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

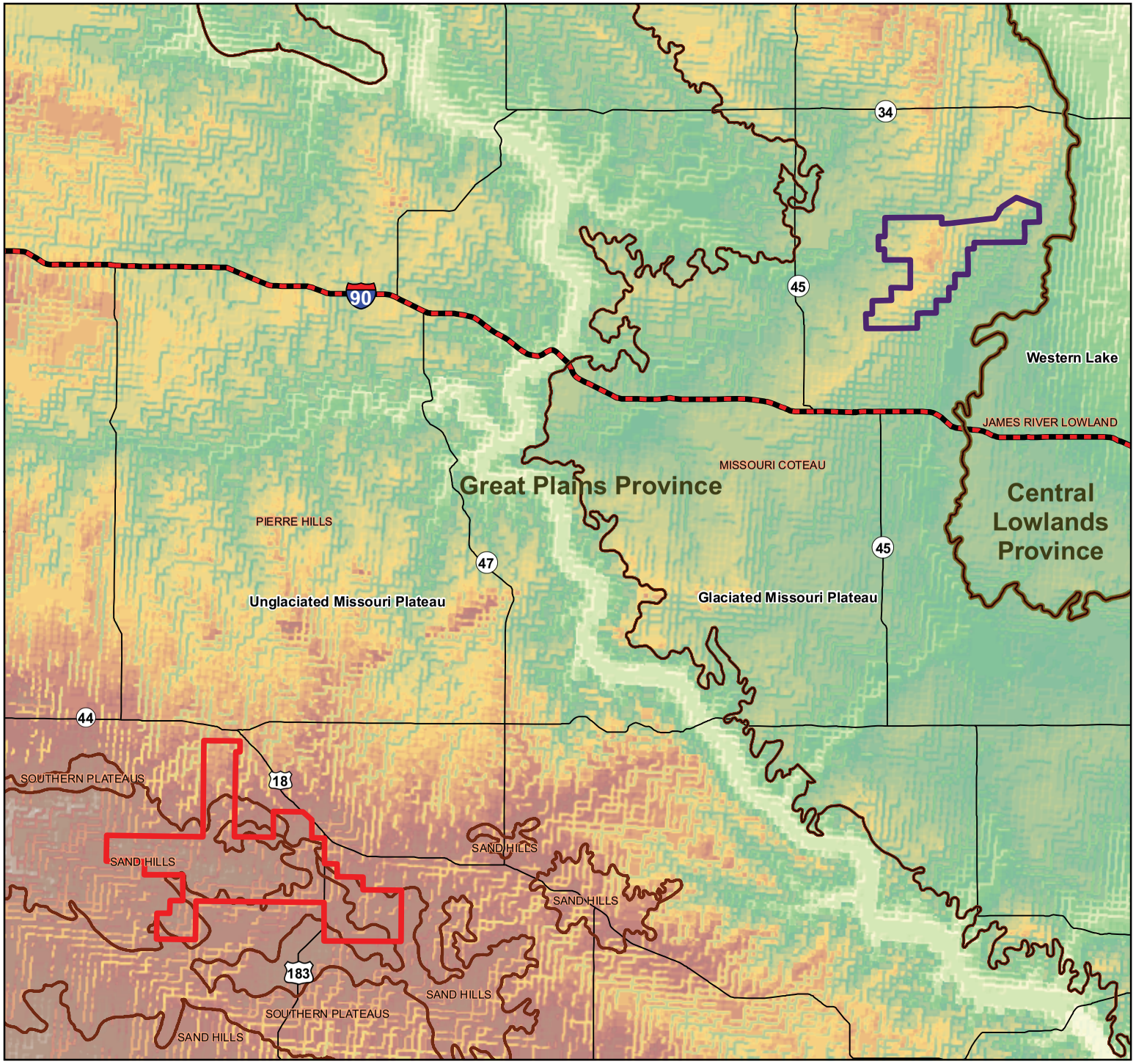
3.1.1.1 Crow Lake Alternative

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).



Alternatives

- Crow Lake
- Winner
- Physiographic Province
- Physiographic Region
- Physiographic Section
- State/US Highway
- I-90

Elevation (Meters)

High : 2144

Low : 292

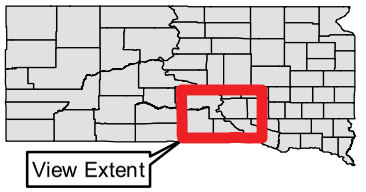


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Figure 3.1-1

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.

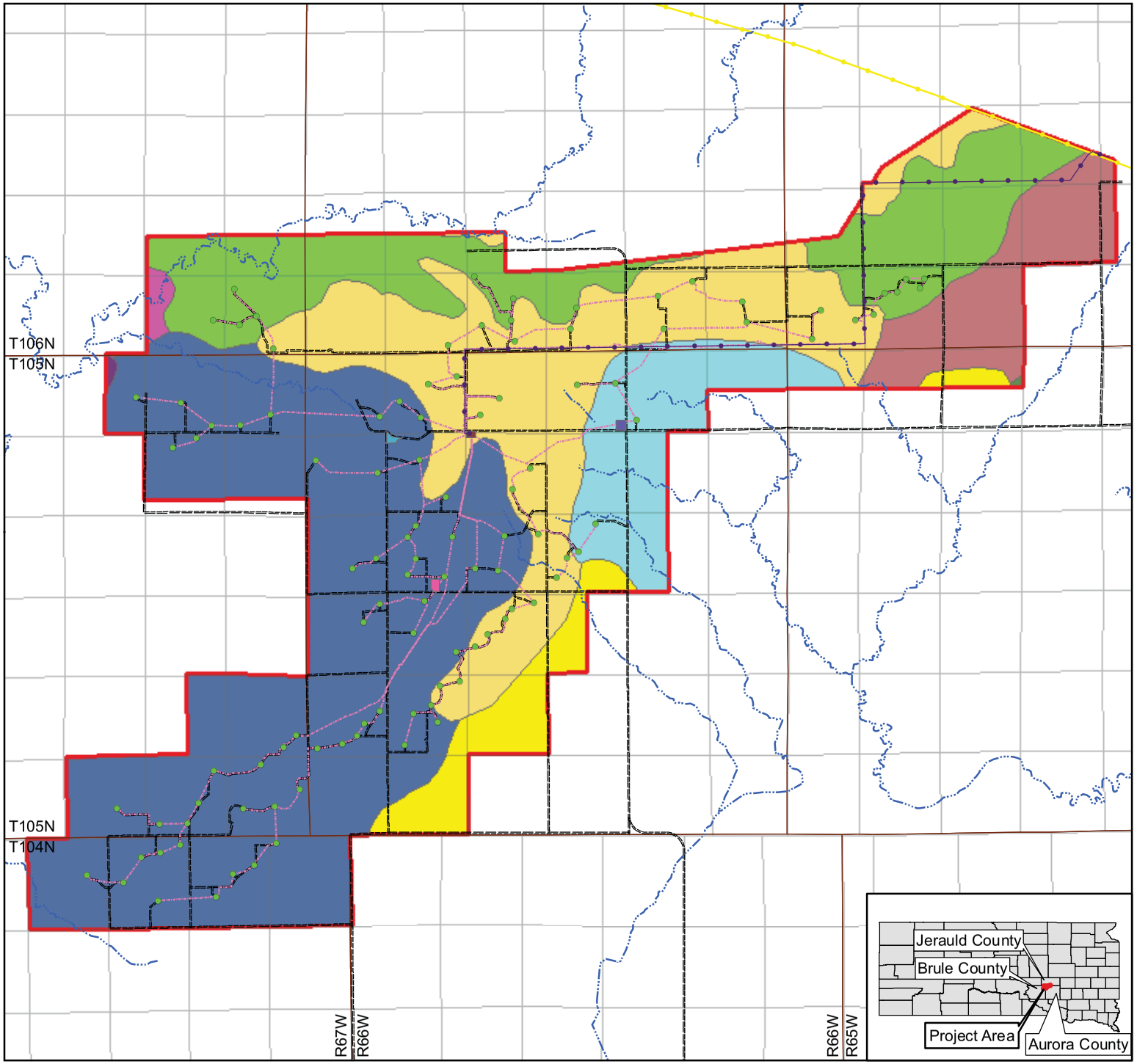
The soil erodibility factors (K), representing both susceptibility of soil to erosion and the rate of runoff, for site soils generally range from 0.28 to 0.32. This slight to moderate potential for erosion is typical for silt loam soils. Silty soils can be susceptible to detachment and produce moderate 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

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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.

