.

### *Construction Activities*

Minimal solid waste is expected to be generated during construction of the Proposed Project Components. Shipping and packing materials and ground clearing are expected to be the most likely activities generating solid wastes. Solid wastes generated from construction activities would be stored in closed containers in accordance with regulatory requirements. The Applicants and Western would adhere to their BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**), and 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.

To minimize impacts from potential leaks of hazardous materials or industrial wastes during on-site storage, materials storage and dispensing areas (*e.g.*, fueling stations for off-road construction equipment), as well as waste storage areas, would be equipped with secondary containment features.

Small amounts of hazardous waste may be generated during construction of the Proposed Project Components (**Table 4.12-1**). All petroleum fluids would be contained within the wind turbines and electrical equipment. The Applicants and Western would adhere to their BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**) regarding petroleum hazardous waste and material would be handled and disposed of in accordance with all applicable Federal, State and local laws and regulations. To further minimize risks and ensure timely response to accidental leaks or spills, spills would be immediately reported to construction inspectors so that cleanup activities could be implemented.

### *Operation*

There would be only small volumes of solid waste produced during operation of the Proposed Project Components. Unlike traditional power generation facilities, wind farms do not produce solid waste products as a direct result of energy conversion. Typically, the facility would be maintained by personnel who would generate approximately 0.5 to 1.0 cubic yards/month/personnel of recyclable waste and 1.0 to 2.0 cubic yards/month/personnel of non-recyclable waste.

**Table 4.12-1 Hazardous and Regulated Materials Associated with a Typical Wind Energy Project**

| Hazardous and Regulated Material | Uses | Typical Quantities Present |
|---|---|---|
| Fuel: diesel fuel[a] | Powers most construction and transportation equipment during construction and decommissioning phases. | Less than 1,000 gallons (gal); stored in aboveground tanks during construction and decommissioning phases.[b] |
| | Powers emergency generator during operational phase. | Less than 100 gal; stored in aboveground tank to support emergency power generator throughout the operation phase. |
| Fuel: gasoline[c] | May be used to power some construction or transportation equipment. | Because of the expected limited number of construction and transportation vehicles utilizing gasoline, no on-site storage is likely to occur throughout any phase of the life cycle of the wind energy. |
| Fuel: propane[d] | Most probable fuel for ambient heating of control building. | Typically 500 to 1,000 gal; stored in aboveground propane storage vessel. |
| Lubricating oils/ grease/ hydraulic fluids/ gear oils | Lubricating oil is present in some wind turbine components and in the diesel engine of the emergency power generator. | Limited quantities stored in portable containers (capacity of 55 gal or less); maintained on-site during construction and decommissioning phases. |
| | Maintenance of fluid levels in construction and transportation equipment is needed. | Limited quantities stored in portable containers (capacity of 55 gal or less); stored on-site during operational phase. |
| | Hydraulic fluid is used in the rotor driveshaft braking system and other controls.<br>Gear oil and/or grease are used in the drive train transmission and motor gears. | Limited quantities stored in portable containers (capacity of 55 gal or less); stored on-site during operational phase. |
| Glycol-based antifreeze | Present in some wind turbine components for cooling (*e.g.*, 5 to 10 gal [19 to 38 L] present in re-circulating cooling system for the transmission). Present in the cooling system of the diesel engine for the emergency power generator. | Limited quantities (10 to 20 gal of concentrate) stored on-site during construction and decommissioning phases. Limited quantities (1 to 10 gal of concentrate) stored on-site during operational phase. |
| Lead-acid storage batteries and electrolyte solution | Present in construction and transportation equipment. Backup power source for control equipment, tower lighting and signal transmitters. | Limited quantities of electrolyte solution (< 20 gal) for maintenance of construction and transportation equipment during construction and decommissioning phases.<br>Limited quantities of electrolyte solution (< 10 gal) for maintenance of control equipment during operational phase. |
| Other batteries (*e.g.*, nickel-cadmium [NI-CAD] batteries) | Present in some control equipment and signal transmitting equipment. No maintenance of such batteries is expected to take place on-site. | |

| Hazardous and Regulated Material | Uses | Typical Quantities Present |
|---|---|---|
| Cleaning solvents | Organic solvents (most probably petroleum-based but not Resource Conservation and Recovery Act listed) used for equipment cleaning and maintenance. Where feasible, water-based cleaning and degreasing solvents may be used. | Limited quantities (< 55 gal) on-site during construction and decommissioning to maintain construction and transportation equipment. Limited quantities (< 10 gal) on-site during operational phase to maintain equipment. |
| Paints and coatings[e] | Used for corrosion control on all exterior surfaces of turbines and towers. Limited quantities (< 50 gal [189 L]) for touch-up painting during construction phase. | Limited quantities (< 20 gal) for maintenance during operational phase. |
| Dielectric fluids[f] | Present in electrical transformers, bushings and other electric power management devices as an electrical insulator. | Some transformers may contain more than 500 gal of dielectric solutions. |
| Explosives | May be necessary for excavation of tower foundations in bedrock. May be necessary for construction of access and/or on-site roads or for grade alterations on-site. | Limited quantities equal only the amount necessary to complete the task. On-site storage expected to occur only for limited periods of time as needed by specific excavation and construction activities. |
| Pesticides | May be used to control vegetation around facilities for fire safety. | Pesticides would likely be brought to the site and applied by a licensed applicator as necessary. |

Source: BLM 2005

[a] It is assumed that commercial vendors would replenish diesel fuel stored on-site as necessary.

[b] This value represents the total on-site storage capacity, not the total amounts of fuel consumed. See footnote a. On-site fuel storage during construction and decommissioning phases would likely be in aboveground storage tanks with a capacity of 500 to 1,000 gal. Tanks may be of double-wall construction or may be placed within temporary, lined earthen berms for spill containment and control. At the end of construction and decommissioning phases, any excess fuel as well as the storage tanks would be removed from the site, and any surface contamination resulting from fuel handling operations would be remediated. Alternatively, rather than store diesel fuel on-site, the off-road diesel-powered construction equipment could be fueled directly from a fuel transport truck.

[c] Gasoline fuel is expected to be used exclusively by on-road vehicles (primarily automobiles and pickup trucks). These vehicles are expected to be refueled at existing off-site refueling facilities.

[d] Delivered and replenished as necessary by a commercial vendor.

[e] It is presumed that all wind turbine components, nacelles, and support towers would be painted at their respective points of manufacture. Consequently, no wholesale painting would occur on-site. Only limited amounts would be used for touch-up purposes during construction and maintenance phases. It is further assumed that the coatings applied by the manufacturers during fabrication would be sufficiently durable to last throughout the operational period of the equipment and that no wholesale repainting would occur.

[f] It is assumed that transformers, bushings and other electrical devices that rely on dielectric fluids would have those fluids added during fabrication. However, very large transformers may be shipped empty and have their dielectric fluids added (by the manufacturer's representative) after installation. It is further assumed that servicing of electrical devices that involves wholesale removal and replacement of dielectric fluids would not likely occur on-site and that equipment requiring such servicing would be removed from the site and replaced. New transformers, bushings or electrical devices are expected to contain mineral-oil-based or synthetic dielectric fluids that are free of polychlorinated biphenyls; some equipment may instead contain gaseous dielectric agents (*e.g.*, sulfur hexafluoride) rather than liquid dielectric fluids.

Small amounts of hazardous waste may be generated due to typical maintenance activities during operation of the Proposed Project Components (**Table 4.12-1**). Hazardous wastes would be handled and disposed in accordance with all applicable Federal, State and local laws and regulations, and the BMPs and APMs (**Chapter 2, Tables 2.2** and **2.3**).

### *Decommissioning*

At the end of the wind farm life cycle, large amounts of solid wastes would result from dismantling the Proposed Project Components. Recycling Proposed Project Components, where feasible, would be a priority, and the remaining materials would be placed in an appropriate waste disposal facility. Possible components that may be recycled include tower segments, electrical transformers and concrete foundations.

### *Waste Collection*

Waste receptacle bins for both solid and hazardous waste would be provided during both construction, operation and decommissioning for the Proposed Project Components. The amount of waste generated should be minimal. Recycling of materials would occur when feasible.

The solid waste resulting from construction and decommissioning would be transported by a commercial trash company and disposed of in a designated landfill. “Roll-offs” may be available at multiple locations for disposal construction debris. Mixed-material waste would be transported to a transfer station, waste disposal facility, or commercial recycling facility.

### *Occupational Hazards*

The types of activities that typically occur during construction, operation and decommissioning of a wind energy development project include a variety of major actions, such as establishing site access; excavating and installing tower foundations; tower assembly; constructing the central control building, electrical substation, meteorological towers and access roads; and routine maintenance of the turbines and ancillary facilities. Construction and operations workers at any facility are subject to risks of injuries and fatalities from physical hazards. While such occupational hazards can be minimized when workers adhere to safety standards and use appropriate protective equipment, fatalities and injuries from on-the-job accidents can still occur. Occupational health and safety are protected through the Federal Occupational Safety and Health Administration (OSHA) (29 U.S. Code 651, *et seq.*) and State laws.

An operator’s instruction manual would be prepared in conformance with the International Electrotechnical Commission (IEC) minimum safety requirements for wind turbine generators (IEC 1999), with supplemental information on special local conditions. The manual would include system safe operating limits and descriptions, start-up and shutdown procedures, alarm response actions and an emergency procedures plan. The emergency procedures plan would identify probable emergency situations and the actions required of operating personnel. The emergency procedures plan may address over-speeding, icing conditions, lightning storms, earthquakes, broken or loose guy wires, brake failure, rotor imbalance, loose fasteners, lubrication defects, sandstorms, fires, floods and other component failures.

Chemical exposures during construction and operation of a typical wind energy project are expected to be routine and minimal, and reduced by using personal protective equipment and/or engineering controls to comply with OSHA permissible exposure limits applicable for construction activities.

***Public Safety and Site Security***

The Programmatic EIS (BLM 2005) identifies a rotor blade breaking and parts being thrown as one of the primary safety hazards of wind turbines. This type of occurrence is anticipated to be extremely rare, particularly with today's generation of turbines. The probability of a fragment hitting a person is even lower. The related issue of ice throw can occur if ice builds up on the turbine blades. As a design characteristic, wind turbines would be set back at least 1,000 feet from occupied residences.

Unauthorized or illegal access to site facilities and the potential for members of the public to attempt to climb towers, open electrical panels, or encounter other hazards is another concern. This section also evaluates the potential for sabotage and terrorism-related impacts (also referred to as Intentional Destructive Acts).

Security measures would be taken during construction and operation, including temporary and permanent (safety) fencing at the substation, 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, except for the pad-mounted transformer. Access to the turbines would only be through a solid steel door that would be locked when not in use. These measures would also act to reduce potential sabotage and terrorism-related impacts. Western and RUS believe that the Proposed Project Components presents an unlikely target for an act of terrorism, with an extremely low probability of attack. The potential for the Proposed Project Components to be targeted in terrorism-related activity would be negligible. All authorized personnel would be issued specific access entry codes/keys to regulate entry into the facilities, including substation and O&M building areas. These measures would limit access and deter intruders.

***Electric and Magnetic Fields***

EMF is composed of both electric and magnetic fields. Electric fields are produced by voltage (or electric charges). Electric fields increase in strength as the voltage increases and are measured in units of volts per meter (V/m). Magnetic fields result from the flow of load current in transmission line conductors or any electrical device. The magnetic field also increases in strength as the current increases and is measure in units of Gauss (G) or Tesla (T). The Gauss is the unit most commonly used in the United States and the Tesla is the internationally accepted scientific term; 1 T is equivalent to 10,000 G. Since a Gauss or Tesla are both very large fields and the majority of magnetic field exposure are substantially lower, values typically reported and measured are in milligauss (mG) (1/1,000 of a Gauss) and microtesla (μT) (1/1,000,000 of a

Tesla, equivalent to 10 mG). Both the electric and magnetic field decrease rapidly, or attenuate, with distance from the source. Electric field induction effects are not generally associated with 230 kV transmission lines.

Exposures to extremely low-frequency EMF from natural and anthropogenic sources are ubiquitous. However, concerns about potential adverse health effects from residential and occupational exposures have been explored. Over the past 25 to 30 years, hundreds of studies have been performed to examine whether power-frequency (60-Hertz [Hz]) electric and magnetic fields pose a potential human health risk. The majority of the scientific studies have been conducted in the following research fields: epidemiology, laboratory cellular research and animal studies. In the U.S. and internationally, expert scientists from a variety of disciplines were assembled to review this very large body of research material and to assess the potential health risk. Major reviews of the existing research have concluded that the current body of scientific evidence does not show that exposure to power-frequency 60-Hz electric and magnetic fields represent a human health hazard.

EMF would be present in the vicinity of overhead power lines and the electric substation. While there is the potential for any generator to produce EMF, the 60-Hz frequencies are thought to be too low to damage human tissue, and EMF would diminish to background levels near the edge of the transmission line right-of-way.

### *Aviation Operations and Electromagnetic Interference*

The Programmatic EIS (BLM 2005) considered two primary aviation safety considerations, including (1) the physical obstruction of the tower itself, and (2) the effects on communications, navigation, and surveillance systems, such as radar. The potential vertical obstruction of the wind turbine, like any tall structure, could pose a hazard to aircraft arriving or departing at a nearby airfield. See **Sections 3.7** and **4.7** for additional description of the proximities to local airports.

Moving wind turbine blades interfere with radar by essentially creating radar echoes, however radar installations can be modified to eliminate this potential problem. Interference with other electromagnetic transmissions can occur when a large wind turbine is placed between a radio, television, or microwave transmitter and receiver, including potential disruptions of public safety communication systems.

### *Low-Frequency Sound*

In addition to more audible noise as discussed in **Section 4.9**, wind turbines are capable of generating low-frequency sound waves. Low-frequency sound may be perceived audibly as well as a vibration. Research suggests that low-frequency sound is disturbing, irritating and even tormenting to some people. Insomnia, headaches and heart palpitations have also been reported as secondary effects.

Infrasound and low-frequency noise are ubiquitous, since they are generated from natural sources (*e.g.*, earthquakes, wind) and anthropogenic sources (*e.g.*, automobiles, industrial machinery, household appliances) and are common in urban environments. The primary effect appears to be annoyance, and has not been proven to result in adverse health impacts.

***Shadow Flicker***

As discussed in the Programmatic EIS (BLM 2005), shadow flicker refers to the phenomenon that occurs when the moving blades of wind turbines cast moving shadows that cause a flickering effect. While the flickering effect may be considered an annoyance, there is also concern that the variations in light frequencies may trigger epileptic seizures in the susceptible population. However, the rate at which modern three-bladed wind turbines rotate generates blade-passing frequencies of less than 1.75-Hz, below the threshold frequency of 2.5-Hz, indicating that seizures should not be an issue.

***Wastewater***

Especially during the construction and decommissioning phases, and, to a lesser extent, during the operational phase, sanitary wastewater is generated by the work crews or maintenance personnel present on-site. During the construction and decommissioning phases, work crews of 50 to 300 individuals may be present. During the operational phase, a maintenance crew of 10 to 12 individuals is likely to be present on the site daily during business hours. Wastewater would be collected in portable facilities and periodically removed by a licensed hauler and introduced into existing municipal sewage treatment facilities. A septic tank and drainage field would likely be included at the O&M building.

***Storm Water and Excavation Water***

Except in those instances of spills or accidental releases, storm water runoff and excavation waters from the site alternatives are not expected to have industrial contamination but may contain sediment from disturbed land surfaces.

## 4.12.3.1 Crow Lake Alternative

The health and safety risks to area residents and the general public for the Crow Lake Alternative would be restricted to short periods during construction, operation and decommissioning at small, individual sites. The included BMPs and APMs (as listed in **Chapter 2, Tables 2.2** and **2.3**) would be employed during all ground disturbing activities. Due to the low voltage at which turbines and overhead and underground collector lines operate, and the setback distances from roads and residences, the potential impacts associated with EMF would be minimal. Magnetic field exposure from the facilities would be minimal in close proximity, and both electric and magnetic fields would dissipate from the facility corridors. Further, the development of the Proposed Project Components would comply with applicable local, State and Federal regulations regarding handling, transport or containment of hazardous materials. For these reasons, impacts to human health and safety would be less than significant.