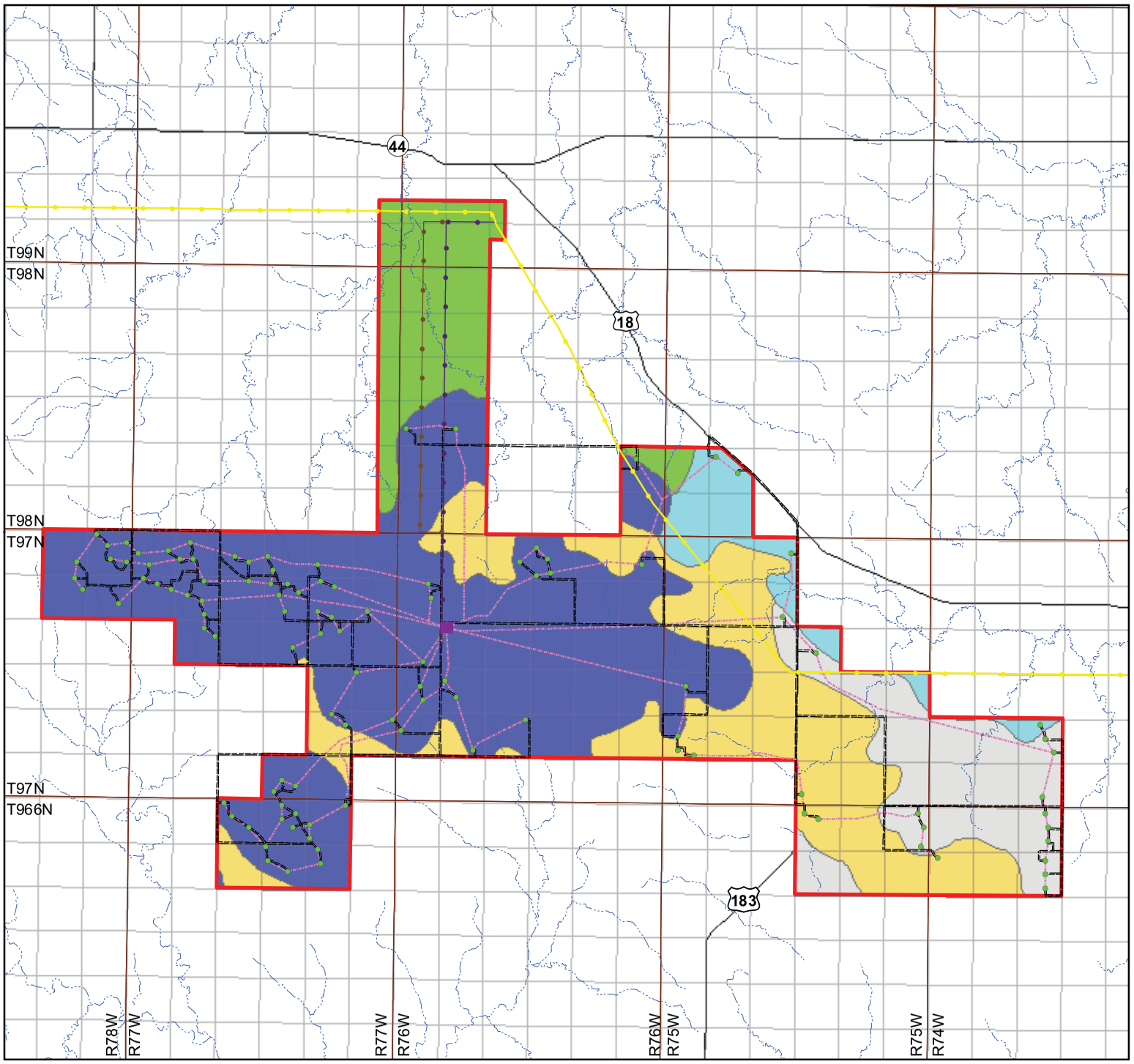
The K factors for the site soils range from 0.20 to 0.37, with the higher potential for erosion associated with the more clayey soils of the Millboro (in the north) and Reliance-Ree-Onita (to the northeast) soil units. Sandy soils and alluvium have lower erodibility factors due to low runoff potential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



Winner

- Project Boundary
- Township and Range
- Sections
- Drainage
- Western Utility Line
- State/US Highway
- Substation and O&M Building
- Turbine
- Internal Road
- Collector System

Overhead Transmission Line

- Alternative 1
- Alternative 2

Soil Unit

- Elsmere-Dunday-Doger-Anselmo
- Millboro
- Reliance-Ree-Onita
- Valentine-Tassel-Anselmo
- Vetal-Tassel-Manter-Holt-Anselmo

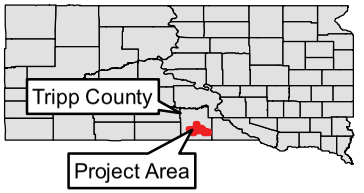


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Figure 3.1-3

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.

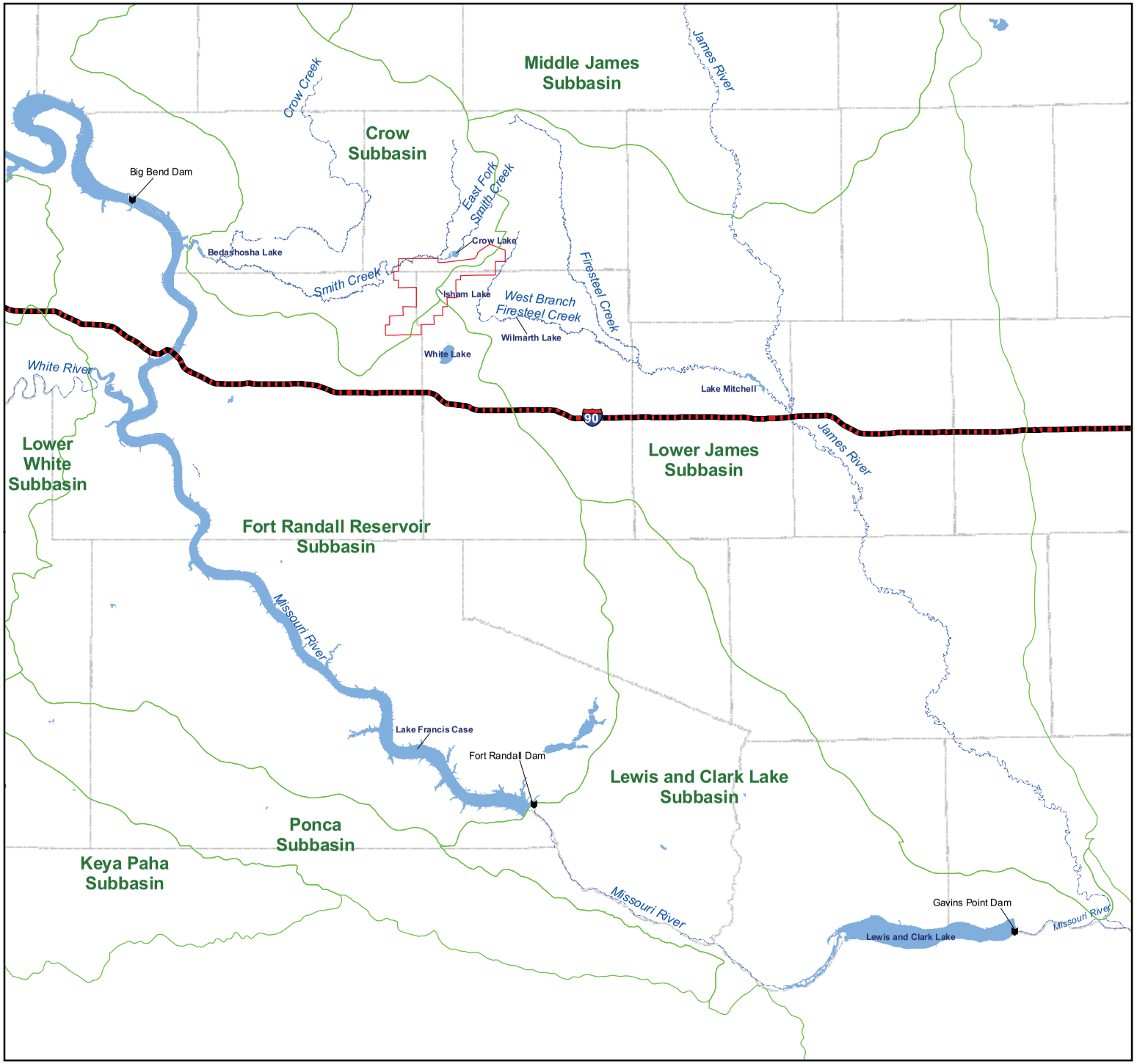
The following sections describe the path of surface water flows from within the alternative site boundaries to their confluence with the Missouri River. Impaired waters, listed under Section 303(d) of the CWA, within the flow path to the Missouri River are also discussed. Impaired waters do not meet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

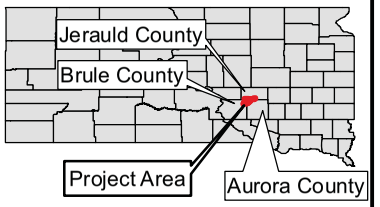


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Figure 3.2-1

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).

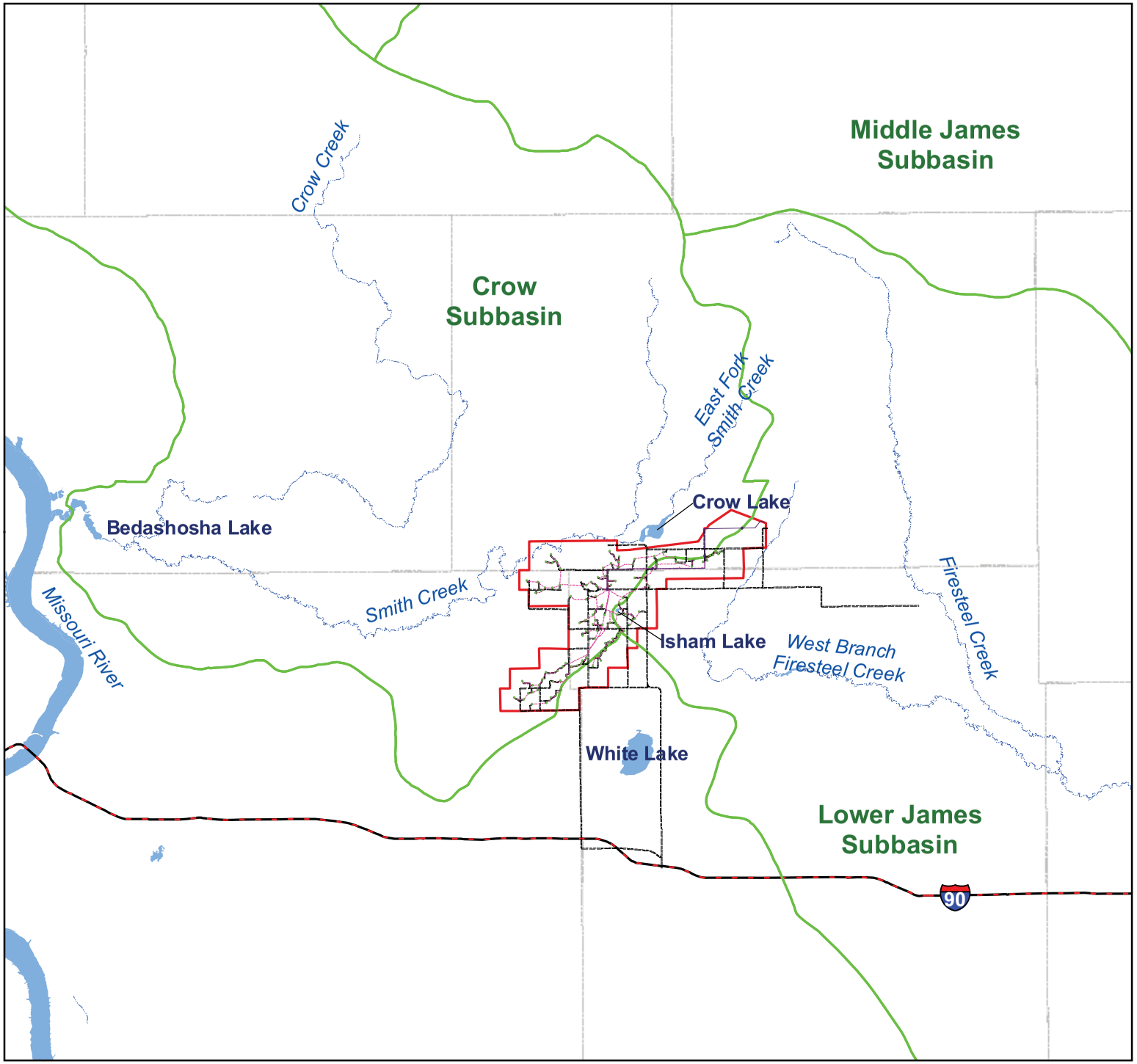
Ponca Subbasin

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

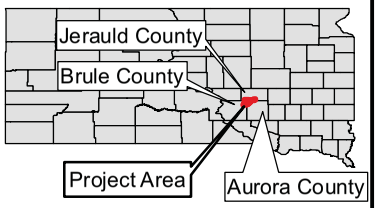


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Figure 3.2-2

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

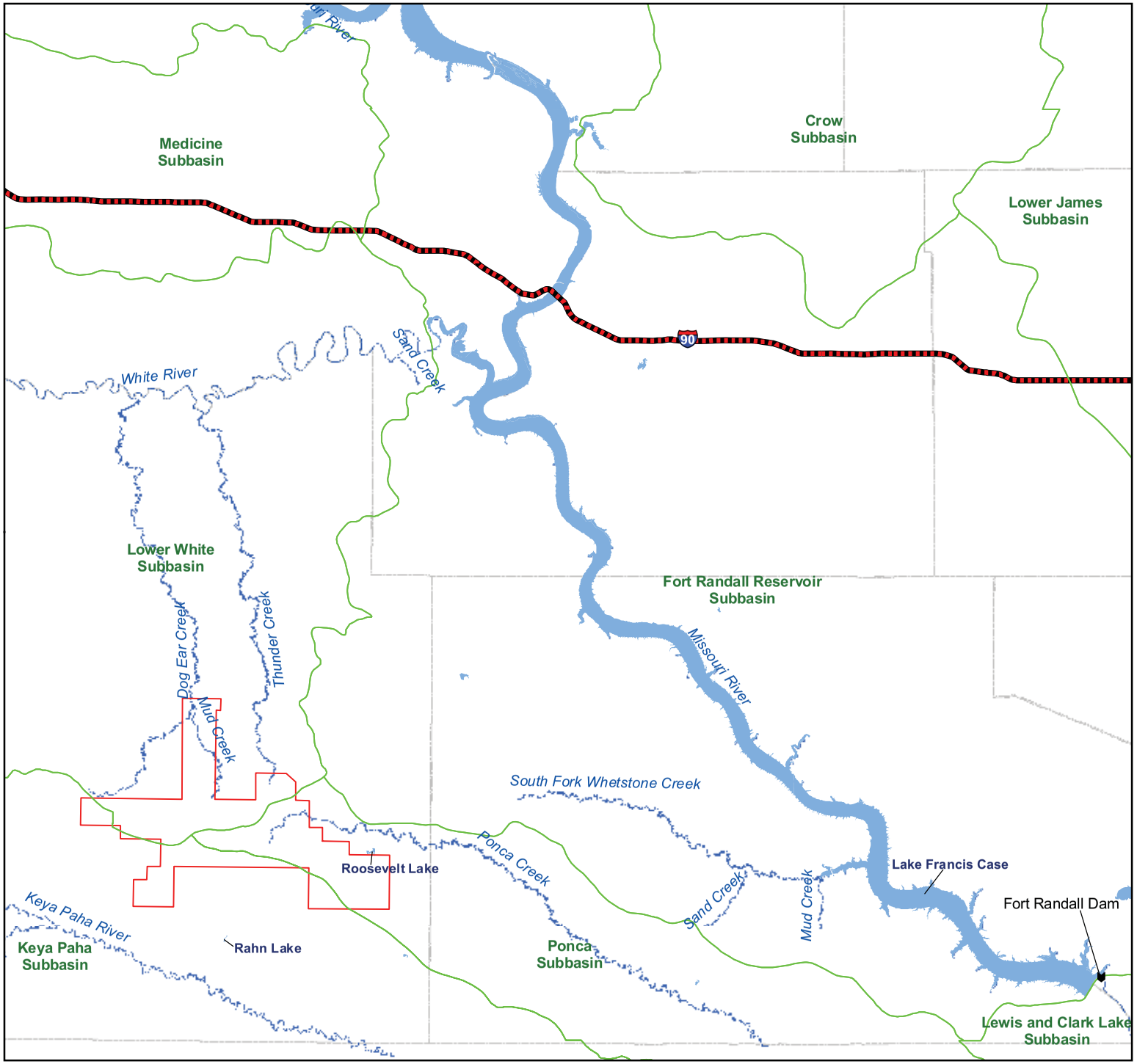
Based on the NWI, two wetland classification types are mapped at various locations across the Crow Lake Alternative, including Freshwater Emergent Wetland and Freshwater Pond. **Figure 3.2-3** depicts the NWI indicated wetland areas. **Table 3.2-1** lists the total number of NWI indicated wetland acres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

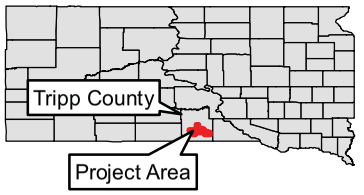
Source: NWI

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.



Winner

- Hydrological Subbasin
- Project Boundary
- I-90
- Water Bodies
- County Boundary
- Drainage



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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

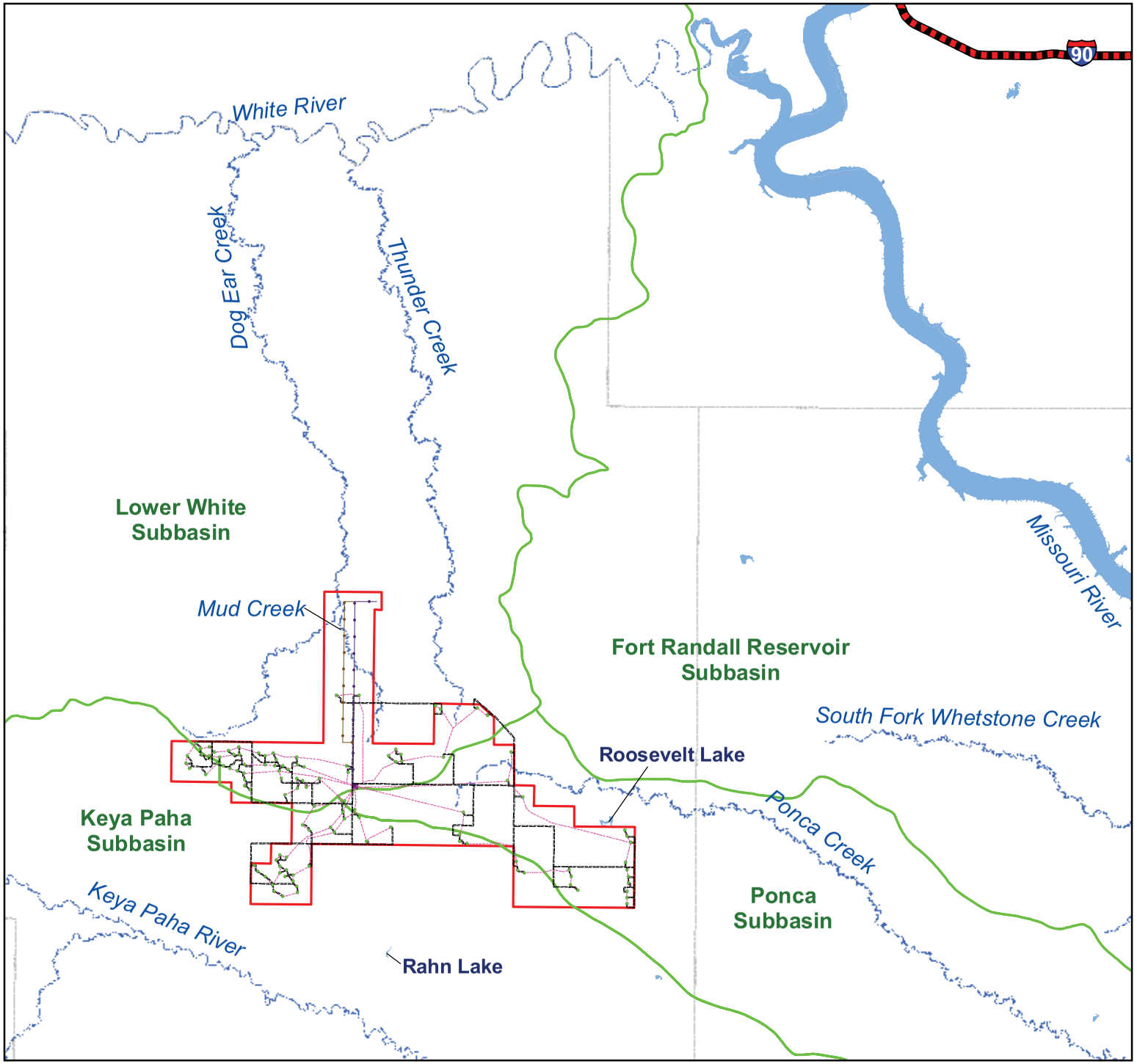
Field investigations in 2008 and 2009 identified a total of 931 acres of deciduous wetland, forested wetland, lake, stock pond, wetland and wet meadow within the Winner Alternative, as depicted in **Figure 3.2-4** (Tierra EC 2009). **Section 3.4.3.2** further describes the field-verified wetland areas. 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.**