Western's Wessington Springs Substation is fenced and specific access is limited to authorized personnel. Western maintains a security plan for the facility and any intrusions would be addressed by Western's security personnel and/or law enforcement personnel. The Wessington Springs Substation would be operated in accordance with Western's safety requirements; wastewater would be collected in portable facilities. Stormwater would be directed away from the site in accordance with the SWPPP, and BMPs and APMs (as listed in **Chapter 2, Tables 2.2** and **2.3**) would be employed. Impacts to human health and safety would be less than significant.

#### 4.12.3.2 Winner Alternative

Impacts of the Winner Alternative would be similar to those identified for the Crow Lake Alternative. With the included BMPs and APMs (as listed in **Chapter 2, Tables 2.2** and **2.3**), impacts to health and safety would be less than significant.

Western's system modifications proposed for the Winner Substation would result in less than significant impacts, similar to the Wessington Springs Substation proposed for the Crow Lake Alternative.

#### 4.12.3.3 No Action Alternative

Under the No Action Alternative, Western would not approve an interconnection request(s) and RUS would not provide financial assistance for the Proposed Project. For the purpose of impact analysis and comparison in this EIS, it is assumed that the Applicants' Proposed Project (and Wind Partners' proposed development as it pertains to the Crow Lake Alternative) would not be built and the environmental impacts, both positive and negative, associated with construction and operation would not occur. There would be no human health and safety impacts associated with the No Action Alternative.

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# 5 Cumulative Impacts

The CEQ regulations for implementing NEPA define cumulative effects as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions” (40 CFR 1508.7).

## 5.1 METHODS

Cumulative impacts were assessed by combining the effects of past activities, present ongoing activities, and reasonably foreseeable future actions with the potential effects of the Proposed Project and Wind Partners’ proposed development. Each of the resource categories were analyzed, however, differences between the two alternative sites were considered marginal for this cumulative impacts analysis of past, present and reasonably foreseeable actions and therefore both sites were addressed simultaneously.

The CEQ regulations (40 CFR 1508.7) further explain, “cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.” Based on these regulations, if the project does not have direct or indirect effects there can be no cumulative effects resulting from the project because there would be no impacts added to past, present, or reasonably foreseeable actions. Because the No Action Alternative has no direct or indirect effects on any resources, it would have no cumulative impacts and is not further evaluated in this chapter. Anticipated Proposed Project Component activities and resultant effects were described in **Chapters 1** through **4** of this FEIS.

The ROI varies by resource, as described in **Chapter 3**, Affected Environment, and was considered for the cumulative impacts assessment as the spatial boundary for the affected area for each resource. The temporal boundary for those resource areas is confined to the project description included in **Chapter 2**, Alternatives and Proposed Federal Actions. The Applicants would like to begin construction in mid-2010 and complete construction by the beginning of 2011 for the Proposed Project and the Wind Partners’ proposed development.

During the scoping process, agencies, organizations, tribes and the public were invited to provide input on the scope of the Proposed Project Components. This same opportunity was provided upon release of the DEIS on January 15, 2010, and with the 45-day public comment period. During this time, a public hearing and an interagency meeting were conducted. Through the DEIS review process, the NPS and USFWS provided similar comments on cumulative effects regarding the potential for development of other wind projects outside the ROIs for visual and biological resources, defined in **Chapter 3**, Affected Environment. Subsequently, the biological and visual cumulative impact discussions have been expanded for the ROI as described in **Section 5.4.2** and **Section 5.4.4**, respectively.

# 5.2 PAST AND PRESENT ACTIONS

***Evaluation Process***

Past and present development activities that have impacted the ROI and that were considered useful and relevant to this cumulative analysis include land use within the site alternatives, overall renewable energy development, wind facilities and utility infrastructure and capacity.

***Past and Present Actions Included in Cumulative Analysis***

<u>Baseline Conditions</u>

The land use within the site alternatives is described in **Section 3.6**, with impacts described in **Section 4.6**. The ROI for land use includes areas of immediate disturbance associated with the Proposed Project Components and proposed Federal actions. The majority of the region, including both site alternatives, is currently used for rangeland and agriculture; additionally, Western's Wessington Springs and Winner substations were identified as industrial uses. Agriculture, sporadic farmsteads and road infrastructure are existing and ongoing activities. For purposes of analyzing cumulative impacts, those past and present activities were considered part of the baseline condition of the areas.

<u>Overall Wind Energy Development</u>

Wind and other renewable sources are expected to become a larger share of the total electric generation resource in the U.S. for several reasons, primarily a desire to reduce overall GHG emissions, help increase energy security, and aid in economic stimulus efforts. Local, State and national energy policies are increasingly incorporating renewable portfolio standards, with wind as a major component, and targeting implementation of such standards by 2020 or sooner. Consequently, installation of wind and other renewable generation has increased dramatically, especially in the last 8-10 years. Between 2002 and 2006, wind generation (in thousands of kilowatt hours [kWh]) rose from approximately 10,400,000 to 26,600,000 (EIA 2008). In 2008, approximately 8,500 MW of new wind energy were installed in the U.S., representing roughly 40% of new power producing capacity, and making wind the second largest new generation source (AWEA 2009). Statewide, South Dakota and North Dakota are rich in wind energy resources (NRC 2007) and are included in this cumulative impacts analysis for a broader perspective. For comparison showing additional states' projects see **Figure 5.1** for a depiction of the Midwest Independent Transmission System Operator (MISO) projects with approved interconnection agreements. Additional information regarding the MISO is provided below (MISO 2010).

> The MISO is an independent, nonprofit organization that supports the reliable delivery of electricity in 13 U.S. states and the Canadian province of Manitoba. This responsibility includes ensuring the reliable operations and administering the regions' interconnected high voltage power lines that support the transmission of more than 100,000 MW of energy in the Midwest.

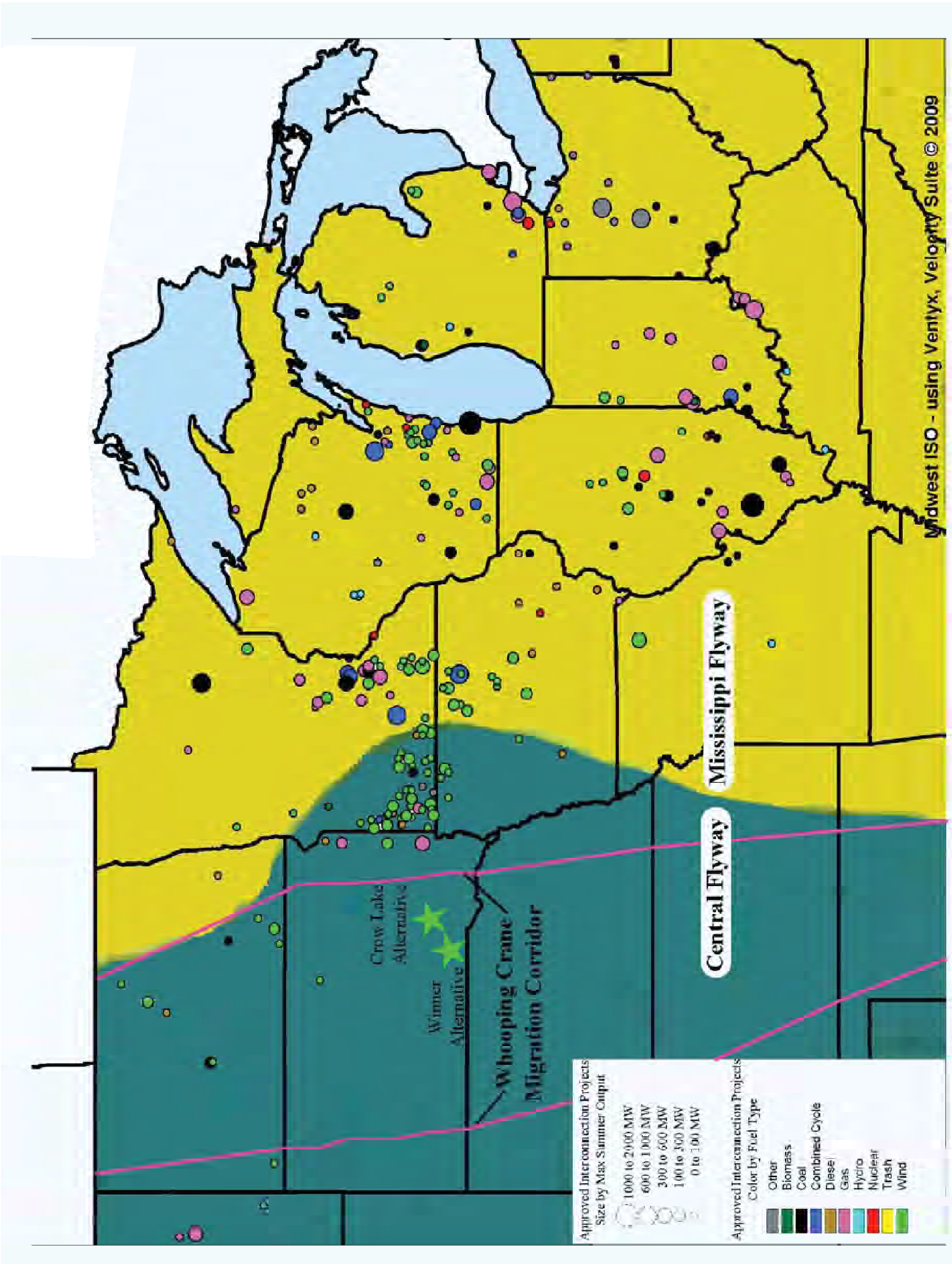


**Figure 5.1 Midwest Independent System Operator Approved Interconnection Projects and Migratory Flyways**

The Federal Production Tax Credit, recently extended through the American Recovery and Reinvestment Act of 2009, has been a major incentive for wind energy development. With the recent economic downturn, difficulties in obtaining credit reportedly have hampered the addition of wind power capacity by some developers. Also in early 2009, the EPA declared that GHGs are a threat to human health, which may lead to additional regulatory or legislative action to reduce GHG emissions.

Wind Energy Facilities in South Dakota

The following provides a summary of existing wind energy facilities in South Dakota (SDPUC 2009b; 2010).

> The state's first large scale wind farm was constructed in 2003 near Highmore. The 27 turbine, 40.5 MW project was built by FPL Energy (now NextEra Energy). In 2006, PPM (now Iberdrola) began developing the southern tip of the Buffalo Ridge area in South Dakota, just east of Brookings. The company built the Minn-Dakota Wind Farm (54 MW) in 2007, followed by Buffalo Ridge I (50.4 MW) in 2009 and recently started construction on Buffalo Ridge II (210 MW). In Day County, NextEra Energy has also begun construction on a 99 MW project. The Coteau des Prairies land formation, which runs from northwestern Iowa, through southwestern Minnesota (known there as the Buffalo Ridge), eastern South Dakota and up into North Dakota, sits in a great wind resource and, more importantly in South Dakota, close to transmission and a market for power. Most of this 200-mile ridge has been leased by developers and will likely be developed in the near term.
>
> The Coteau des Prairies/Buffalo Ridge has not been the only location in South Dakota developed for wind energy production; other developers have found niche areas in the state. Spanish developer Acciona built Tatanka I in 2008 near Long Lake on a ridge that dips down from North Dakota. This 180 MW project straddles the North Dakota-South Dakota border, with 88.5 MW on the South Dakota side along with a maintenance facility and a transmission substation. The ridges west of the James River Valley have also seen development including the previously mentioned South Dakota Wind Energy Center near Highmore as well as the newer Wessington Springs Wind Farm (51 MW), built by Babcock & Brown in 2009, and Titan I (25 MW) near Ree Heights, developed by BP Alternative Energy and launched in December of 2009. Most recently, the Day County Wind Project, 20 miles east of Groton, South Dakota and featuring 66 turbines and 99 MW, began construction in October of 2009 and was placed into operation as of April of 2010.
>
> Large-scale wind farms, although typically the most economical, have not been the only wind development in South Dakota. Both small residential and older, rebuilt larger turbines have been installed recently in South Dakota. With Federal tax incentives increasing during the last two years, residential turbines have become very popular. Resalers are popping up throughout South Dakota. The number of 2 to 10 kW turbines installed have been too numerous for the SDPUC to accurately track. The Wind for Schools program is an example of small-scale wind development. You can find more information about that program at wac.sdwind.org.

Buffalo Ridge II is the single large-scale wind project in construction at this time. **Table 5.1** provides a comprehensive list chronicling wind projects in South Dakota that are either existing, under construction or have been determined to be reasonably foreseeable as described in **Section 5.3**. See **Figure 5.2** for an illustration of those projects and their general locations in South Dakota.

Wind Energy Facilities in North Dakota

**Table 5.2** provides a comprehensive list chronicling wind projects in North Dakota that have been determined to be either existing, under construction or have been determined to be reasonably foreseeable as described in **Section 5.3**. See **Figure 5.3** for an illustration of those projects and their general location in North Dakota.

Utility Infrastructure and Capacity

The Federal government has also recognized the need for improvement to the nation's transmission infrastructure and the alleviation of transmission constraints. The American Reinvestment and Recovery Act granted Western $3.2 billion in budget authority "… to construct, finance, facilitate, own, plan, operate, maintain or study construction of new and/or upgraded electric power transmission lines and related facilities … for delivering or facilitating the delivery of power generated by renewable energy resources constructed or reasonably expected to be constructed" (Western 2009).

Basin Electric has 406.36 MW (owned or purchased) generated from current wind energy facilities in North Dakota and South Dakota. These currently consume some of the transmission capacity identified as available.

Existing utility infrastructure within the Crow Lake Alternative area includes Western's existing transmission system including a 230-kV transmission line and the Wessington Springs Substation. In addition, the existing Wessington Springs Wind Project, a 51 MW wind energy generating facility (Western 2007), is located adjacent to the northeast edge of the Crow Lake Alternative. Existing utility infrastructure within the Winner Alternative area includes Western's transmission system, including a 115-kV transmission line and the Winner Substation.

**Table 5.1 Existing and Reasonably Foreseeable Wind Energy Projects in South Dakota**

| Wind Project Name | Existing, In Construction or Reasonably Foreseeable | Location | Power Capacity | Units | Turbine Mfr. | Developer | Owner | Power Purchaser | Year Online | SDPUC Approval |
|---|---|---|---|---|---|---|---|---|---|---|
| Chamberlain | Existing | Chamberlain | 2.6 MW | 2 | Nordex | Crown Butte Wind Power | Basin Electric | Basin Electric/East River Coop | 2001 | N/A |
| Howard | Existing | Howard | 216 kW | 2 | Micon | MCCR & City of Howard | City of Howard | City of Howard | 2001 | N/A |
| Canova | Existing | Near Canova | 108 kW | 1 | Micon | MCCR & City of Canova | City of Canova | City of Canova | 2002 | N/A |
| Gary | Existing | Gary | 90 kW | 1 | Vestas | Energy Maintenance Services | Energy Maintenance Services | Energy Maintenance Services | 2002 | N/A |
| Carthage Turbine | Existing | Near Carthage | 108 kW | 1 | *(unknown)* | MCCR & City of Carthage | City of Carthage | City of Carthage | 2003 | N/A |
| Alex Little Soldier Wind Turbine | Existing | Rosebud Sioux reservation | 750 kW | 1 | Native Energy Micon | Native Energy, DISGEN and Rosebud Sioux | Rosebud Sioux | East River Electric | 2003 | N/A |
| SD Wind Energy Center / Highmore | Existing | Highmore | 40.5 MW | 27 | GE Energy | FPL Energy | NextEra Energy Resources | Basin Electric | 2003 | N/A |
| Oaklane Colony | Existing | Near Alexandria | 160 kW | *(un-known)* | *(unknown)* | Oaklane Colony | Oaklane Colony | Oaklane Colony | 2006 | N/A |
| Minn-Dakota | Existing | Brookings County | 54 MW | 36 | GE Energy | Iberdrola Renewables | PPM Energy | Xcel Energy | 2008 | N/A |
| Sisseton Wahpeton Community College | Existing | Sisseton Wahpeton Community College | 130 kW | *(un-known)* | *(unknown)* | Sisseton Wahpeton Community College and USDA | Sisseton Wahpeton Community College | Sisseton Wahpeton Community College | 2008 | N/A |
| Tatanka I | Existing | Near Long Lake, McPherson County | 88.5 MW | 60 | Acciona | Acciona Energy | Acciona Energy | Midwest ISO | 2008 | N/A |

**Table 5.1 Existing and Reasonably Foreseeable Wind Energy Projects in South Dakota**

| Wind Project Name | Existing, In Construction or Reasonably Foreseeable | Location | Power Capacity | Units | Turbine Mfr. | Developer | Owner | Power Purchaser | Year Online | SDPUC Approval |
|---|---|---|---|---|---|---|---|---|---|---|
| Buffalo Ridge I | Existing | Brookings County | 50.4 MW | 24 | Suzlon | Iberdrola Renewables | Iberdrola Renewables | Northern Indiana Public Service Company | 2009 | N/A |
| Titan I | Existing | Near Ree Heights, Hand County | 25 MW | 10 | *(unknown)* | Clipper Wind and BP Alternative Energy | BP Alternative Energy | NorthWestern Energy | 2009 | N/A |
| Wessington Springs | Existing | Jerauld County | 51 MW | 34 | GE Energy | Babcock & Brown | NextEra Energy Resources | Heartland Consumers Power District | 2009 | N/A |
| Day County | Existing | *(unknown)* | 99 MW | 66 | *(unknown)* | NextEra Energy Resources | NextEra Energy Resources | Basin Electric | Expected mid-2010 | N/A |
| Buffalo Ridge II | In Construction | Brookings and Duel Counties | 210 MW | 100 | *(unknown)* | Iberdrola Renewables | Iberdrola Renewables | *Midwest ISO* | Expected late-2010 | Yes |
| Buffalo Ridge III | Reasonably Foreseeable | Brookings and Duel Counties | 170 MW | 113 | *(unknown)* | Heartland Wind, LLC | Heartland Wind, LLC | *(unknown)* | Estimated for Winter 2011 | Reasonably Foreseeable |
| White | Reasonably Foreseeable | Brookings County | 200 MW | 103 | *(unknown)* | Navitas | Babcock & Brown | *(unknown)* | *(unknown)* | Yes |

Source: SDPUC 2009b and AWEA 2009b

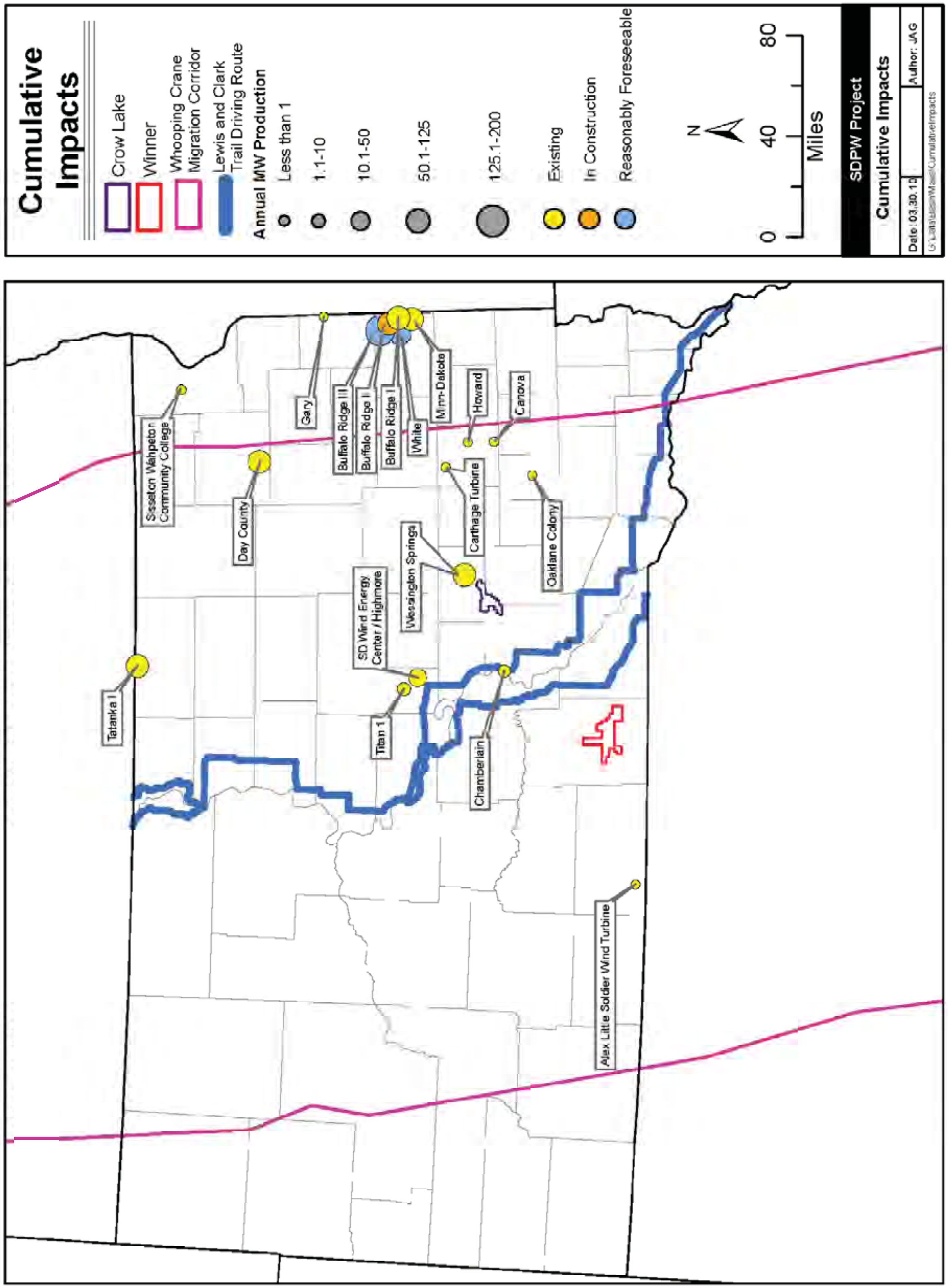


**Figure 5.2 Existing and Reasonably Foreseeable Wind Energy Proejcts in South Dakota**

**Table 5.2 Existing and Reasonably Foreseeable Wind Energy Projects in North Dakota**

| Wind Farm Name | Existing, in Construction or Reasonably Foreseeable | Location | Power Capacity | Units | Turbine Mfr. | Owner | NDPSC Approval |
|---|---|---|---|---|---|---|---|
| 3 Affiliated Tribes | Existing | New Town | 6.5 kW | 1 | *(unknown)* | 3 Affiliated Tribes | N/A |
| Ashtabula | Existing | Barnes County | 200 MW | 133 | GE 1.5 MW | FPL - Ashtabula Wind, LLC | Yes |
| Belcourt | Existing | Belcourt | 130 kW | 1 | Micon 108 | Turtle Mountain Chippewa Tribe | N/A |
| Edgeley/Kulm | Existing | Edgeley | 40 MW | 27 | GE 1.5 MW | FPLE / BEPC | N/A |
| Edgeley/Kulm | Existing | Edgeley | 21 MW | 14 | GE 1.5 MW | FPLE / Otter Tail | N/A |
| Fort Totten | Existing | Fort Totten | 130 kW | 1 | Micon 108 | Spirit Lake Sioux Nation | N/A |
| Langdon Expansion | Existing | Cavalier County | 40 MW | 26 | GE 1.5 MW | FPL- Langdon Wind, LLC | N/A |
| Langdon II | Existing | Cavalier County | 40.5 MW | 27 | GE 1.5 MW | Otter Tail Corporation | N/A |
| Langdon Project | Existing | Cavalier County | 118.5 MW | 79 | GE 1.5 MW | FPL- Langdon Wind, LLC | Yes |
| Luverne | Existing | Griggs/Steele counties | 157 MW | 105 | GE 1.5 MW | M-Power LLC | Yes |
| Minot | Existing | South of Minot | 2.6 MW | 2 | Nordex N60 | BEPC - PrairieWinds | N/A |
| North Valley Career | Existing | Grafton | 6.5 kW | 1 | *(unknown)* | North Valley Carreer and Technology Center | N/A |
| Oliver | Existing | Center | 50.6 MW | 22 | 2.3 MW Turbines | FPL - Oliver County Wind LLC | N/A |
| Oliver II | Existing | Center | 48 MW | 32 | GE 1.5 MW | FPL - Oliver County Wind LLC | N/A |
| Petersberg | Existing | Petersberg | 90 kW | 1 | NEG Micon NM52/901 | Minnkota Power Cooperative | N/A |
| PrairieWinds | Existing | Ward County | 115.5 MW | 77 | GE 1.5 MW | BEPC - PrairieWinds ND 1, Inc. | Yes |
| Rugby | Existing | Rugby | 149.1 MW | 71 | Suzlon 2.1 MW S88 | Iberdrola, Inc. f/k/a PPM Energy | Yes |
| Sacred Heart Monastery | Existing | Richardton | 130 kW | 2 | Silver Eagle | Sacred Heart Monastary | N/A |
| Tatanka I | Existing | Dickey County | 90 MW | 60 | Acciona AW 1500 | Tatanka Wind Power, LLC | N/A |
| Turtle Mountain CC | Existing | Belcourt | 66 kW | 1 | Vestas V47 | Turtle Mountain Community College | N/A N/A |
| Valley City | Existing | Valley City | 90 kW | 1 | NEG Micon NM52/900 | Minnkota Power Cooperative | N/A |
| Velva | Existing | Velva | 12 MW | 18 | Vestas V80 | EHN / Xcel Energy | N/A |

**Table 5.2 Existing and Reasonably Foreseeable Wind Energy Projects in North Dakota**

| Wind Farm Name | Existing, in Construction or Reasonably Foreseeable | Location | Power Capacity | Units | Turbine Mfr. | Owner | NDPSC Approval |
|---|---|---|---|---|---|---|---|
| Wilton | Existing | Wilton | 49.5 MW | 33 | GE 1.5 MW | FPL Burleigh County Wind LLC | N/A |
| Wilton II | Existing | Wilton | 49.5 MW | 33 | GE 1.5 MW | FPL Burleigh County Wind LLC | N/A |
| Gascoyne I | Reasonably Foreseeable | Adams/Bowman counties | 200 MW | 133 | GE 1.5 MW | Crown Butte Wind Power LLC | Pending |
| Logan County I | Reasonably Foreseeable | Logan County | 368 MW | 160 | Mitsubishi 2.4 MW | Just Wind, LLC | Pending |
| Dickey County | Reasonably Foreseeable | 15 miles NW of Ellendale | 150 MW | 100 | GE 1.5 MW | Rough Rider Wind 1, LLC | Pending |
| Oliver County Expansion | Reasonably Foreseeable | 6 miles NW of Center | 1,000 MW | 667 | *(unknown)* | FPL Energy, LLC | Pending |
| Border Winds | Reasonably Foreseeable | Rolette and Towner Counties | 150 MW | 66 | *(unknown)* | Sequoia Energy U.S. Inc. | Pending |
| Hartland | Reasonably Foreseeable | Ward, Burke, Mountrail counties | 2,000 MW | *(unknown)* | *(unknown)* | Hartland Wind Farm, LLC | Pending |
| Bison I | In Construction | Oliver County | 125 MW | *(unknown)* | *(unknown)* | Allete, Inc. (MN Power) | Yes |
| Merricourt | Reasonably Foreseeable | McIntosh/Dickey counties | 150 MW | *(unknown)* | *(unknown)* | enXco | Pending |
| *Emmons County* | Reasonably Foreseeable | Emmons County | 900 MW | *(unknown)* | *(unknown)* | Just Wind, LLC | Pending |
| Bison I | In Construction | Oliver/Morton counties | 75.9 MW | 33 | Siemons 2.3 MW | Allete, Inc. (MN Power) | N/A |
| Cedar Hills | In Construction | Rhame | 19.5 MW | 13 | GE 1.5 MW | Montana-Dakota Utilities | N/A |
| Ashley | Reasonably Foreseeable | McIntosh County | 487.6 MW | 212 | *(unknown)* | CPV Ashley Renewable Energy Company, LLC | Pending |
| Baldwin | Reasonably Foreseeable | Burleigh County | 99.0 MW | 66 | *(unknown)* | NextEra Energy Resources, LLC | N/A |
| Radiance | Reasonably Foreseeable | Burleigh County | 99.0 MW | *(unknown)* | *(unknown)* | North Dakota Winds, LLC | N/A |

Source: NDPSC 2010

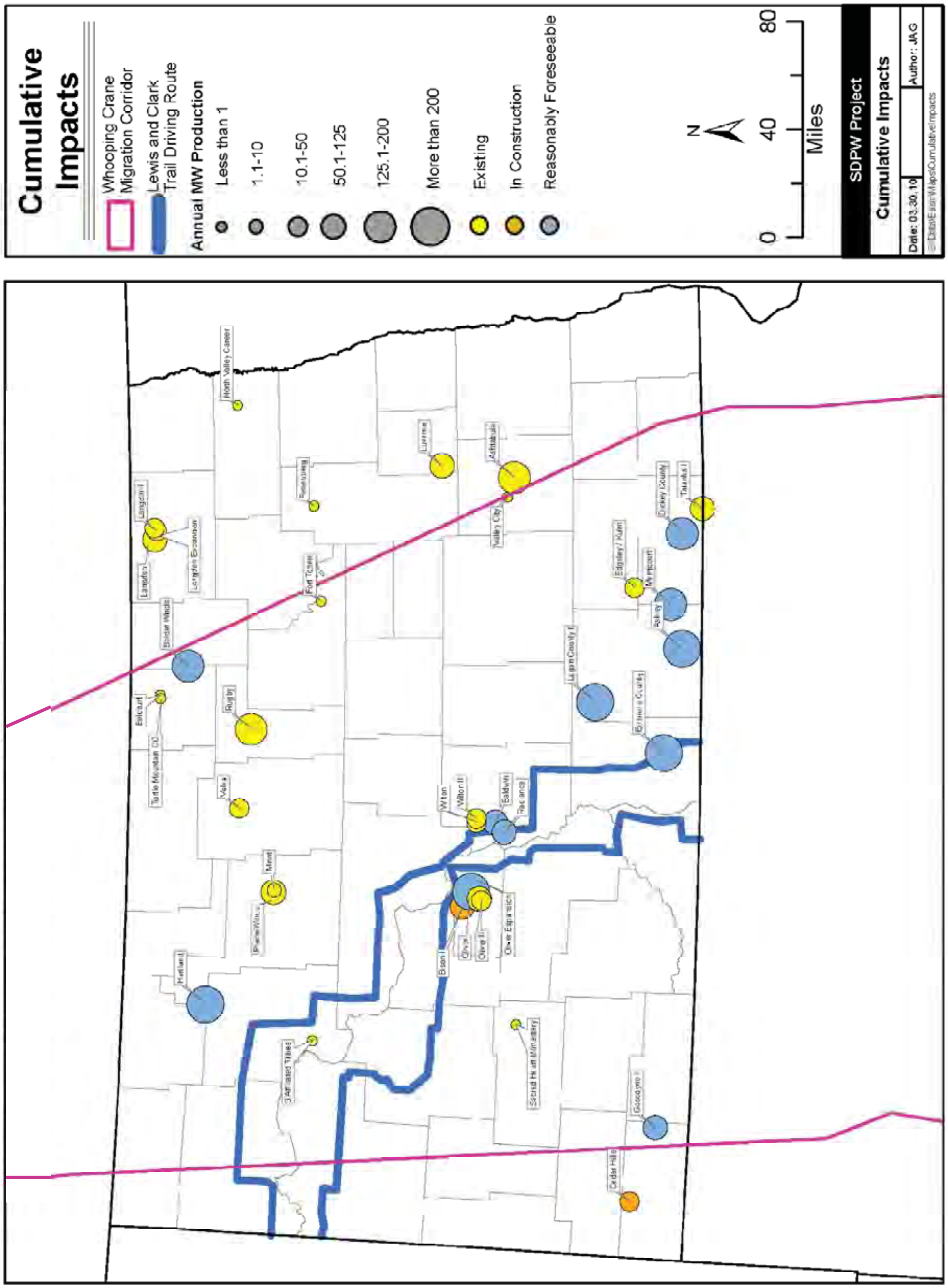


**Figure 5.3 Existing and Reasonably Foreseeable Wind Energy Projects in North Dakota**

# 5.3 REASONABLY FORESEEABLE FUTURE ACTIONS

***Evaluation Process***

Activities considered reasonably foreseeable future actions were evaluated based on the criteria listed below. Information was gathered to identify potential future actions in the following ways: contacting local county planning staff; reviewing regional planning documents; considering other EIS/EAs recently done for other projects in the region; and reviewing public feedback from the scoping and DEIS review/comment periods. The Agencies used the information gathered and applied the criteria below to determine which of these projects are speculative due to limiting factors and which are reasonably foreseeable to occur and relevant to the cumulative impacts discussion.