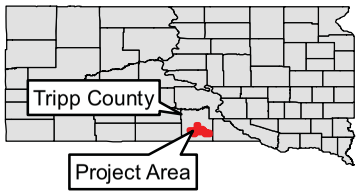


Winner

- 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



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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.

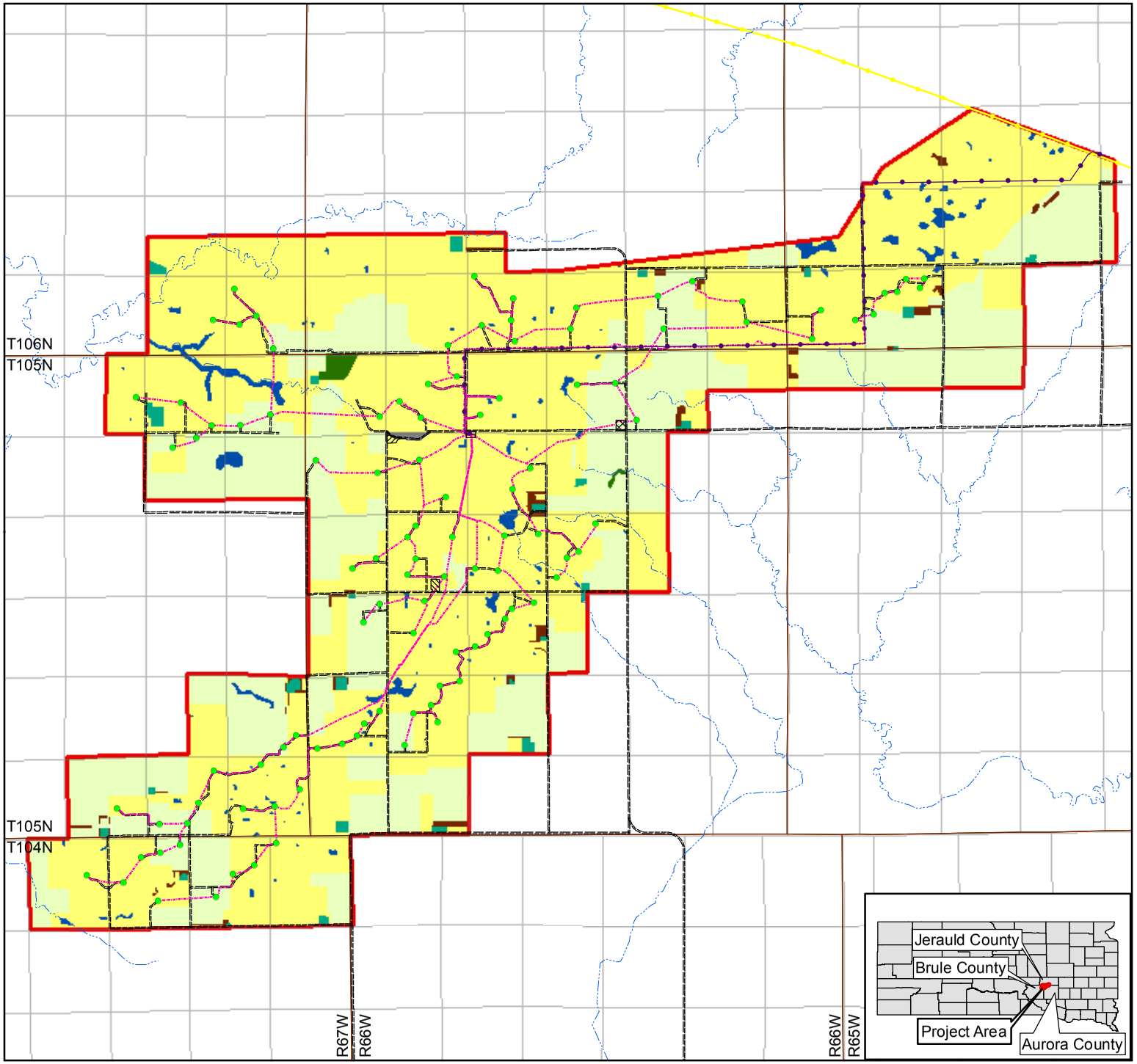
CRP/prairie (93 acres) is areas of naturally occurring prairie or planted grasslands where native prairie grasses are dominant. CRP includes areas of cropland that have been removed from crop production for a specific period (usually 10 years) and are planted with cover designed to conserve soil and 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 15th 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

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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

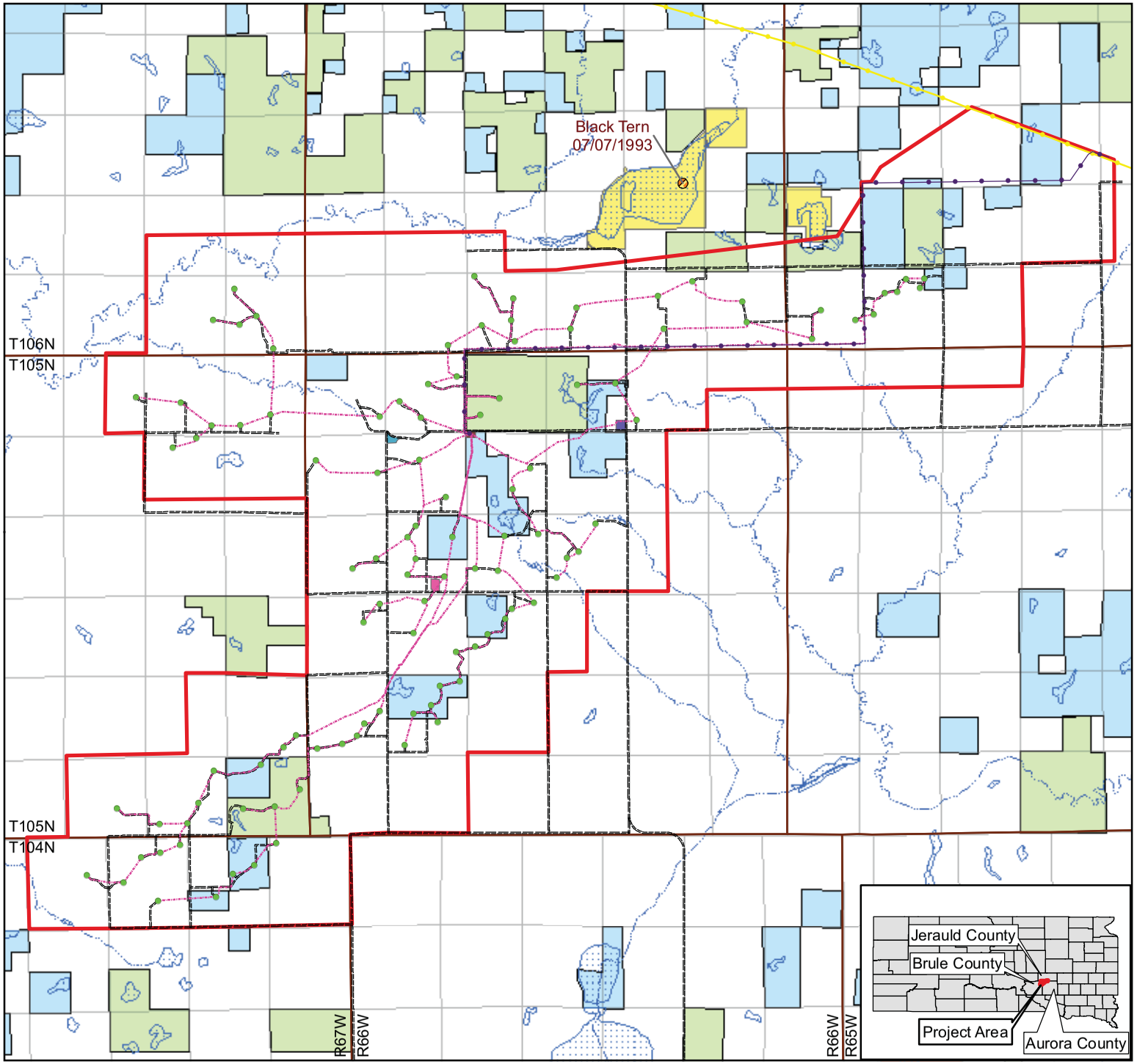
Farmsteads account for less than one percent (276 acres) of the Crow Lake Alternative. Farmsteads include developed areas of land with various structures devoted to residential, commercial or industrial practices. These areas are adjacent to pasture or rangeland and are scattered throughout the site.