- **Transmission –** evaluate the availability and/or proximity to existing transmission paths necessary to direct the transmission of energy
- **Power purchase agreements –** identify a legal contract between an electricity generator and a power purchaser
- **Market availability –** analyze sufficient accessibility of an electricity market for the trade and supply of energy
- **Siting authorities/applications –** identify if an application has been submitted to a siting authority (*e.g.*, as a utilities commission, Public Utilities Commission [PUC] or Public Service Commission [PSC] that regulates the rates and services of a public utility, reviews and approves and/or denies applications for development of wind projects with a capacity of 100 MW or more)
- **NEPA process/Federal approvals –** identify if a project is under NEPA review (*e.g.*, Federal agencies are required to consider and disclose the potential environmental impacts of their “major” or “significant” proposed actions, prior to decision-making, to keep the decision-making process transparent and cooperative)
- **System studies and planning analysis –** determine if a project requires analysis or an evaluation of proposal design to determine the difficulty in carrying out a designated task, such studies precede technical development and project implementation

The subsequent discussion describes the activities determined to be reasonably foreseeable future actions, and those that were excluded from full cumulative impact analysis.

***Reasonably Foreseeable Future Actions Included in Cumulative Analysis***

Using the above criteria, only two projects have been identified as reasonably foreseeable. It is recognized that cumulative analysis may include other types of generation (see page 242 below) however, wind projects were the only actions determined to be reasonably foreseeable and pertinent to this analysis. Currently, the White Wind Project (200 MW, 105 turbines) that would be located in Brookings County, South Dakota, has approval from the SDPUC wind energy siting authorities and has completed an EIS; although it is not in construction at this time, these factors render the project reasonably foreseeable. The Buffalo Ridge III Wind Project (170 MW, 113 turbines) that would be located in Deuel and Brookings counties has released an NOI to prepare an EIS; it has potential to occur although it has not submitted a wind energy application to the SDPUC at this time, it is considered reasonably foreseeable.

Growth in wind generation is expected to slow appreciably through 2010, after having grown 50 percent in 2008 (EIA 2009). Nonetheless, the EIA forecast through 2030 indicates steady growth in wind capacity through 2012, after which capacity increases slightly, but essentially levels off, through 2030. In 2030, wind is forecast to be 2.5 percent of total generation. Also, an increase in the cost of carbon-based generation would make wind power more economical, which could drive wind development. If legislation allowed for the conversion of renewable energy credits to emissions offsets, wind development could be even more prolific (SDPUC 2009a). See **Figure 5.1** for a depiction of the MISO approved interconnection projects.

South Dakota is one of the top ranked States for potential wind development in the U.S., and has actively promoted development of wind energy. The State offers a wind energy tax credit and a reduced property tax for wind facilities; the wind energy credit was extended in March 2009. Although South Dakota has high wind potential, like many other States, it has not been fully developed because of the limited amount of installed transmission. The distance of the markets from the wind regions of South Dakota further compounds this issue.

Recognizing this, South Dakota and 4 nearby States have discussed integrated transmission development in support of wind energy that will promote regional electric transmission investment and cost sharing. The States working together are contributing to the Upper Midwest Transmission Development Initiative to identify energy generation resources, transmission projects and infrastructure needed to support those resources in a cost-effective manner. Over the next 10 months, participants will determine a reasonable allocation of costs for necessary infrastructure ultimately leading to the development of a concrete plan or tariff proposal for consideration by the MISO. See **Figure 5.4** for a depiction of existing utilities across South Dakota. It is important to reiterate that while the map depicts abundant existing utilities, the reality of capacity constraints, coupled with the characteristics of the aging transmission grid, lessen the possibilities of future wind energy development.

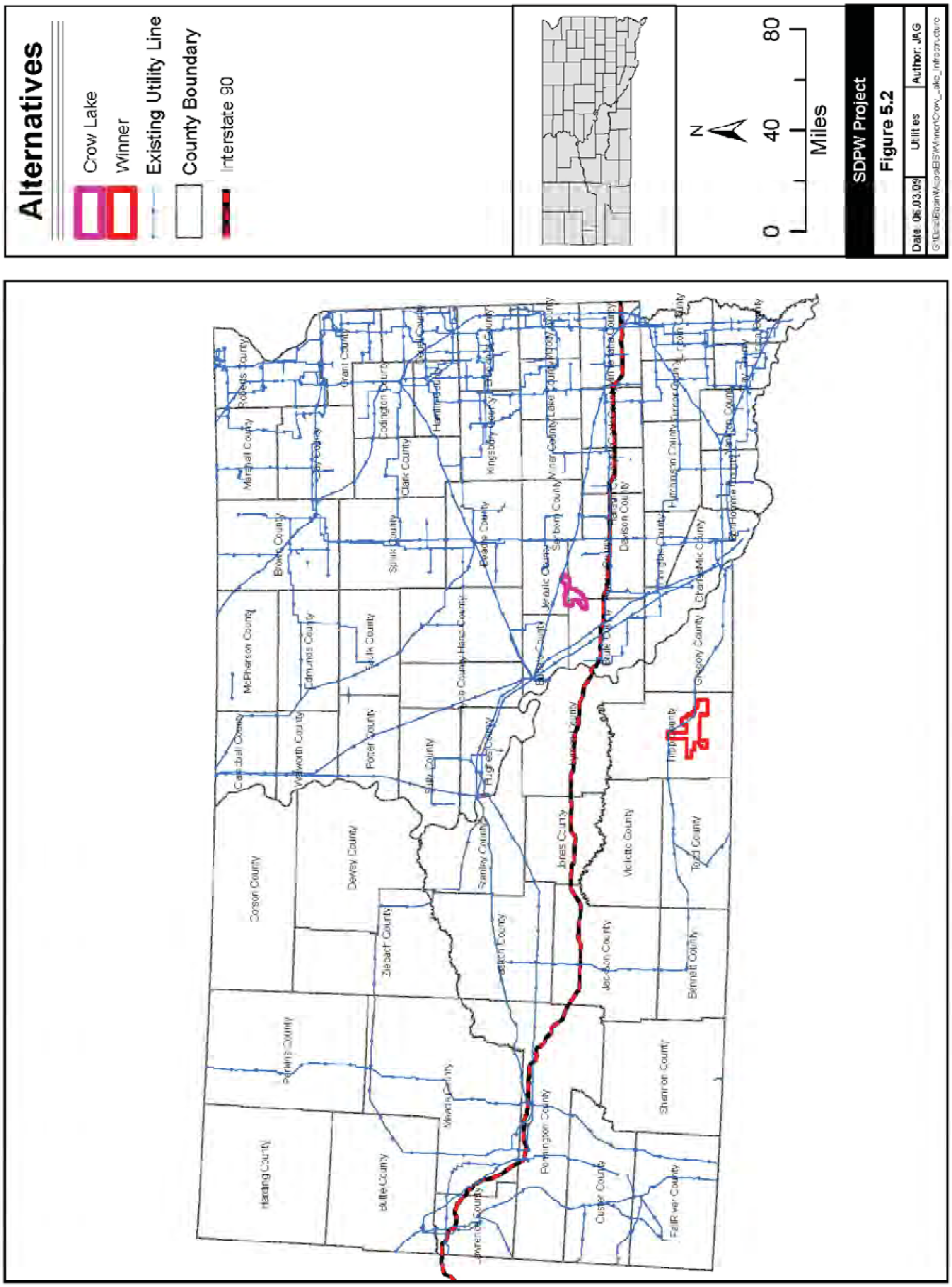


**Figure 5.4 South Dakota Existing Utilities**

### *Proposed Projects Excluded from Cumulative Analysis*

Issues Affecting Wind Energy Development

Speculation exists about what is needed to drive more wind energy development in South Dakota. A wind project has three basic requirements that enable it to be realistic: wind resource, a buyer for the electricity and transmission to get it from the wind turbines to the load. The SDPUC states that South Dakota really has only one of those three to offer: the wind resource (SDPUC 2009b).

Wind development in South Dakota has increased over the last couple years, with the state moving from 40 MW to over 300 MW during that time. The SDPUC anticipates the State's generation development to double to 600 MW in 2010. Beyond these projects, however, development is likely to get more difficult. With 600 MW of total wind generation, South Dakota nears 30 percent of their peak load of just more than 2000 MW (SDPUC 2009b). At this level of wind integration, the state is nearing the limits of what the transmission system can handle without extensive upgrades and new transmission lines. Most of the exporting transmission is filling to capacity and electric load in South Dakota is not large enough to take on much more wind generation. The future wind potential in South Dakota is dependent on the ability to export it to larger markets (SDPUC 2009b).

The ability to export electricity lies solely on the expansion of high voltage transmission lines, mostly to eastern markets such as Minneapolis and Chicago. As utilities serving states to the east of South Dakota are required to buy more renewable energy to meet their states' requirements, the lowest cost power is likely to come from wind projects in the Dakotas. The two main barriers to developing those transmission lines are cost allocation and siting. Traditional cost allocation formulas recover transmission costs from customers within the geographic area that transmission is built. Without any changes, South Dakotans would end up paying for the transmission moving wind power to eastern customers. Everyone agrees the cost allocation formulas need to change; it is simply a question of what method is the most equitable. Although siting has not been as much of a concern in South Dakota, it is nearly impossible to build transmission lines through Minnesota, especially if there are no benefits attached for the landowner (e.g. wind turbine payments that will go to landowners in South Dakota). Siting new, high voltage transmission lines is a process that will take years but cannot start until the cost allocation formulas have been decided. South Dakota will not come anywhere near its real wind development potential until states in the region solve these two issues.

Communications with planning and zoning personnel from Aurora (Vissia 2009), Brule (Westendorf 2009), Jerauld (Reindle 2009), and Tripp (Hirsh 2009) counties did not identify any proposed projects within these counties. Based on the excellent wind resource in South Dakota, it is likely that more renewable energy and associated transmission projects will be proposed in the near future. However, the following actions were identified through the regional research conducted, but were excluded from the cumulative impacts analysis for the stated reasons.

South Dakota Economic Development Proposed Projects

South Dakota Governor's Office of Economic Development (SDGOED) has created a wind energy development map that identifies several existing and proposed wind projects (SDGOED

2009). Projects identified as “existing” and “under construction” were verified, included as past and present actions within the analysis area and are identified as “existing” in **Table 5.1**. White Wind Farm and Buffalo Ridge III were identified as reasonably foreseeable for the reasons described above. The remaining projects identified as “pending” or “proposed” were evaluated based on the criteria identified above and were determined to either have insufficient information available to be considered in the analysis or did not meet the evaluation factors to be deemed feasible at this time. Additionally, it is unlikely that the majority of the pending or proposed projects would be viable due to limited transmission capacity as identified by the SDPUC (SDPUC 2009b) as described above.

<u>South Dakota State Transportation Improvement Plan Transportation Project</u>

The 2010 to 2014 South Dakota State Transportation Improvement Plan (SDDOT 2009) identified projects associated with SR45 in Brule County and US183 in Tripp County. Both of these projects are identified as resurfacing projects and would occur during the 2011 to 2012 timeframe. These resurfacing projects have not been included in the cumulative impacts analysis because both would result in temporary impacts associated only with duration of the resurfacing project and would occur after completion of construction of the Proposed Project Components and, therefore, would not result in a cumulative impact.

<u>Rosebud Sioux Tribe Wind Project</u>

The Rosebud Sioux Tribe proposes to construct a wind project in Todd County approximately 2.5 miles north of Mission, South Dakota. The tribe currently has interconnection requests within Western’s queue for 90 MW and/or 100 MW; however, system impact studies relating to these interconnection requests have not yet begun. Depending on the outcome of system impact studies, the tribe may develop the project as a 90 MW, 100 MW or 190 MW wind farm (Haukaas 2009). At this time, the Rosebud Sioux Tribe project proponents are conducting preliminary environmental studies. Because this proposed wind project is in preliminary study stages and is not sufficiently advanced in project development, it has been excluded from the cumulative impact analysis.

## 5.4 CUMULATIVE IMPACT ANALYSIS

Cumulative effects were evaluated for both the construction (anticipated to begin mid-2010 and complete by the end of 2010) and post-construction (operation) periods of the Proposed Project Components. As identified in **Chapter 2** (and for either site alternative), the “Proposed Project Components” include:

- Wind Turbine Generators and Foundations
- O&M Building
- Underground Communication System and Electrical Collector Lines
- Collector Substation and Microwave Tower
- Overhead Transmission Line
- Temporary Equipment/Material Storage or Lay-down Areas
- Temporary Batch Plant
- Crane Walks

- New and/or Upgraded Service Roads to Access the Facilities

As identified in **Chapter 4**, the impacts to the following resources are anticipated to be minimal and primarily occur during construction: geology and soils, water, land use, transportation, noise, socioeconomics, environmental justice, and health and safety. Additionally, there are no other proposed projects identified within the ROI that would potentially impact the aforementioned resources, therefore, these resources will not be further evaluated for cumulative impacts. Where applicable, the Applicants' and Agencies' standard BMPs (see **Table 2.2)**, and Applicants' APMs (see **Table 2.3**) have been included and would be used for the Proposed Project Components and proposed Federal actions as appropriate, thereby reducing or eliminating the potential for incremental effects resulting from the Proposed Project Components.

### 5.4.1 CLIMATE CHANGE AND AIR QUALITY

Cumulative impact analysis for climate change includes consideration of the ROI for the project, and State and national GHG emission reduction efforts. Current national and State practices include the inventory of GHG emissions to compare the relative contribution of different emission sources and GHG emissions to climate change. According to the EPA (2010), "a GHG inventory is an accounting of the amount of GHGs emitted to or removed from the atmosphere over a specific period of time (*e.g.*, one year). A GHG inventory also provides information on the activities that cause emissions and removals, as well as background on the methods used to make the calculations. Policy makers use GHG inventories to track emission trends, develop strategies and policies and assess progress. Scientists use GHG inventories as inputs to atmospheric and economic models. To track the national trend in emissions and removals since 1990, EPA develops the official U.S. GHG inventory each year. The national GHG inventory is submitted to the United Nations in accordance with the Framework Convention on Climate Change. In addition to the U.S. inventory, GHG emissions can be tracked at the global, State and local levels as well as by companies and individuals. "

$CO_2$ is one of six GHGs that contribute to climate change. $CO_2$ emissions represent approximately 84 percent of all GHG emissions in the U.S. The greatest advantage of wind power is electricity generation without air emissions, including $CO_2$. Within South Dakota, $CO_2$ emissions resulting from fossil fuel combustion totaled 13.78 million tons in 2007 (EPA 2009a). Of these, activities related to the generation of electric power accounted for 2.96 million tons of $CO_2$ emitted in South Dakota (EPA 2009a). Further, operation of the Proposed Project Components would avoid 726,600 metric tons of $CO_2$ emissions per year (EPA 2009b) compared to the average emissions of fossil fueled generating stations employed in South Dakota; thus, contribute to the national and State efforts to minimize GHG emissions. Implementation of the proposed development would therefore not contribute to cumulative effects on air quality or climate change.

### 5.4.2 BIOLOGICAL RESOURCES

There are three cumulative impact analysis areas for biological resources: the ROI (project area boundary) for vegetation, mammals (excluding bats), reptiles, amphibians; the Aransas-Wood Buffalo migration corridor for whooping crane; and the South Dakota portion of the Central Flyway for bats and birds, excluding whooping crane.

Some biological resources would be impacted due to the construction and operation of the Proposed Project Components. Construction would result in the permanent loss of a small amount of native vegetation and wildlife habitat, and could result in a minor number of mammal, reptile, and amphibian mortalities. Impacts to these biological resources resulting from the Proposed Project Components would be minimal within the ROI, and incremental impacts are not anticipated to increase cumulative impacts due to the low degree of impacts in a very localized area. The past, present and reasonably foreseeable actions carried forward in the cumulative impacts analysis (**Table 5.1** and **Table 5.2**) are geographically isolated from the Proposed Project Components, are not in the project area boundary's cumulative impact analysis area, and those species that use habitats in these areas are not connected to the same populations in the ROI because of their relatively small home ranges.

Given the current economic climate, transmission constraints, and market availability, it is difficult to accurately predict the actual growth of wind energy in South Dakota and other top wind states – many of which also lie within the whooping crane migration corridor. However, the number of wind projects and associated infrastructure is growing, and will likely continue to grow into the near future. Research on how whooping cranes respond to turbines remains nascent, so it is difficult to predict the cumulative impacts of wind energy project development and disturbance within the whooping crane corridor. It can be assumed that as development and disturbance within the migratory corridor continues to increase, stopover habitat quality and quantity would continue to degrade.

Past activities that have affected habitat in the Project area include conversion of native vegetation and CRP lands for farming, construction of the Wessington Springs Wind Project, and construction of roads, transmission lines, and residences. Development of electrical power generation and transmission within the crane migration corridor (**Table 5.1, Figure 5.2, Table 5.2,** and **Figure 5.3**) has contributed to a baseline condition that presents considerable risk to a small and vulnerable crane population. Continued development of power generation and transmission within the Aransas-Wood Buffalo migration corridor, whether from renewable or non-renewable sources, will increase the potential for collisions with structures and loss or avoidance of stopover habitat. Implementation of the whooping crane monitoring program (BA, **Appendix G**) and proposed habitat offsets will help reduce incremental impacts to the whooping crane resulting from the Proposed Project but the project will add to cumulative effects to the Aransas Wood Buffalo Population. A BA was prepared under Section 7 of the ESA Western, and RUS and Applicants will follow USFWS recommendations provided during the Section 7 consultation process. While SDCL 34A-8 does not require agency consultation for State-listed threatened and endangered species, SDGFP has been active in the preparation of this FEIS.

As discussed in **Section 4.4.3**, implementation of the Proposed Project Components are likely to cause displacement effects for greater prairie chicken and sharp-tailed grouse; however, it is difficult to estimate the level of effect because few studies have been conducted. Agricultural and other activities have fragmented grassland habitats significantly, and future energy projects are likely to increase fragmentation, thus contributing to cumulative impacts for these species. In order to better understand the impact wind development may have on these species, a grouse study plan has been developed for the Proposed Project Components (WEST 2010a). Existing leks will be monitored to determine the degree of displacement effects.

Operation of the Proposed Project Components would likely result in avian and bat mortalities (see **Sections 4.4.3.1 and 4.4.3.2**), mainly as a result of habitat fragmentation, and possible collisions with new overhead transmission lines and wind turbines. FAA-approved marker lights would be installed on turbines taller than 200 feet. Very little literature on the subject of wind turbine lighting is available. Studies have shown that tower lights may attract birds under certain weather conditions; others have shown this to be inconclusive (Manville 2009). Gehring and Kerlinger (2007) conducted a study that suggests bird fatalities resulting from the attraction of tower lights can be reduced by up to 50 to 70 percent if steady red lights are replaced with red strobe or red incandescent or white strobe lights. Given the few studies and inconclusive nature of studies relating to impacts of tower lights, tower lighting may incrementally increase cumulative effects on avian species in areas where the lights are highly concentrated, such as the edges of the Proposed Project Components.

As discussed in Sections **5.2 Past and Present Actions** and **5.3 Reasonably Foreseeable Future Actions**, there are numerous existing and proposed transmission and wind generation projects in South Dakota that have or may have similar impacts on birds and bats. However, most of these projects are located in eastern South Dakota and are considerably distant from the Proposed Project Components areas (**Figure 5.2**). Existing transmission lines and wind generation projects have negatively affected birds and bats, and, as discussed in **Sections 5.2** and **5.3**, the likely need for additional wind generation facilities and transmission capacity to meet increasing demand could increase cumulative effects in areas where these facilities are concentrated, such as eastern South Dakota. Incremental impacts associated with the Proposed Project Components may result in increased cumulative impacts when added to other wind and transmission projects near the wind facility. However, the site alternatives are geographically isolated from the majority of existing and proposed wind generation facilities (with the exception of the Wessington Springs Wind Project) and transmission lines. Therefore, bird and bat species utilizing the habitats in eastern South Dakota would not likely be incrementally impacted by the Proposed Project Components. Grassland bird use was shown to be in the normal range in the site alternatives areas; the alternatives are not high use areas based on numerous habitat factors including a relatively large amount of agricultural lands. Raptor use was shown to be low compared to other wind facilities (Derby et al 2010c and 2010d). Bat use was shown to be similar to existing wind facilities that have low mortality rates, and the same is expected for the Proposed Project Components (Derby et al. 2010a and 2010b). Therefore, bird and bat populations utilizing habitats in the local area may experience slight incremental impacts by the Proposed Project Components.

It can be assumed that as development and disturbance within the central flyway continues to increase, this would continue to degrade migratory and resident bird and bat habitat quality and quantity. Past activities that have affected habitat in the project area include conversion of native vegetation and CRP lands for farming, and construction of roads, transmission lines, and residences. Similar to the situation faced by the whooping crane, development of electrical power generation and transmission within the central flyway has contributed to a baseline condition that presents some level of risk to a bird and bat populations. Continued development of power generation and transmission (including this proposed wind facility), whether from renewable or non-renewable sources, will increase the potential for habitat fragmentation and collisions with structures.

## 5.4.3 CULTURAL RESOURCES

Potential impacts to cultural resources, such as prehistoric properties, historic properties, and cultural landscapes, were identified in the results of the Class III Survey and TCP Survey that were completed for the preferred alternative (Crow Lake Alternative). Agreements are being developed to ensure avoidance and/or mitigation of adverse effects to historic properties. These agreements are being developed among Western, RUS, SHPO, affected Federal agencies, Applicants, and all interested Native American Tribes. The preferred treatment of any potential TCPs and archaeological sites that are eligible for listing or remain unevaluated for the NRHP is to avoid these identified sites. Avoidance and monitoring protocol during construction will be included in an agreement. Viewshed impacts may occur on historic architectural or structural properties. Such viewshed impacts will be mitigated through a MOA in accordance with 36 CFR 800.6.

## 5.4.4 VISUAL

Cumulative visual impacts were assessed within the ROI described in **Section 3.8**. In response to comments received during the review of the DEIS, the visual cumulative impact analysis was expanded to include the Lewis and Clark NHT and auto tour route through North Dakota. Additional transmission line installation and wind energy development from the Proposed Project Components would incrementally increase cumulative effects on the visual landscape in the local counties caused by the addition of man-made elements to a landscape that is primarily natural or agricultural. As the number or density of tall, man-made structures increased in the local rural counties, it is possible that viewer sensitivity would also increase. The significance of the visual changes would vary according to the location of the wind project and the perceptions of the viewers. Perceptions of visual effects are highly subjective. Some people would view the turbines as relatively unobtrusive, while others would view the turbines as an obstructing addition to a landscape that may currently contain relatively little infrastructure.

Information on existing and reasonably foreseeable wind projects along the length of the Lewis and Clark NHT auto tour route is provided in **Table 5.1, Figure 5.2, Table 5.2,** and **Figure 5.3**. The build-out of all reasonably foreseeable wind projects would result in an impact to the visual landscape from the Lewis and Clark NHT auto tour route, primarily in Oliver and Burleigh counties in North Dakota where projects are clustered near the auto tour route. However, the Proposed Project Components would result in a minimal, nearly imperceptible, addition to the existing landscape (see **Section 4.8**) and would be located more than 240 miles away from Oliver and Burleigh counties in North Dakota. Areas along the Lewis and Clark NHT and auto tour route with a view of the wind facility would not likely have views of other projects identified in the cumulative analysis. The addition of the Proposed Project Components would result in a less than significant cumulative impact on the visual landscape for travelers on the Lewis and Clark NHT auto tour route.

# 6 Unavoidable Adverse Impacts

Unavoidable adverse impacts are those that would occur after implementation of all incorporated BMPs, APMs and mitigation measures. Unavoidable adverse impacts do not include temporary or permanent impacts which would be mitigated.

The Applicants and Western have committed to implementing BMPs and APMs to minimize or eliminate potential impacts from constructing and operating the Proposed Project Components. If additional impacts are identified through other Federal, State or County permitting processes, the Applicants would develop appropriate mitigation measures in consultation with the requesting agency (*i.e.*, USFWS, USACE). Constructing and operating the Proposed Project Components would unavoidably convert less than 0.4 percent of available farmland within the site alternative's boundary. Loss of this agricultural farmland would have a minimal effect on the overall agricultural production in the area.

Constructing, operating and maintaining the Proposed Project Components may result in unavoidable adverse impacts to biological resources and cultural resources as described below. The Proposed Project Components would have a less than significant impact on the other resource areas as identified in **Chapter 4**.

Some biological resources would be lost due to the construction and operation of the Proposed Project Components. Construction would result in the permanent loss of a small amount of native vegetation and wildlife habitat. Operation of the Proposed Project Components would likely result in avian and bat mortalities. A BA has been prepared for consultation with the USFWS, in accordance with Section 7 of the ESA, for the preferred alternative (the Crow Lake Alternative, see **Section 2.8**), including the Proposed Project and Wind Partners' proposed development. The BA was submitted to the USFWS by RUS on February 22, 2010, with a determination that the Proposed Project Components could adversely affect the whooping crane. Based on USFWS reply to the BA, on March 16, 2010, RUS and USFWS have entered formal consultation on the Proposed Project and the Wind Partners' proposed development. Upon completion of formal consultation, the USFWS will issue a BO. The results of the BO will be addressed in Western's and RUS's RODs.

Potential impacts to cultural resources, such as prehistoric properties, historic properties, and cultural landscapes, were identified in the results of the Class III Survey, survey of historic architectural properties within the Proposed Project Components viewshed, and TCP Survey that were completed for the preferred alternative (Crow Lake Alternative). Agreements are being developed to ensure avoidance and/or mitigation of adverse effects to historic properties. These agreements are being developed among Western, RUS, SHPO, affected Federal agencies, Applicants, and all interested Native American Tribes. The preferred treatment of any potential TCPs and archaeological sites that are eligible for listing or remain unevaluated for the NRHP is to avoid these identified sites. Avoidance and monitoring protocol during construction would be included in an agreement. Viewshed impacts may occur on historic architectural or structural properties and would be mitigated through a MOA in accordance with 36 CFR 800.6.

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# 7 Irreversible and Irretrievable Commitments of Resources

This section describes the irreversible and irretrievable commitments of resources associated with constructing the Proposed Project Components. An “irreversible commitment of resources” occurs when, once committed to the Proposed Project Components, the resource would continue to be committed throughout the life of the Proposed Project. An "irretrievable commitment of resources" refers to those resources that, once used, consumed, destroyed or degraded during construction, operation, or decommissioning of the Proposed Project Components, would cause the resource to be unavailable for use by future generations. Examples of irretrievable types of resources include nonrenewable resources, such as minerals and cultural resources, as well as renewable resources that would be unavailable for the use of future generations such as loss of production, harvest, or habitat.

If wind turbines are not upgraded, upon termination of operations, the Applicants have a contractual obligation to the landowners to remove the wind facilities, including foundations to a depth of four feet. The Applicants also have an obligation to restore the area to a condition reasonably similar to the condition of the surrounding soil. The Applicants may explore alternative methods to accomplish decommissioning of the Proposed Project at the time that this activity approaches. Decommissioning activities would be conducted in compliance with applicable rules and regulations.

Constructing and operating the Proposed Project Components would constitute an irreversible commitment of land, soil and vegetation for the life of the Proposed Project. The area of the underground collector and communication systems would be revegetated. While the Winner Alternative would require a slightly larger use of land, soil and vegetation, the commitments of these resources would be similar for either of the proposed alternatives.

Constructing the wind turbines and transmission structures would remove a minimal amount of agricultural lands from production and is an irreversible and irretrievable commitment of farmland. The Proposed Project would result in few changes to existing agricultural practices because farming and grazing would continue in and around the wind turbines and other Proposed Project Components.

Some biological resources would be lost due to the construction and operation of the Proposed Project Components. Construction of the Proposed Project Components would result in the permanent loss of a small amount of native vegetation and wildlife habitat. Operation of the wind farm would likely result in avian and bat mortalities. A BA has been prepared under Section 7 of the ESA for Federally-listed species for the preferred alternative (the Crow Lake Alternative, see **Section 2.8**), including the Wind Partners’ proposed development. Upon completion of formal consultation, the USFWS will issue a BO. The results of the BO will be addressed in Western’s and RUS’s RODs.

Cultural resources are nonrenewable resources. Potential impacts to cultural resources, such as prehistoric properties, historic properties, and cultural landscapes, were identified in the results of the Class III Survey, survey of historic architectural properties within the Proposed Project

Components viewshed, and TCP Survey that were completed for the preferred alternative (Crow Lake Alternative). Agreements are being developed to ensure avoidance and/or mitigation of adverse effects to historic properties. These agreements are being developed among Western, RUS, SHPO, affected Federal agencies, Applicants, and all interested Native American Tribes. The preferred treatment of any potential TCPs and archaeological sites that are eligible for listing or remain unevaluated for the NRHP is to avoid these identified sites. Avoidance and monitoring protocol during construction would be included in an agreement. Viewshed impacts may occur on historic architectural or structural properties and would be mitigated through a MOA in accordance with 36 CFR 800.6.

# 8 Short-Term Use and Long-Term Productivity

This section discusses the Proposed Project and Wind Partners' proposed development 's short-term use of the local environment and the anticipated effects on long-term productivity. The impacts and use of resources associated with the Proposed Project are described in **Chapter 4**.

The Proposed Project and Wind Partners' proposed development would require commitments of resources such as soil, water, vegetation, wildlife populations and habitats, noise, visual resources, and land use for the life of the Proposed Project and Wind Partners' proposed development. Impacts to transportation resources and social and economic resources would occur primarily during construction. Revenue would likely increase for some local businesses, such as construction suppliers (*i.e.*, sand and gravel operators, machine shops/fabricators, etc.), hotels, restaurants, gas stations, and grocery stores in response to the needs of workers associated with constructing the Proposed Project and, to a lesser degree, the Wind Partners' proposed development.

Although the Proposed Project and Wind Partners' proposed development would not require a large amount of land to be taken out of production, losses of terrestrial plants, animals, and habitats from natural productivity to accommodate the Proposed Project Components and temporary disturbances during construction are possible. Land-clearing and construction activities, including personnel and equipment moving about a localized area, would disperse wildlife and temporarily eliminate habitats. Constructing the Proposed Project Components would result in short-term disturbances of biological habitats and could cause minimal long-term reductions in the biological productivity of localized areas near facilities.

The Proposed Project and Wind Partners' proposed development would remove less than 0.4 percent of agricultural lands from production within the area of the site for the life of the project. However, the Proposed Project and Wind Partners' proposed development would result in few changes to existing agricultural practices because farming and grazing would continue in and around the wind turbines and other Proposed Project Components.

Introducing a new, renewable energy power project to the regional electrical system would be expected to reduce reliance on carbon-based energy sources, increase domestic energy production and supply, and contribute to long-term improvement of air quality.

If the Proposed Project and Wind Partners' proposed development are decommissioned, the facilities would be removed and the area of disturbance would be reclaimed. This action would restore the long-term productivity to the area.

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# 9 Consultation and Coordination

## 9.1 AGENCIES AND PERSONS CONTACTED/ CONSULTED

Western and RUS, as co-lead Federal Agencies, have consulted with Federal, State, and local agencies and Native American groups regarding the potential alternatives for the Proposed Project. The following is a list of contacts that were made during preparation of this FEIS.