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

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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.

Federally-listed Species

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

State-Listed Species

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%

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

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.

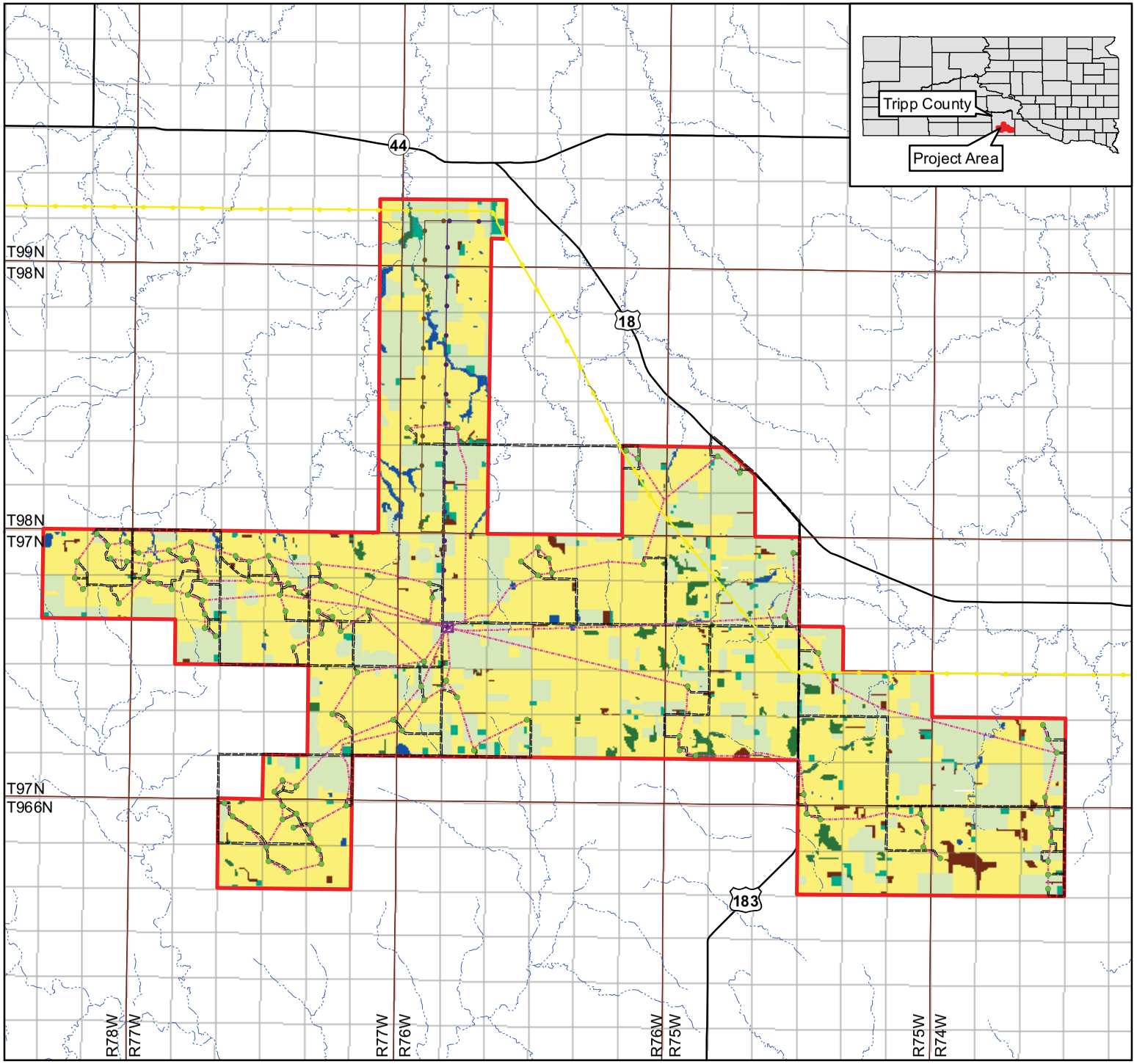
Stock ponds are areas that are bermed (natural drainage features or seasonal wetlands) to create a persistent water supply for livestock. These areas are often heavily grazed and do not contain a perimeter of hydrophytic vegetation.

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

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).

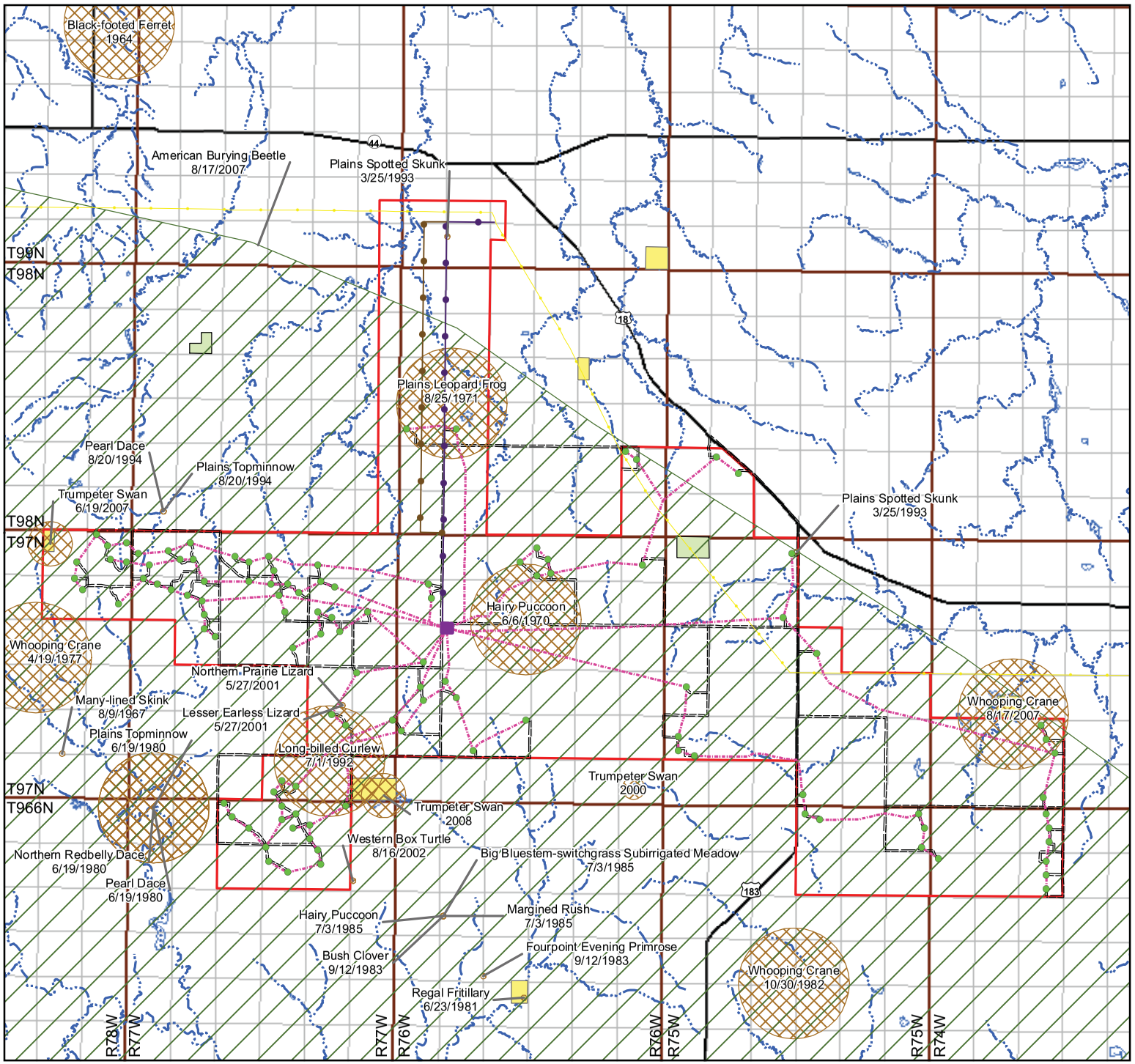
State-Listed Species

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*



Winner

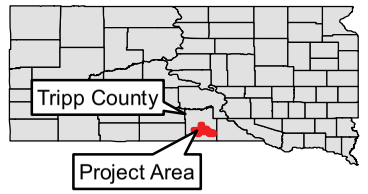
- Project Boundary
- Township and Range
- Section
- State/US Highway
- Western Utility Line
- Turbine
- Substation and O&M Building
- Collector System
- Internal Road

Overhead Transmission Line

- Alternative 1
- Alternative 2
- USFWS Grassland Easement
- Game Production Areas

Natural Heritage Habitat

- Species Occurrence
- American Burying Beetle
- Drainage
- Major Water Bodies (EPA)



N

0 2.5 5

Miles

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**.

Bird Survey Results

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.

Bat Survey Results

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**.

Bird Survey Results

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 40th compared to 44 other wind energy facilities with spring data, 41st compared to 41 other wind energy facilities with summer data, and 27th 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

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

USFWS on February 22, 2010. Detailed information (*i.e.,* legal status, species ecology, local distribution) from the BA is summarized in this section.