### Federal Agencies

Bureau of Indian Affairs – Great Plains Office
Federal Emergency Management Agency
Federal Highway Administration
National Park Service – Lewis and Clark National Historic Trail
Natural Resources Conservation Service
U.S. Army Corps of Engineers – South Dakota Regulatory Office
U.S. Department of Agriculture – Farm Service Agency, Jerauld County
U.S. Department of Agriculture – Farm Service Agency, Lyman County
U.S. Department of Energy
U.S. Department of the Interior – Office of Environmental Policy and Compliance
U.S. Environmental Protection Agency Region 8
U.S. Environmental Protection Agency – Head Quarters in Washington D.C.
U.S. Fish and Wildlife Service – Ecological Services Field Office
U.S. Fish and Wildlife Service – Lake Andes Wetland Management District
U.S. Fish and Wildlife Service – Huron Wetland Management District
U.S. Forest Service – Black Hills National Forest
U.S. Forest Service – Nebraska & Samuel R. McKelvie National Forests
U.S. Forest Service – Fort Pierre National Grassland
U.S. Forest Service – Buffalo Gap National Grassland
U.S. Forest Service – Oglala National Grasslands
U.S. Geological Survey, Northern Prairie Wildlife Research Center
U.S. Geological Survey, South Dakota State University

### State Agencies

Nebraska Public Power District
South Dakota Aeronautics Commission
South Dakota Department of Agriculture
South Dakota Department of Environment and Natural Resources
South Dakota Department of Health
South Dakota Department of Transportation
South Dakota Game, Fish, and Parks
South Dakota Game, Fish, and Parks – National Heritage Program
South Dakota Highway Patrol
South Dakota Indian Affairs Commission
South Dakota Public Utilities Commission

South Dakota State Historic Preservation Office
South Dakota State Historical Society
South Dakota State Land Department
South Dakota Transmission Authority

## Local Agencies

Aurora County
Aurora County Board of Commissioners
Brule County
Brule County Board of Commissioners
City of Chamberlain
City of Colome
City of Kimball
City of Plankinton
City of White Lake
City of Winner
Gregory County Board of Commissioners
Jerauld County
Jerauld County Board of Commissioners
Town of Alpena
Town of Wessington Springs
Tripp County
Tripp County Board of Commissioners

## Organizations

Basin Electric Power Cooperative
Ducks Unlimited
Intertribal COUP
Northwestern University
Sierra Club
Southern Illinois University
The Nature Conservancy
Wessington Springs Area Development Corporation

## Elected Officials

South Dakota Governor – Honorable Mike Rounds
South Dakota Senator – Honorable Tim Johnson
South Dakota Senator – Honorable John Thune
South Dakota U.S. House of Representatives – Representative Stephanie Herseth
South Dakota U.S. House of Representatives – Mark Gerhardt (for Rep. Stephanie Herseth)

## Native American Tribes and Communities

Northern Cheyenne
Cheyenne River Sioux Tribe
Crow Creek Sioux Tribe
Flandreau Santee Sioux Executive Committee
Fort Peck Sioux and Assiniboine Tribe
Lower Brule Sioux Tribe
Lower Sioux Indian Community
Oglala Sioux Tribe
Rosebud Sioux Tribe of Indians
Santee Sioux Tribe of Nebraska
Sisseton-Wahpeton Oyate

Spirit Lake Tribal Council
Standing Rock Sioux Tribe
Three Affiliated Tribes Business Council
Turtle Mountain Band of Chippewa
Upper Sioux Indian Community
Wahpetkute Band of the Dakota
Yankton Sioux Tribe
South Dakota State Historical Society

# 9.2 INDIVIDUALS TO RECEIVE THE EIS

In addition to the Federal, State, and local agencies and Native American groups listed in **Section 9.1**, the FEIS has been distributed to the following individuals:

## Individuals

D. Anderson
D. Assman
E. Bailey
E. Beckman
J. Bennett
R. Bennett
K. & S. Bradwisch
M. Brandert
G. Brodkorb
B. Brozik
E. Brumbaugh
S. Bucher
J. Burg
H.C.
R. Carsten
B. & P. Cerny
R. Clifford
H. Dean
R. & K. Demers
B. Finzen
D. Gillen
M. Gray
G. Grieve
R. Grim
W. Haines
R. Hartog
J. Higgins
G. Higgins, Jr.
G. Higgins, Sr.
P. Higher
E. Hlavka
V. & G. Hoing
H. Hotchkiss
K. & K. Janouselo
M. JeLinek
D. Jorgensen
K. & W. Kayl
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R. Klein
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R. Kovacevich
R. & K. Kreinbuhl
B. Kroupa
M. LaPointe
C. LaRive
P. Licht
B. Lindbloom
T. Luke
R. Lunne
J. Lyda
R. Malisch
D. Markhardt
R. & G. Meier
D. & M. Moerike
R. Moseman
P. Muth
J. Nelson
L. Nelson
R.G. & E. Nemer
D. Neuharth
E. Odenbach
J. Patmore
R. Pearson
K. Perrin
J. Peters
R. Petersek
G. & O. Peterson
S. Regan
K. Robinson
R. Rubel
W.S.
D. Salmen
M. Schochenmaie
L. Scott
L. Sdeiger
P. Seppanen
S. Splittstorsen
T. Stevicks
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V. Svoboda
D. & C.Thomas
G. Thum
V. Vanderhule
G. VanGenderen
D. Vaughn
J. Waterbury
F. Weidner
D. Weiland
N. West
T. West
L. & A.Wihelmsen
L. & F. Woods
S. Woolley

Copies of the FEIS have also been provided to the following locations and are available for public review.

Cozard Memorial Library in Chamberlain – Brule County
Kimball Public Library – Brule County
Plankinton City Library – Aurora County
Winner Public Library – Tripp County
Wessington Springs Carnegie Library – Jerauld County

Western Area Power Administration
Upper Great Plains Customer Service Region
South Dakota Maintenance Office
200 4th Street SW.
Huron, SD 57350

Rural Utilities Service
1400 Independence Ave. SW.
Mail Stop 1571, Room 2244
Washington DC 20250-1571

# 9.3 LIST OF PREPARERS

| WESTERN – JOINT LEAD FEDERAL AGENCY | | |
|---|---|---|
| **Name/Title** | **Education/Experience** | **Responsibility** |
| David Swanson – Technical | • B.A., Biological Sciences<br>• 32 years experience | NEPA compliance review |
| Jeff Irwin – Regional Preservation Officer, Upper Great Plains | • B.S., Anthropology<br>• M.A., Anthropology<br>• 17 years experience | Cultural resources |
| Liana G. Reilly, PMP – Project Manager | • B.S., Biological Psychology<br>• M.S., Environmental Management<br>• M.S., Public Health<br>• 9 years experience | Project management |
| Misti K. Schriner – Biologist | • B.S., Biology<br>• M.S., Environmental Science<br>• 7 years experience | Review of biological resources |
| Rod O'Sullivan – Environmental Protection Specialist | • A.S., Biology/Chemistry<br>• B.S., Range Management/Biology<br>• 32 years experience | Project management |
| Stephen Tromly – Tribal Energy Program Manager | • B.S., Resource Conservation<br>• M.A., Anthropology<br>• 19 years experience | Cultural resources |

| RUS – JOINT LEAD FEDERAL AGENCY | | |
|---|---|---|
| **Name/Title** | **Education/Experience** | **Responsibility** |
| Arthur Gile | • B.S., Mechanical Engineer<br>• Professional Engineer<br>• 36 years experience | Generation Planning & Engineering Review |
| Bard Jackson | • B.S., Electrical Engineering<br>• 36 years experience | Transmission Planning & Engineering Review |
| David Hui | • B.S., Electrical Engineering<br>• 20 years experience | Purpose and need, engineering review |
| Dennis Rankin – Project Manager/ Environmental Protection Specialist | • B.A., Biology<br>• M.S., Biology<br>• 32 years experience | Avian impacts |
| Laura Dean - Archeologist, Federal Preservation Officer | • B.S., Anthropology<br>• B.A., Anthropology<br>• Ph.D., Archeology<br>• 30 years experience | Cultural resources, Section 106 compliance |
| Richard Fristik - Senior Environmental Protection Specialist | • B.S., Wildlife & Fisheries Science<br>• M.S., Wildlife Management<br>• 20 years experience | ESA Section 7 consultation |
| Steve Slovikosky | • B.S., Electrical Engineering<br>• 32 years experience | Transmission/ engineering review |

| USFWS – COOPERATING FEDERAL AGENCY | | |
|---|---|---|
| **Name/Title** | **Education/Experience** | **Responsibility** |
| Mark Heisinger – Wildlife Refuge Specialist | • B.S., Wildlife Biology<br>• 32 years experience | Cooperating agency, considering refuge lands in Aurora, Brule and Tripp counties |
| Sandra Uecker – Wildlife Refuge Manager | • B.S., Wildlife Biology<br>• 22 years experience | Cooperating agency, considering refuge lands in Jerauld County |

| CONSULTANTS FOR THE EIS | | |
|---|---|---|
| **Name/Title** | **Education/Experience** | **Responsibility** |
| Jason Ramsey – Senior GIS Analyst | • M.S., GIS<br>• B.A., Anthropology<br>• 6 years experience | Geospatial analysis, map generation |
| Jessica Wilton – Project Manager | • B.A, Biology<br>• 6 years experience | Project management, technical editing, land use, visual resources, noise, biological resources, socioeconomics and environmental justice, cumulative effects |
| Jodi Strohmayer, RPA – Archaeologist | • M.S., GIS & Spatial Analysis in Archaeology<br>• B.A., Anthropology<br>• 6 years experience | Land use, visual resources, air quality, noise, geology and seismicity, cultural resources, socioeconomics and environmental justice, public health and safety, transportation, cumulative effects |
| Joe Gregory – Senior GIS Analyst | • M.S., GIS<br>• B.S., Anthropology<br>• 6 years experience | Geospatial analysis, map generation |
| Kenda Pollio – Project Manager | • B.S., Environmental/Urban & Regional Planning<br>• M.A., Political Science – International Environmental Policy<br>• 14 years experience | Project management |
| Larry Killman – Principal | • 30 years experience | Project management, technical input, land use, water resources |
| Molly Cresto – Assistant Project Manager | • M.S., Science Technology and Policy (expected 2010)<br>• Graduate Certificate in Sustainable Technology Management<br>• B.S., Plant Biology Environmental Science & Ecology<br>• 6 years experience | Project management, technical editing, biological resources, land use, visual resources, transportation, socioeconomics and environmental justice, cumulative effects |
| Pat Golden – Senior Biologist | • B.A., Environmental, Population, Organismic Biology<br>• 14 years experience | Biological resources, Section 7 consultation |
| Sarah Bresnan – Scientist | • B.S., Plant Biology, Environmental Science and Ecology<br>• 3 years experience | Biological resources |
| Sheila Logan, P.E. – Senior Project Manager | • B.S., Civil and Environmental Engineering<br>• Graduate work, Civil and Environmental Engineering<br>• Registered Professional Engineer in AZ<br>• 16 years experience | Geology and soils, water resources, public health and safety, technical editing |
| Trish Mitchell, RPA – Senior Project Archeologist | • M.S., Anthropology<br>• 23 years experience | Cultural resources |

# 10 Disclosure Statement

**Organizational Conflict of Interest Representation Statement**

I hereby certify as a representative of my organization that, to the best of my knowledge and belief, no facts exist relevant to any past, present or currently planned interest or activity (financial, contractual, personal, organizational or otherwise) that relate to the proposed work; and bear on whether I or the organization has a possible conflict of interest with respect to (1) being able to render impartial, technically sound, and objective assistance or advice; or (2) being given an unfair competitive advantage.

Signature: Larry Killman

Date: January 8, 2010

Name: Larry Killman

Title: Principal

Organization: Tierra Environmental Consultants, LLC

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# 12 Glossary

This chapter contains a glossary of words, legislative terms and regulatory requirements used in this FEIS.

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| Administrative Rule (AR) | Administrative rules officially proclaim the State of South Dakota's regulations and have the force of law. Administrative rules and regulations elaborate or detail the requirements of a law or policy. |
| Aesthetics | Referring to the perception of beauty. |
| Affected environment | Existing biological, physical, social, and economic conditions of an area subject to change, both directly and indirectly, as the result of a proposed human action. |
| Air pollutant | Generally, an airborne substance that could, in high enough concentrations, harm living things or cause damage to materials. From a regulatory perspective, an air pollutant is a substance for which emissions or atmospheric concentrations are regulated or for which maximum guideline levels have been established due to potential harmful effects on human health and welfare. |
| Air Quality Standards | The level of pollutants prescribed by regulation that may not be exceeded during a specified time in a defined area. |
| Alluvial deposits | Deposits of earth, sand, gravel and other materials carried by moving surface water deposited at points of weak water flow. |
| Ambient air | Any unconfined portion of the atmosphere; open air, surrounding air. That portion of the atmosphere, external to buildings, to which the general public has access. |
| American Wind Energy Association (AWEA) | National trade association representing wind power project developers, equipment suppliers, service providers, parts manufacturers, utilities, researchers, and others involved in the wind industry. |
| Anabat | A system to identify and survey bats by detecting and analyzing their echolocation calls. |
| Applicants | Basin Electric Power Cooperative and PrairieWinds SD1, Incorporated |
| Aquifer | A body of rock or sediment in a formation, group of formations, or part of a formation that is saturated and sufficiently permeable to transmit economic quantities of water to wells and springs. |

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| Archaeological Resources Protection Act | A Federal law, passed in 1979 (16 USC 1B, Pub. L. 96-95), to protect archaeological resources on public and Indian lands. |
| Archaeological sites (resources) | Any location where humans have altered the terrain or discarded artifacts during either prehistoric or historic times. |
| Archaeology | A scientific approach to the study of human ecology, cultural history, and cultural process. |
| Area of potential effects (APE) | The area in which disturbance to cultural resources may occur and within which a systematic cultural resource inventory is required. |
| Artifact | An object produced or shaped by human workmanship of archaeological or historical interest. |
| Attainment area | An area which the U.S. Environmental Protection Agency (EPA) has designated as being in compliance with one or more of the National Ambient Air Quality Standards (NAAQS) for sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and particulate matter. Any area may be in attainment for some pollutants but not for others. |
| Average daily traffic (ADT) | The average volume of vehicles at a given point or section of highway over a 24-hour period. |
| Avian monitoring study | A study done to characterize and monitor the quality of avian species. Avian monitoring studies are used in the preparation of impact assessments, as well as in many circumstances in which human activities carry a risk of harmful effects on avian species natural environment. |
| Avian Power Line Interaction Committee | Committee that works in partnership with other utilities, resource agencies and the public to develop and provide educational resources, identify and fund research, develop and provide cost-effective management options, and serve as the focal point for avian interaction utility issues. |
| Bald and Golden Eagle Protection Act (BGEPA) | Law that provides for the protection of the Bald Eagle and the Golden Eagle by prohibiting the taking, possession and commerce of such birds (16 U.S.C. 668-668d, 54 Stat. 250). |
| Biological Assessment (BA) | An evaluation of potential effects of a proposed project on proposed, endangered, threatened, and sensitive animal and plant species and their habitats. Information prepared by, or under the direction of, a Federal agency to determine whether a proposed action is likely to adversely affect listed species or designated critical habitat, jeopardize the continued existence of species that are proposed for listing, or adversely modify proposed critical habitat. |

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| Board of County Commissioners | A group of elected officials charged with administering the policies and regulations of county government. |
| Bounding | A credible upper limit to consequences or impacts. |
| Breaker | A switching device that is capable of closing or interrupting an electrical circuit under over-load or short-circuit conditions as well as under normal load conditions. |
| Bus | A set of two or more electrical conductors that serve as common connections between load circuits and each of the phases (in alternating current systems) of the electric power source. |
| Candidate species | A species of plant or animal for which there is sufficient information to indicate biological vulnerability and threat, and for which proposing to list as “threatened” or “endangered” is or may be appropriate. |
| Capability | The maximum load that a generator, turbine, transmission circuit, apparatus, station, or system can supply under specified conditions for a given time interval, without exceeding approved limits of temperature and stress. |
| Capacity | The load for which a generator, turbine, transformer, transmission circuit, apparatus, station, or system is rated. Capacity is also used synonymously with capability. |
| Carbon dioxide ($CO_2$) | A chemical compound composed of two oxygen atoms covalently bonded to a single carbon atom. It is a gas at standard temperature and pressure and exists in Earth's atmosphere in this state. $CO_2$ is also recognized as the most prominent greenhouse gas. |
| Carbon monoxide (CO) | A colorless, odorless gas that is toxic if breathed in high concentrations over a period of time. It is formed as the product of the incomplete combustion of hydrocarbons (fuel). |
| Class I, II and III Areas | Area classifications, defined by the Clean Air Act, for which there are established limits to the annual amount of air pollution increase. Class I areas include international parks and certain national parks and wilderness areas; allowable increases in air pollution are very limited. Air pollution increases in Class II areas are less limited, and are least limited in Class III areas. Areas not designated as Class I start out as Class II and may be reclassified up or down by the State, subject to Federal requirements. |
| Clast | A rock fragment or grain resulting from the breakdown of larger rocks. |

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| Clean Air Act (CAA) | (42 U.S.C. 7401 *et seq.*) Establishes (1) national air quality criteria and control techniques (Section 7408); (2) NAAQS (Section 7409); (3) State implementation plan requirements (Section 4710); (4) Federal performance standards for stationary sources (Section 4711); (5) National Emission Standards for Hazardous Air Pollutants (NESHAP) (Section 7412); (6) applicability of CAA to Federal facilities (Section 7418), *i.e.*, Federal agency must comply with Federal, State, and local requirements respecting control and abatement of air pollution, including permit and other procedural requirements, to the same extent as any person; (7) Federal new motor vehicle emission standards (Section 7521); (8) regulations for fuel (Section 7545); (9) aircraft emission standards (Section 7571). |
| Clean Water Act (CWA) | (33 U.S.C. 1251 *et seq.*) Restores and maintains the chemical, physical, and biological integrity of the nation's waters. |
| Code of Federal Regulations (CFR) | All Federal regulations in force are published in codified form in the Code of Federal Regulations. |
| Colluvium | A loose deposit of rock debris accumulated through the action of gravity at the base of a cliff or slope. |
| Community (biotic) | All plants and animals occupying a specific area under relatively similar conditions. |
| Conditional Use Permit | A permit issued by a city, county, or other administrative entity to consider special uses which may be essential or desirable to a particular community, but which are not allowed as a matter of right within a particular zoning district or zoning ordinance. A conditional use permit can provide flexibility in planning, allowing, with conditions, a special use of property that is the public interest. |
| Conservation | A reduction in electric power consumption as a result of increases in the efficiency of energy use, production, or distribution. |
| Conservation Reserve Program (CRP) | A cost-share and rental payment program under the U.S. Department of Agriculture (USDA) administered by the Farm Service Agency. Technical assistance for CRP is provided by the USDA Forest Service and the USDA Natural Resources Conservation Service (NRCS). The CRP program encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as tame or native grasses, wildlife plantings, trees, filter strips, or riparian buffers. |

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| Council on Environmental Quality (CEQ) | Established by the National Environmental Policy Act (NEPA), the CEQ consists of three members appointed by the President. A CEQ regulation (Title 40 CFR 1500-1508, as of July 1, 1986) describes the process for implementing NEPA, including preparation of environmental assessments and environmental impacts statements, and the timing and extent of public participation. |
| Criteria pollutants | An air pollutant that is regulated by the NAAQS. The EPA must describe the characteristics and potential health and welfare effects that form the basis for setting or revising the standard for each regulated pollutant. Criteria pollutants include sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and particulate matter. |
| Critical habitat | Habitat identified as essential to the conservation of a threatened or endangered species, and which may require special management considerations or protection. |
| Cultural resources | Districts, sites, structures, and objects and evidence of some importance to a culture, a subculture, or a community for scientific, traditional, religious, and other reasons. These resources and relevant environmental data are important for describing and reconstructing past lifeways, for interpreting human behavior, and for predicting future courses of cultural development. |
| Cumulative impact | The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. |
| Customer | Any entity or entities purchasing power from the power generator or distributor provider. |
| Day-night average sound level ($L_{dn}$) | The average noise level over a 24 hour period. |
| Decibel (dB) | A unit for expressing the relative intensity of sounds on a logarithmic scale from 0 for the average least perceptible sound to about 130 for the average level at which sound causes pain to humans. For traffic and industrial noise measurements, the A-weighted decibel (dBA), a frequency-weighted noise unit, is widely used. The A-weighted decibel scale corresponds approximately to the frequency response of the human ear and thus correlates well with loudness. |

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| Decommissioning | The process to remove the Proposed Project Components, or portions thereof, from service. Decommissioning may include decontamination, dismantling, shipment and final disposition of project components, and site rehabilitation, in compliance with applicable rules and regulations. |
| Demand | The rate at which energy is used at a given instant or averaged over a designated period of time. |
| Dendritic | Stream pattern resembling the branching pattern of blood vessels or tree branches. |
| Deposition | In geology, the laying down of potential rock-forming materials; sedimentation. In atmospheric transport, the settling out on ground and building surfaces of atmospheric aerosols and particles ("dry deposition") or their removal from the air to the ground by precipitation ("wet deposition" or "rainout"). |
| Drinking water standards | The prescribed level of constituents or characteristics in a drinking water supply that cannot be exceeded legally. |
| Ecology | A branch of science dealing with the interrelationships of living organisms with one another and with their nonliving environment. |
| Ecosystem | Living organisms and their non-living (abiotic) environment functioning together as a community. |
| Effects (impacts) | As used in NEPA documentation, the terms effects and impacts are synonymous. Effects can be ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial. |
| Elevation | Height in feet above mean sea level. |
| Eligibility | The criteria of significance in American history, architecture, archeology, engineering, and culture. The criteria require integrity and association with important people or events, distinctiveness for any of a variety of reasons, or importance because of information the property does or could hold. |

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| Eligible cultural resource | A cultural resource that has been evaluated and reviewed by an agency and the State Historic Preservation Officer and recommended as eligible for inclusion in the National Register of Historic Places, based on the criteria of significance. |
| Electric and magnetic fields (EMF) | The invisible lines of force associated with the production, transmission, and use of electric power, such as those associated with high-voltage transmission lines, secondary power lines, and home wiring and lighting. EMFs are present around any electrical device. |
| Emission Standards | Requirements established by a State, local government, or the EPA Administrator that limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis. |
| Emissions | Pollution discharged into the atmosphere from smoke stacks, other vents, and surface areas of commercial or industrial facilities, residential chimneys, and vehicle exhausts. |
| Endangered species | Plants or animals that are in danger of extinction through all or a significant portion of their range. |
| Endangered Species Act of 1973 | (16 U.S.C. 1531 *et seq.*) Provides for listing and protection of animal and plant species identified as in danger, or likely to be in danger, or extinction throughout all or a significant portion of their range. Section 7 places strict requirements on Federal agencies to protect listed species. |
| Energy | That which does or is capable of doing work. It is measured in terms of the work it is capable of doing; electric energy is usually measured in kilowatt-hours. |
| Environmental Impact Statement (EIS) | The detailed written statement that is required by Section 102(2)(C) of NEPA for a proposed major Federal action significantly affecting the quality of the human environment. |
| Environmental Justice | Identification of potential disproportionately high and adverse impacts on low-income and/or minority populations that may result from proposed Federal actions (required by Executive Order 12898). |
| Eolian | Sediment materials eroded and deposited by the wind. |
| Erosion | Wearing away of soil and rock by weathering and the actions of surface water, wind, and underground water. |
| Ethnographic | Information about cultural beliefs and practices. |
| Facility | The wind power generating components of the Proposed Project. |

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| Farmland Protection Policy Act | A statute enacted in 1981 by the USDA to ensure that significant agricultural lands are protected from conversion to nonagricultural uses. |
| Federal Aviation Administration | An agency that regulates civil aviation to promote safety, encourages and develops civil aeronautics including new aviation technology, develops and operates a system of air traffic control and navigation for both civil and military aircraft, researches and develops the National Airspace System and civil aeronautics, develops and carries out programs to control aircraft noise and other environmental effects of civil aviation, and regulates U.S. commercial space transportation. |
| Federal Energy Regulatory Commission (FERC) | An independent agency that regulates the interstate transmission of electricity, natural gas, and oil. FERC also reviews proposals to build liquefied natural gas (LNG) terminals and interstate natural gas pipelines as well as licensing hydropower projects. |
| Floodplain | The lowlands adjoining inland and coastal waters and relatively flat areas, including at a minimum that area inundated by a 1-percent or greater chance flood in any given year. The base floodplain is defined as the 100-year (1.0 percent) floodplain. The critical action floodplain is defined as the 500-year (0.2 percent) floodplain. |
| Fluvial | Sediment materials eroded and deposited by the action of a stream. |
| Formation | In geology, the primary unit of formal stratigraphic mapping or description. Most formations possess certain distinctive features. |
| Game Production Areas (GPA) | Areas owned and managed by the South Dakota Department of Game, Fish and Parks for game production and public hunting. |
| Gauss (G) | The unit most commonly used in the United States to measure magnetic fields. |
| Generation | The act or process of producing electricity from other forms of energy. |
| Generator | A machine that converts mechanical energy into electrical energy. |
| Glaciofluvial | Sediments deposited by streams fed by melting glaciers. |

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| Grassland Easements | A legal agreement signed with the United States of America, through the U.S. Fish and Wildlife Service that pays to permanently keep land in grass. This restriction is to help grassland nesting species, such as ducks and pheasants, complete their nesting before the grass is disturbed. |
| Groundwater | Water within the earth that supplies wells and springs. |
| Hazardous Air Pollutants | Air pollutants that are not covered by ambient air quality standards, but that may present a threat of adverse human health effects or adverse environmental effects. |
| Hazardous waste | A category of waste regulated under the Resource Conservation and Recovery Act (RCRA). To be considered hazardous, a waste must be a solid waste under RCRA and must exhibit at least one of four characteristics described in 40 CFR 261.20 through 40 CFR 261.24 (*i.e.*, ignitability, corrosivity, reactivity, or toxicity) or be specifically listed by the EPA in 40 CFR 261.31 through 40 CFR 261.33. |
| Historic properties | Resources of national, State, or local significance in American history, architecture, archaeology, engineering, or culture, and worthy of preservation. |
| Hydric soils | Soils containing considerable moisture. |
| Hydrophytic | Growing wholly or partially in water or having or characterized by excessive moisture. |
| Hydrophytic vegetation | Vegetation adapted to an aquatic or very wet environment. |
| Impacts (effects) | An assessment of the meaning of changes in all attributes being studied for a given resource; an aggregation of all the positive and negative effects, usually measured using a qualitative and nominally subjective technique. In this EIS, as well as in the CEQ regulations, the word impact is used synonymously with the word effect. |
| Impaired waters | Under Section 303(d) of the Clean Water Act, States, territories, and authorized tribes are required to develop lists of impaired waters. These are waters that are too polluted or otherwise degraded to meet the water quality standards set by States, territories or authorized tribes. The law requires that these jurisdictions establish priority rankings for waters on the lists and develop total maximum daily loads for these waters. Total maximum daily loads are calculations of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards. |

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| Indirect impacts | Impacts resulting from an action that are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect impacts may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. |
| Infrastructure | The basic installations and facilities (e.g., roads, schools, power plants, transportation, communication systems) on which the continuance and growth of a community or State are based. |
| Interested parties | Those groups or individuals that are interested, for whatever reason, in the project and its progress. Interested parties include but are not limited to private individuals, public agencies, organizations, customers, and potential customers. |
| Invertebrate | Animals characterized by not having a backbone or spinal column, including a wide variety of organisms such as insects, spiders, worms, clams, crayfish, *etc*. |
| K Factor (K) | Represents the potential for soil erosion accounting for several factors, including rainfall/runoff, slope length and steepness, cover management, and the physical properties of the soil itself. |
| Kame | A short ridge or mound of sand and gravel deposited during the melting of glacial ice. |
| Key Observation Point (KOP) | An element of the contrast rating system used by the Bureau of Land Management (BLM) to analyze the potential visual impact of proposed projects and activities. The rating is done from the most critical viewpoints, or Key Observation Points. Factors that should be considered in selecting KOPs are: angle of observation, number of viewers, length of time the project is in view, relative project size, season of use, and light conditions. |
| Kilovolt (kV) | The electrical unit of power that equals 1,000 volts. |
| Landowner agreements | A lease agreement established between the Applicants and a private landowner for the construction of the Proposed Project. These leases would allow construction and operation of wind facilities for a negotiated term. |
| Large Generator Interconnection | The protocols established by Western for customers requesting an interconnection with a capacity greater than 20 MW. |

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| Large Generator Interconnection Agreement (LGIA) | The agreement established between Western and an interconnection customer outlining the terms and provisions of the interconnection. |
| Lewis and Clark Interpretive Center (LCIC) | An educational center, managed by the USDA Forest Service, providing information to the public a personal sense of President Thomas Jefferson's vision of expanding America to the west. Information based toward the challenges faced by the Lewis and Clark expedition as they portaged the great falls of the Missouri River and explored the 'unknown', brings to life the daily experiences of the expedition and the environment and native peoples of the 'uncharted West.' |
| Lewis and Clark National Historic Trail (NHT) | Meriwether Lewis and William Clark traveled over a three-year period through lands that later became 11 States. Most of the trail follows the Missouri and Columbia Rivers. At 3,700 miles (5,950 km), it begins at Hartford, Illinois, and passes through portions of Missouri, Kansas, Iowa, Nebraska, South Dakota, North Dakota, Montana, Idaho, Oregon, and Washington. It is part of the National Trails System of the United States. |
| Lewis and Clark Trail Driving Route (LCTDR) | The LCTDR is a network of roads that generally tracks the Lewis and Clark NHT along the Missouri River and provides vistas as well as historic markers. The Lewis and Clark NHT extends more than 3,700 miles and includes the entire Missouri River from its headwaters in Montana to its confluence with the Mississippi River near St. Louis, Missouri. |
| Liter (L) | Unit of volume of the metric system. |
| Lithic | A stone artifact that has been modified or altered by human hands. |
| Load | The amount of electric power required at a given point on a system. |
| Loam | A rich, permeable soil composed of a mixture of clay, silt, sand, and organic matter. |
| Low-income population | A population that is classified by the U.S. Bureau of the Census as having an aggregated mean income level for a family of four that correlates to $13,359, adjusted through the poverty index using a standard of living percentage change where applicable, and whose composition is at least 25 percent of the total population of a defined area or jurisdiction. |

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| Mammal | Animals in the class Mammalia that are distinguished by having self regulating body temperature, hair, and in females, milk-producing mammary glands to feed their young. |
| Megawatt (MW) | The electrical unit of power that equals 1 million watts or 1 thousand kilowatts. |
| Megawatt-hours (MWh) | A unit of energy. Energy in watt hours is the multiplication of power in watts and time in hours. |
| Mesic | Ecological term indicating characterized by, or adapted to a moderately moist habitat. |
| Meteorology | The science dealing with the dynamics of the atmosphere and its phenomena, especially relating to weather. |
| Microtesla (µT) | The Tesla is the internationally accepted scientific unit for measuring magnetic fields. Since a Tesla is very large, and the majority of magnetic field exposure is substantially lower, values typically reported and measured are in microtesla (µT) (or 1/1,000,000 of a Tesla). |
| Migratory Bird Treaty Act (MBTA) | Establishment of a Federal prohibition, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention for the protection of migratory birds or any part, nest, or egg of any such bird." (16 U.S.C. 703) |
| Miles per hour (mph) | The ratio of the distance traveled (measured in miles) to the time expended traveling that distance (measured in hours). |
| Milligauss (mG) | A unit of measurement for measuring magnetic fields. Since a Gauss is very large and the majority of magnetic field exposure is substantially lower, values typically reported and measured are in milligauss (mG) (1/1,000 of a Gauss). |
| Minority population | A population that is classified by the U.S. Bureau of the Census as African American, Hispanic American, Asian and Pacific American, American Indian, Eskimo, Aleut, and other non-White persons, whose composition is at least 25 percent of the total population of a defined area or jurisdiction. |