Whooping Crane

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,

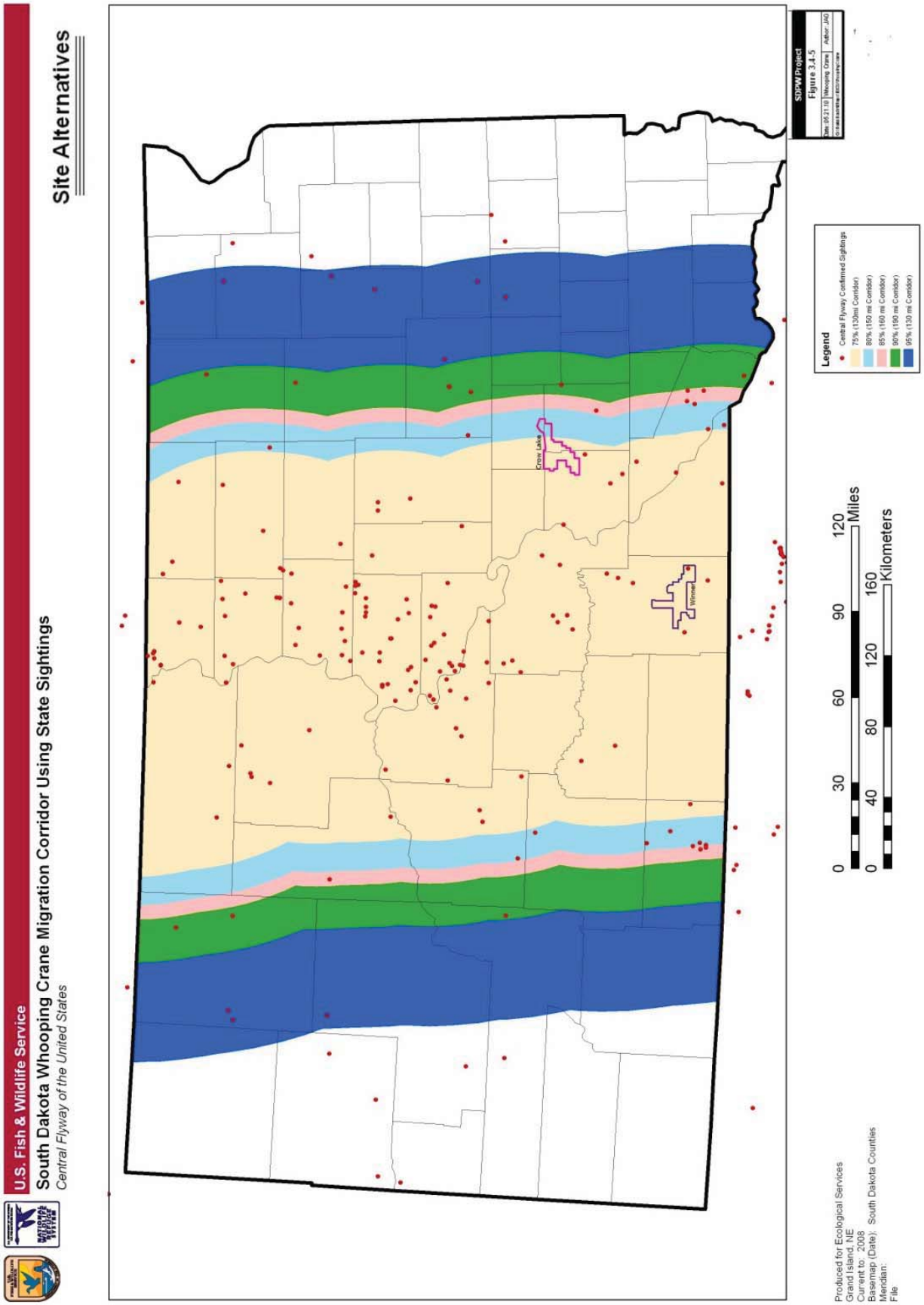


Figure 3.4-5 Whooping Crane Migration Corridor with Sightings

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.

Greater Prairie Chicken

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).

Sharp-tailed Grouse

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.

American Burying Beetle

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 19th 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).

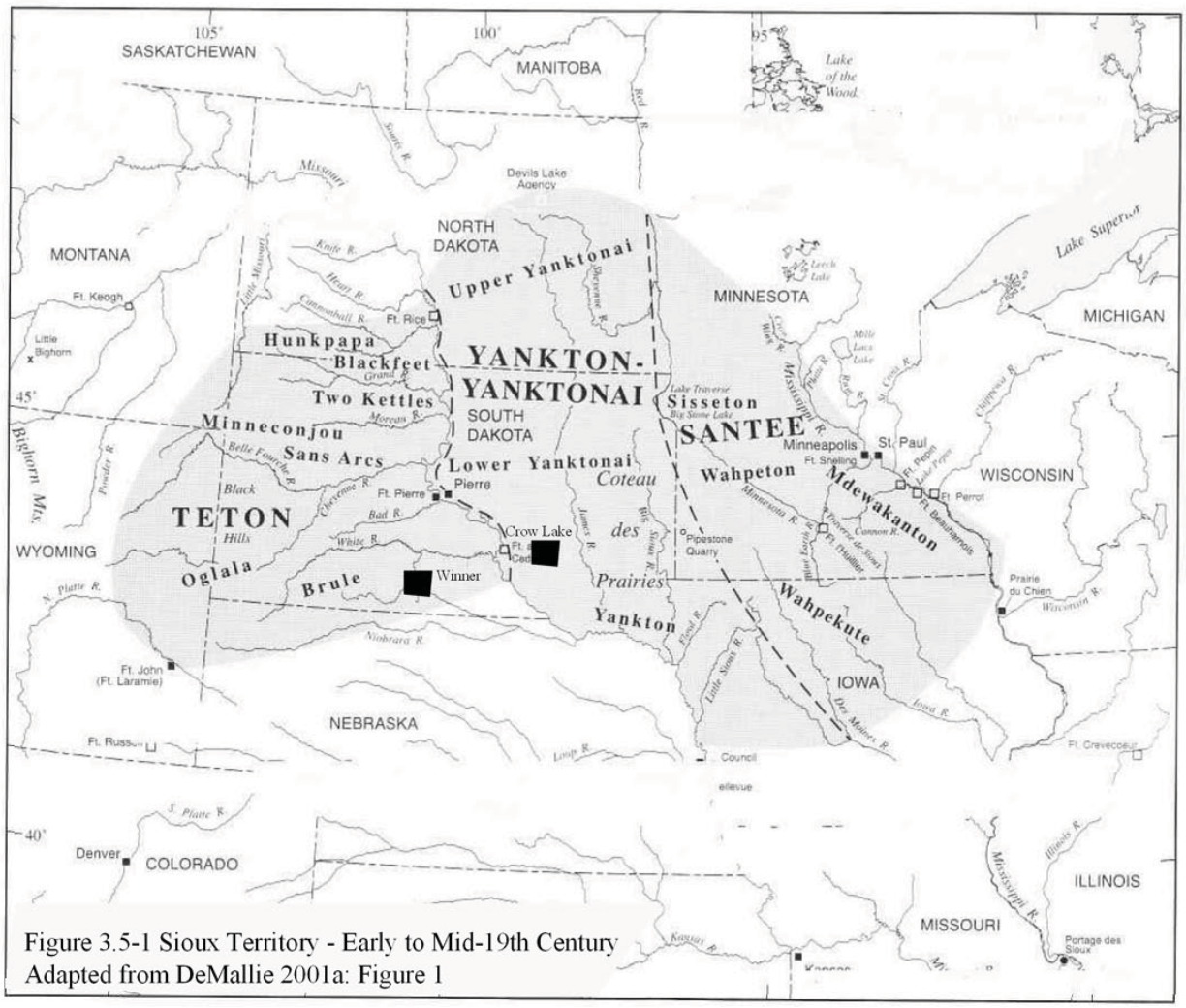


Figure 3.5-1 Sioux Territory – Early to Mid 19th Century

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 18th 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

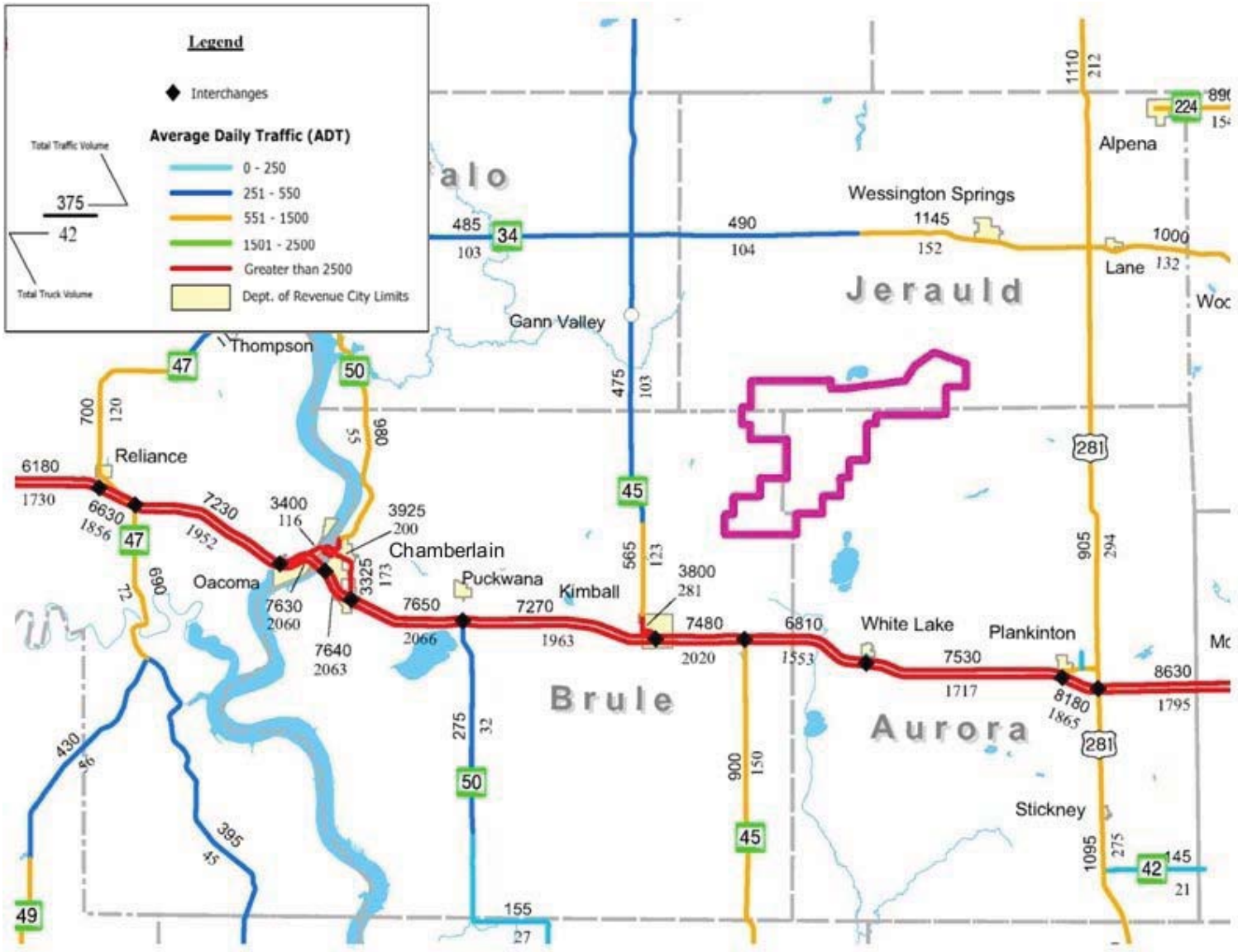
Three airports are within 20 miles of the Crow Lake Alternative. The Wessington Springs Airport and Kimball Municipal Airport are municipal airports serving the local communities, with less than 300 takeoffs/landings per year each (SDDOT Aeronautics 2007). Drake Farm is a farm airfield used for local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

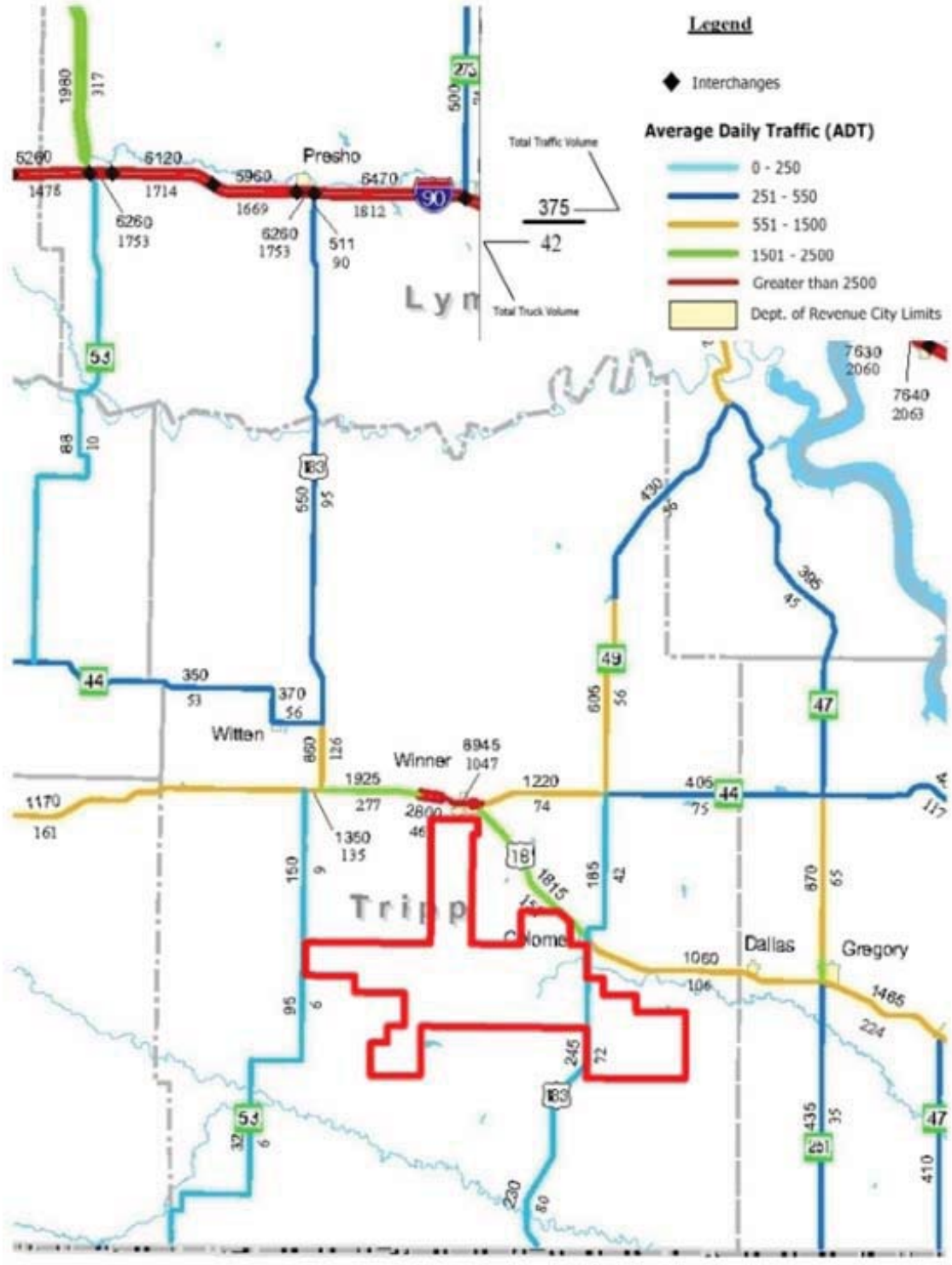
Two airports and one helipad are within 20 miles of the Winner Alternative. The Winner Regional Airport is used for takeoffs/landings over 20,000 times per year, with nearly half of that being local traffic staying within 20 miles; and the Gregory Municipal Airport is less heavily used at 6,500 takeoffs/landings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

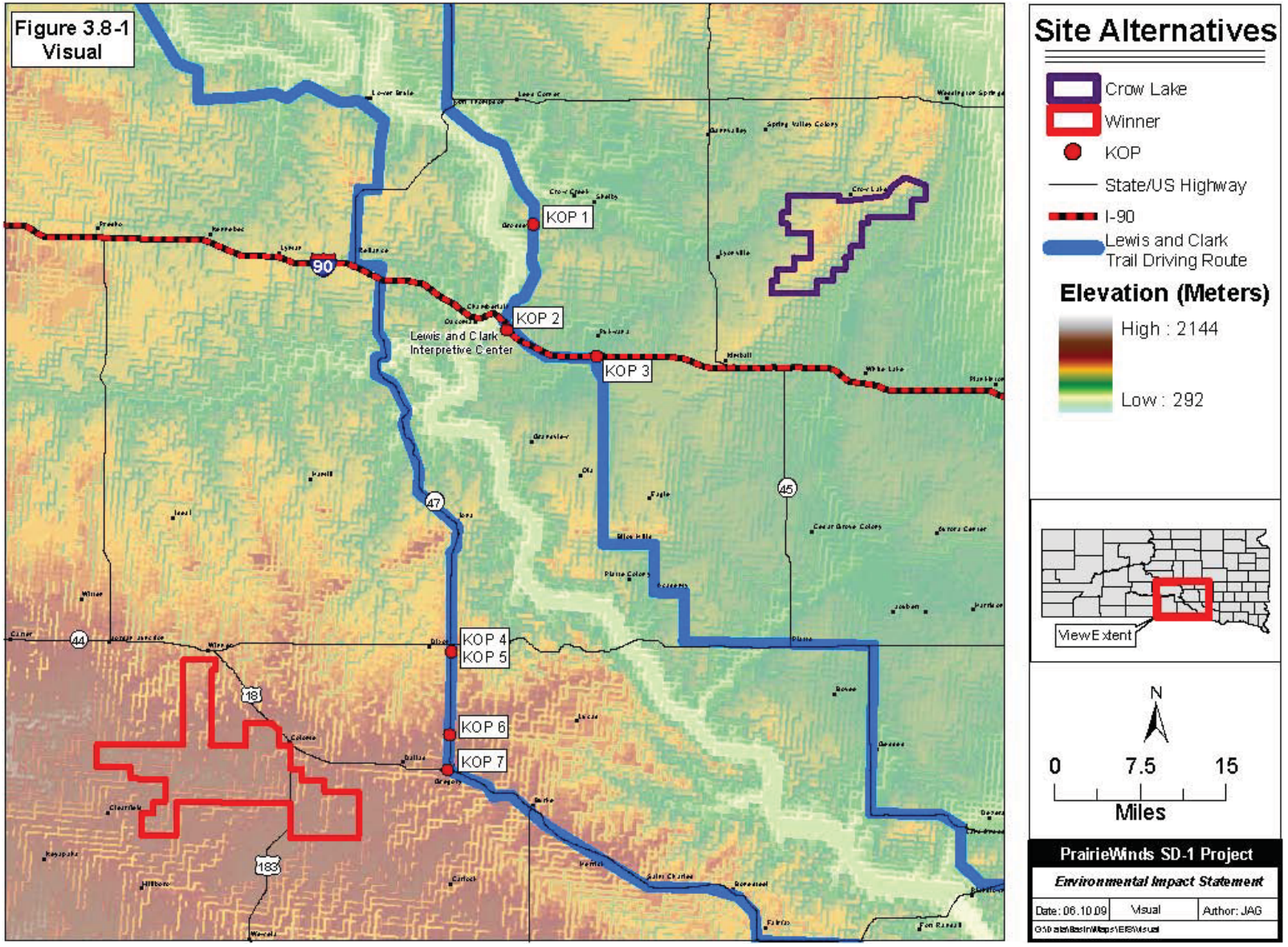


Figure 3.8-1 Key Observation Points

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.