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| Mitigation | The alleviation of adverse impacts on environmental resources by avoidance through project redesign or project relocation, by protection, or by adequate scientific study. |
| National Ambient Air Quality Standards (NAAQS) | Standards defining the highest allowable levels of certain pollutants in the ambient air. Because the EPA must establish the criteria for setting these standards, the regulated pollutants are called criteria pollutants. |
| National Environmental Policy Act (NEPA) | This Act (42 U.S.C. 4341, passed by Congress in 1975) established a national policy designed to encourage consideration of the influences of human activities (e.g., population growth, high-density urbanization, industrial development) on the natural environment. NEPA also established the CEQ. NEPA procedures require that environmental information be made available to the public before decisions are made. Information contained in NEPA documents must focus on the relevant issues in order to facilitate the decision-making process. |
| National Historic Preservation Act (NHPA) | The National Historic Preservation Act of 1966, as amended, recognized the nation's cultural and historical heritage, and established requirements for ensuring the protection of cultural resources considered significant at the local, State, and national levels (16 U.S.C. 470). The NHPA also provides for an expanded National Register of Historic Places (NRHP) to include districts, sites, buildings, structures, and objects significant to American history, architecture, archaeology, and culture. Section 106 requires that the President’s Advisory Council on Historic Preservation be afforded an opportunity to comment on any undertaking that adversely affects properties listed in, or eligible for listing in, the NRHP. |
| National Pollutant Discharge Elimination System Permit (NPDES) | Federal regulation (40 CFR Parts 122 and 125) that requires permits for the discharge of pollutants from any point source into the waters of the United States regulated through the Clean Water Act, as amended. |
| National Register of Historic Places (NRHP) | A list maintained by the Keeper (an individual who has been delegated by the National Park Service) of districts, sites, buildings, structures, and objects of prehistoric or historic local, State, or national significance. The list is expanded as authorized by Section 2(b) of the Historic Sites Act of 1935 (16 U.S.C. 462) and Section 101(a)(1)(A) of the National Historic Preservation Act of 1966, as amended. |

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| National Renewable Energy Laboratory (NREL) | A national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC. |
| National Wetlands Inventory (NWI) | A series of maps produced by U.S. Fish and Wildlife Service (USFWS) to show wetlands and deepwater habitats to illustrate reconnaissance level information on the location, type, and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology, and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis. |
| Native American | A tribe, people, or culture that is indigenous to the United States. |
| Native American Graves Protection and Repatriation Act (NAGPRA) | A Federal law requiring Federal agencies and institutions that receive Federal funding to return Native American cultural items and human remains to their respective peoples. Cultural items include funerary objects, sacred objects, and objects of cultural patrimony. |
| Native vegetation | Plant life that occurs naturally in an area without agricultural or cultivation efforts. It does not include species that have been introduced from other geographical areas and have become naturalized. |
| Natural Resources Conservation Service | A USDA service that provides a partnership effort to help America's private land owners and managers conserve their soil, water, and other natural resources. |
| Nitrogen dioxide ($NO_2$) | A highly reactive toxic gas and one of the six criteria pollutants regulated by EPA through the NAAQS. |
| Noise | Unwanted or undesirable sound, usually characterized as being so loud as to interfere with, or be inappropriate to, normal activities such as communication, sleep, study or recreation. |
| Non-attainment area | An area that the EPA has designated as not meeting (that is, not being in attainment of) one or more of the NAAQS for criteria pollutants. An area may be in attainment for some pollutants, but not others. |

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| Noxious weeds | Plant species that have been designated by State or national agricultural authorities as a plant that is injurious to agricultural and/or horticultural crops and/or humans and livestock. Most have been introduced into a foreign ecosystem either by accident or mismanagement, but some are also native species. Typically they are plants that are aggressive growing, multiply quickly, and adversely affect desirable plants, or are somehow injurious to livestock or humans either by contact or when ingested. They are a large problem in many parts of the world, greatly affecting areas of agriculture, forest management and other open lands. |
| Obligate species | Plant species that almost always occur in wetlands (*i.e.*, greater than 99 percent of the time). |
| Off-peak | Power that is generated during low-demand periods of the day, typically evenings and to a lesser extent, weekends. There is less demand for power during these times, thus more power is available in the marketplace at a lower cost. |
| On-peak | Power that is generated during high-demand periods of the day, typically mornings and evenings. Power generated during this time is generally more expensive because baseload power plants are fully operational and excess power in the marketplace is relatively scarce. |
| Open Access Transmission Service Tariff (Tariff) | A document (typically filed with a regulatory body) that sets forth the rates, terms, and conditions under which an interested entity can receive transmission service from an electric utility. Western's Tariff filed with FERC requires Western to offer its transmission lines for delivery of electricity when capacity is available. |
| Outwash | A broad, outspread flat or gently sloping deposit of sediment deposited by streams flowing away from a melting glacier. |
| Oyate | Native American word meaning *people* or *nation.* |
| Ozone | A molecule of three oxygen atoms bound together. In the stratosphere, ozone protects the earth from the sun's ultraviolet rays but in the lower levels of the atmosphere, ozone is considered an air pollutant. |
| Paleontology | The study of fossils. |
| Palustrine | All nontidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 parts per trillion. |

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| Particulate matter (PM, PM10, and PM2.5) | Any finely divided solid or liquid material, other than uncombined water. A subscript denotes the upper limit of the diameter of particles included. Thus, PM10 includes only those particles equal to or less than 10 micrometers (0.0004 inch) in diameter; PM2.5 includes only those particles equal to or less than 2.5 micrometers (0.0001 inch) in diameter. |
| Peak capacity | The maximum capacity of a system to meet loads. |
| Peak demand | The highest demand for power during a stated period of time. |
| Permeability | The ability of rock or soil to transmit a fluid. |
| pH | A measure of the relative acidity or alkalinity of a solution, expressed on scale from 0 to 14, with the neutral point at 7.0. Acid solutions have pH values lower than 7.0, and basic (*i.e.* alkaline) solutions have pH values higher than 7.0. Because pH is the negative logarithm of the hydrogen ion (H+) concentration, each unit increase in pH value expresses a change of state of 10 times the preceding state. Thus, pH 5 is 10 times more acidic than pH 6, and pH 9 is 10 times more alkaline than pH 8. |
| Potential Impact Index (PII) | A scoring protocol used to evaluate the potential for wind development sites to affect plant and wildlife species. |
| Prairie Pothole Region (PPR) | An area of the northern Great Plains and midgrass and tallgrass prairies that contains thousands of shallow wetlands known as potholes. These potholes are the result of glacier activity in the Wisconsin glaciation, which ended approximately 10,000 years ago. The decaying ice sheet left behind depressions formed by the uneven deposition of till in ground moraines, and melting ice blocks which created kettle lakes. These depressions filled with water, creating the potholes. |
| Prehistoric | Of, relating to, or existing in times before written history. Prehistoric cultural resources are those that precede written records of the human cultures that produced them. |
| Presidential Executive Order 11988 (Floodplain Management) | Executive Order 11988 requires Federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. |

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| Presidential Executive Order 11990 (Wetlands Management) | Executive Order 11990 directs Federal agencies to minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. The order requires Federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. |
| Presidential Executive Order 12088 (Federal Compliance with Pollution Control) | Executive Order 12088 requires all Federal agencies to be in compliance with environmental laws and fully cooperate with EPA, State, interstate, and local agencies to prevent, control, and abate environmental pollution. |
| Presidential Executive Order 12898 (Environmental Justice) | Executive Order 12898 directs Federal agencies to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. |
| Presidential Executive Order 13007 (Indian Sacred Sites) | Executive Order 13007 directs Federal land managing agencies to accommodate access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such sacred sites. |
| Presidential Executive Order 13112 (Invasive Weed Species) | Executive Order 13112 requires the prevention of the introduction of invasive species and provides for their control and to minimize the economic, ecological, and human health impacts that invasive species cause. |
| Presidential Executive Order 13186 (Protection of Migratory Birds) | Executive Order 13186 directs executive departments and agencies to take certain actions to further implement the MBTA. Each Federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations is directed to develop and implement a Memorandum of Understanding (MOU) with the USFWS that shall promote the conservation of migratory bird populations. |
| Prime farmland | Soil types with a combination of characteristics that make the soils particularly productive for agriculture. |
| Raptor | Birds of prey including various types of hawks, falcons, eagles, vultures, and owls. |

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| Record of Decision (ROD) | A concise public document that records a Federal agency's decision(s) concerning a proposed action for which the agency has prepared, or cooperated in the preparation of an EIS. The ROD is prepared in accordance with the requirements of the CEQ NEPA regulations (40 CFR 1505.2). |
| Region of Influence (ROI) | The geographical region that would be expected to be affected in some way by a proposed action and alternatives. |
| Reliability | The ability of the power system to provide customers uninterrupted electric service, including generation, transmission, and distribution reliability. |
| Renewable Portfolio Standard | A provision stating that any load serving entity shall derive a percentage of its total retail energy sold from new solar resources or environmentally friendly renewable electricity technologies, whether that energy is purchased or generated by the seller. |
| Right-of-way | An easement for a certain purpose over the land of another use, such as a strip of land used for a transmission line, roadway, or pipeline. |
| Riparian | Of or pertaining to the bank of a river, stream, lake, or other water bodies. |
| Runoff | The portion of rainfall, melted snow, or irrigation water that flows across the ground surface and may eventually enter streams. |
| Safe Drinking Water Act | The principal Federal law in the United States that ensures safe drinking water for the public. Pursuant to the act, the EPA is required to set standards for drinking water quality and oversee all States, localities, and water suppliers who implement these standards. |
| Scoping | An early, open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. |
| Section 106 Process | Section 106 of the National Historic Preservation Act and its implementing regulations (36 CFR 800) require Federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. The purpose of the Section 106 process is to identify, evaluate, and protect cultural resources eligible for listing in the NRHP that may be affected by Federal actions or undertakings (16 U.S.C. §470 *et seq.).* |

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| Sediment | Material deposited by wind or water. |
| Sedimentation | The process of deposition of sediment, especially by mechanical means from a state of suspension in water. |
| Sensitive species | Those plants and animals for which population viability is a concern, as shown by a significant current or predicted downward trend in populations or density and significant or predicted downward trend in habitat capability. |
| Socioeconomics | The social and economic condition in the study area. |
| Solid waste | In general, solid wastes are non-liquid, non-soluble discarded materials ranging from municipal garbage to industrial wastes that contain complex and sometimes hazardous substances. Solid wastes include sewage sludge, agricultural refuse, demolition wastes, and mining residues. |
| South Dakota Ambient Air Quality Standards (SDAAQS) | The thresholds established and regulated for criteria air pollutants. The Department of Environment and Natural Resources (DENR) has adopted the NAAQS for the State air quality program. |
| South Dakota Codified Laws (SDCL) | Statutes, laws, and regulations established through the State's legislative process. |
| South Dakota Department of Game, Fish and Parks | The Department of Game, Fish and Parks conserves, manages, protects and enhances South Dakota's wildlife resources, parks, and outdoor recreational opportunities. |
| South Dakota State Historic Preservation Office | The State Historic Preservation Office manages the National Register of Historic Places program of the National Park Service in South Dakota. The program surveys, inventories, and registers historical properties; monitors State, Federal, and local government activities which affect cultural and historic resources; provides advice on preservation methods; promotes public education on historical properties; and supports municipal and county historic preservation commissions to advance the State's economic, social, and educational objectives. |
| Special Use Permit (SUP) | A permit issued under specific circumstances to regulate activities that may otherwise be prohibited. |
| Special-status species | Those species that have been identified as endangered, threatened, proposed, State species of special concern, or State protected. |

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| Spill Prevention Control and Countermeasures Plan (SPCC) | A plan implemented to help prevent any discharge of oil into navigable waters or adjoining shorelines. As stipulated by EPA, SPCC plans are required for non-transportation facilities that have a total above-ground oil storage capacity of 1,320-gallons. |
| State Historic Preservation Officer | The official within each State, authorized by the State at the request of the Secretary of the Interior, to act as liaison for purposes of implementing the National Historic Preservation Act. |
| Step-up transformer | Transformer in which the energy transfer is from a low- to a high-voltage winding or windings. (Winding means one or more turns of wire forming a continuous coil for a transformer, relay, rotating machine, or other electric device.) |
| Storm Water Pollution Prevention Plan (SWPPP) | A plan required to be implemented for construction projects disturbing more than one acre of land. Implementation of a SWPPP is a requirement to obtain NPDES permit coverage for storm water discharges. |
| Stratigraphy | The study of rock strata, especially the distribution, deposition and age of sedimentary rocks. |
| Substation | A facility where electric energy is passed for transmission, transformation, distribution, or switching. |
| Sulfur dioxide ($SO_2$) | One of the six criteria pollutants regulated by EPA through the NAAQS. |
| Sulfur hexafluoride ($SF_6$) | A colorless, odorless gas considered by the Intergovernmental Panel on Climate Change to be one of the more potent greenhouse gases (GHGs) in the atmosphere. $SF_6$ is used in electrical equipment, such as circuit breakers. |
| Super long extreme (sle) | A technical specification of one of the proprietary wind turbines manufactured by General Electric. |
| Supervisory control and data acquisition (SCADA) | A software program used to communicate directly with individual wind turbines to monitor performance, report energy output, and trouble-shoot technical difficulties. |
| Surface water | All bodies of water on the surface of the earth and open to the atmosphere, such as rivers, lakes, reservoirs, ponds, seas, and estuaries. |
| Switchyard | Facility with circuit breakers and automatic switches to turn power on and off on different transmission lines. Switchyards are typically associated with substations. |
| Tesla (T) | The internationally accepted scientific unit for measuring magnetic fields. |

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| Threatened species | Plant and wildlife species likely to become endangered in the foreseeable future. |
| Total suspended solids (TSS) | A measure of the amount of small, particulate solid pollutants that are suspended in water. |
| Traditional Cultural Property/Use Area | Areas of significance to the beliefs, customs, and practices of a community of people that have been passed down through generations. |
| Transformer | Its most frequent use in power systems is for changing voltage levels. |
| Transmission line | The structures, insulators, conductors and other equipment used to transfer electrical power from one point to another. |
| Trophic state index | A measure of eutrophication (increase in chemical nutrients resulting in increased productivity) of a body of water using a combination of measures of water transparency or turbidity, chlorophyll-a concentrations and total phosphorus levels. |
| U.S. Army Corps of Engineers (USACE) | A Federal Army construction management agency. Generally associated with dams, canals and flood protection in the United States, U.S. Army Corps of Engineers is involved in a wide range of public works support to the nation and the Department of Defense throughout the world. U.S. Army Corps of Engineers specializes in planning, designing, building, operating locks and dams, and environmental regulation and ecosystem restoration. |
| U.S. Code (USC) | The United States Code is the codification by subject matter of the general and permanent laws of the United States. It is divided by broad subjects into 50 titles and published by the Office of the Law Revision Counsel of the U.S. House of Representatives. |
| U.S. Environmental Protection Agency (EPA) | The independent Federal agency, established in 1970, that regulates Federal environmental matters and oversees the implementation of Federal environmental laws. |
| U.S. Fish and Wildlife Service (USFWS) | The U.S. Fish and Wildlife Service is the unit of the U.S. Department of the Interior dedicated to the management and preservation of wildlife. Units within the USFWS include: National Wildlife Refuge System, Migratory Birds program, Federal Duck Stamp, National Fish Hatchery System, Endangered Species Program and the Office of Law Enforcement. |

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| Vertebrate | Animals that are members of the subphylum Vertebrata, including fishes, amphibians, reptiles, birds, and mammals, all of which are characterized by having a segmented bony or cartilaginous spinal column. |
| Volt | The unit of voltage or potential difference. It is the electromotive force which, if steadily applied to a circuit having a resistance of one ohm, will produce a current of one ampere. |
| Voltage | Potential for an electric charge to do work; source of an electric field. |
| Waterfowl Production Areas (WPAs) | Public lands purchased by the Federal government for the purpose of increasing the production of migratory birds, especially waterfowl. |
| Waters of the United States (WUS) | As defined by the Clean Water Act, waters of the United States applies only to surface waters, rivers, lakes, estuaries, coastal waters, and wetlands. Waters of the United States include all interstate waters, intrastate waters used in interstate and/or foreign commerce, tributaries of the above, territorial seas at the cyclical high tide mark, and wetlands adjacent to all the above. |
| Wetland | Land or areas exhibiting hydric soil concentrations saturated or inundated soil during some portion of the year, and plant species tolerant of such conditions. |
| Wetland Management District (WMD) | Public lands managed by the USFWS as part of the National Wildlife Refuge System to provide habitat for endangered species, migratory birds, and other wildlife and to provide places for people to learn about and enjoy wildlife. |
| Wind Resource Assessment Network (WRAN) | A network of 11 towers throughout South Dakota used for measuring wind speed and direction to allow for statistical verification of wind resources within the State. |