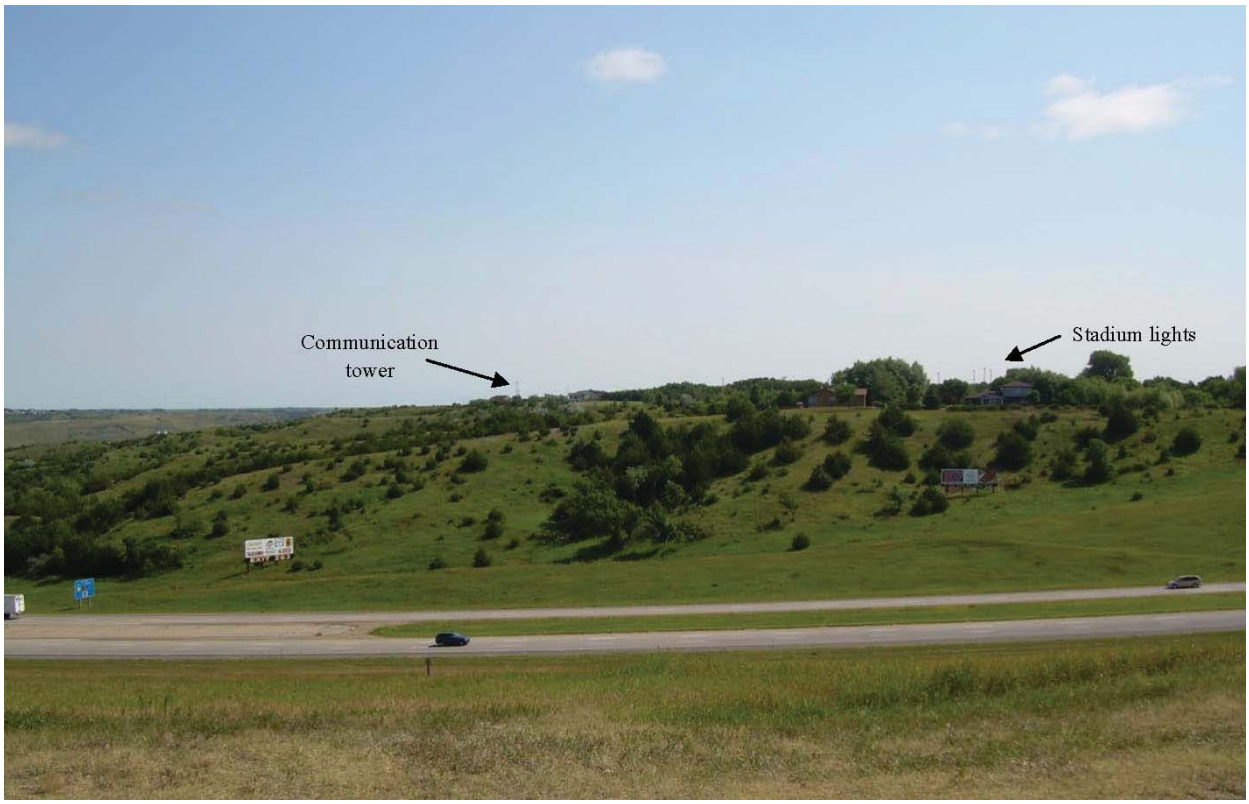


Figure 3.8-3 KOP 2 Existing Condition

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.

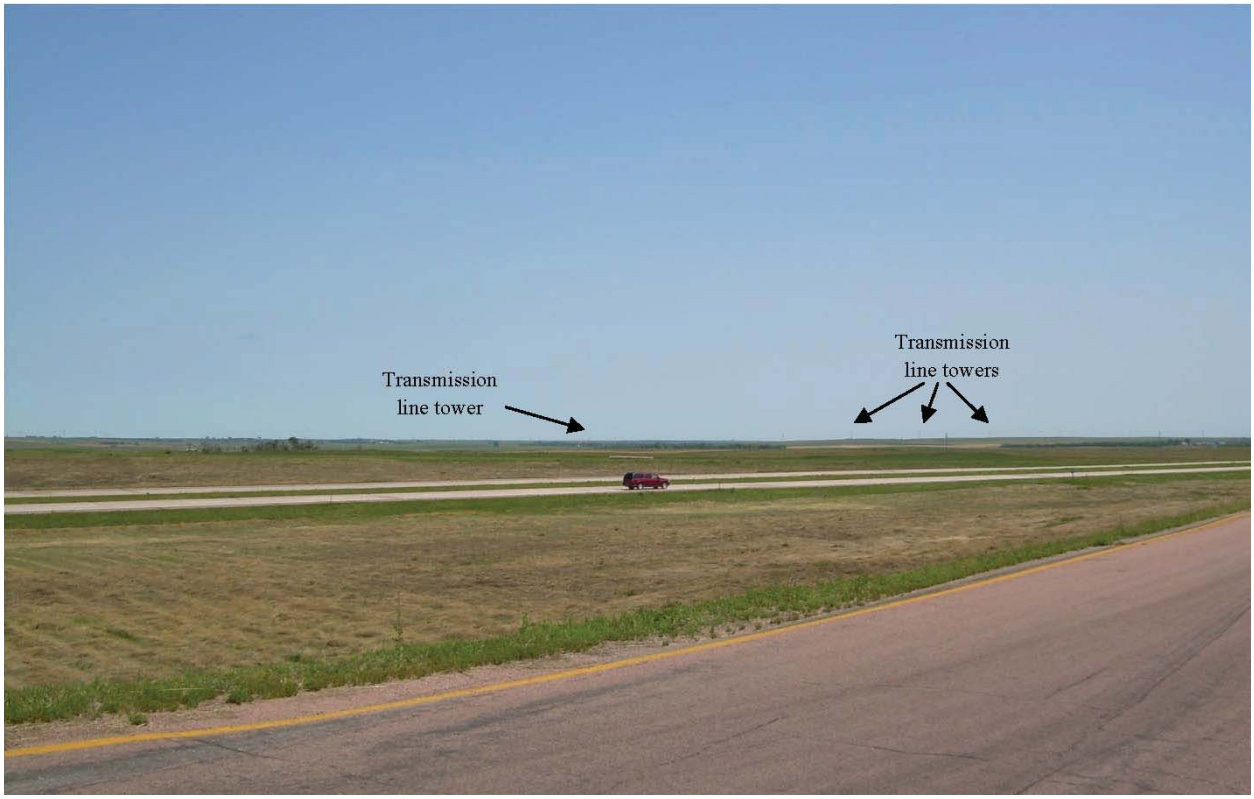


Figure 3.8-4 KOP 3 Existing Condition

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).

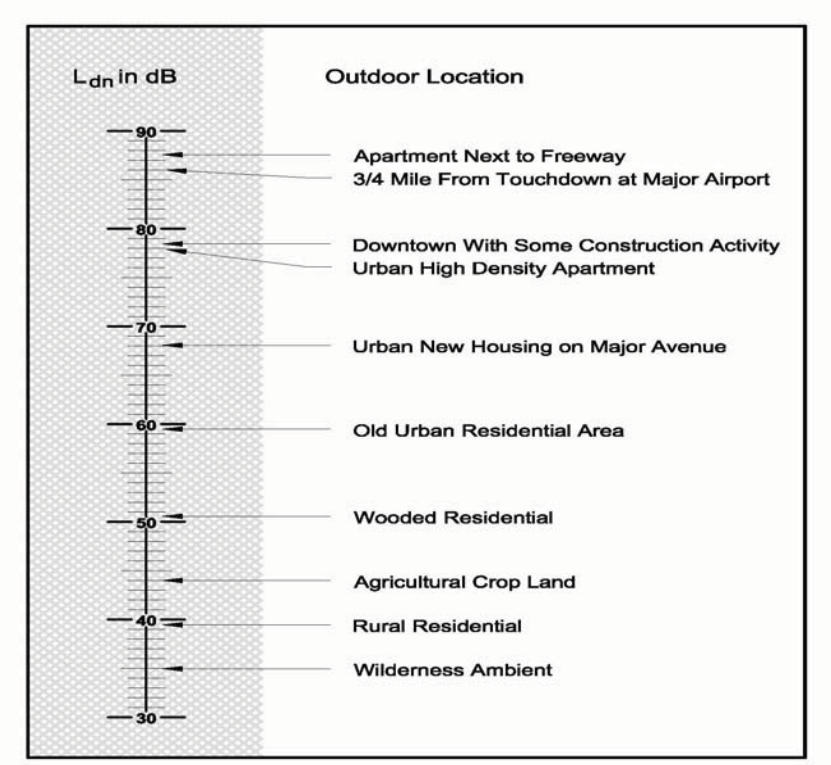
The L_{dn} is the A-weighted average sound level for a 24-hour period. It is calculated by adding a 10 dB "penalty" to sound levels in the night (10 p.m. to 7 a.m.) to compensate for the increased sensitivity to noise during the quieter evening and nighttime hours. Sound levels typical of outdoor areas 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 Brule County: Chamberlain –2,264, Kimball – 692 Jerauld County: Wessington Springs – 846, Alpena – 225				
2000	Population in two largest cities	Aurora County: Plankinton-601, White Lake- 405 Brule County: Chamberlain – 2338, Kimball – 745 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."

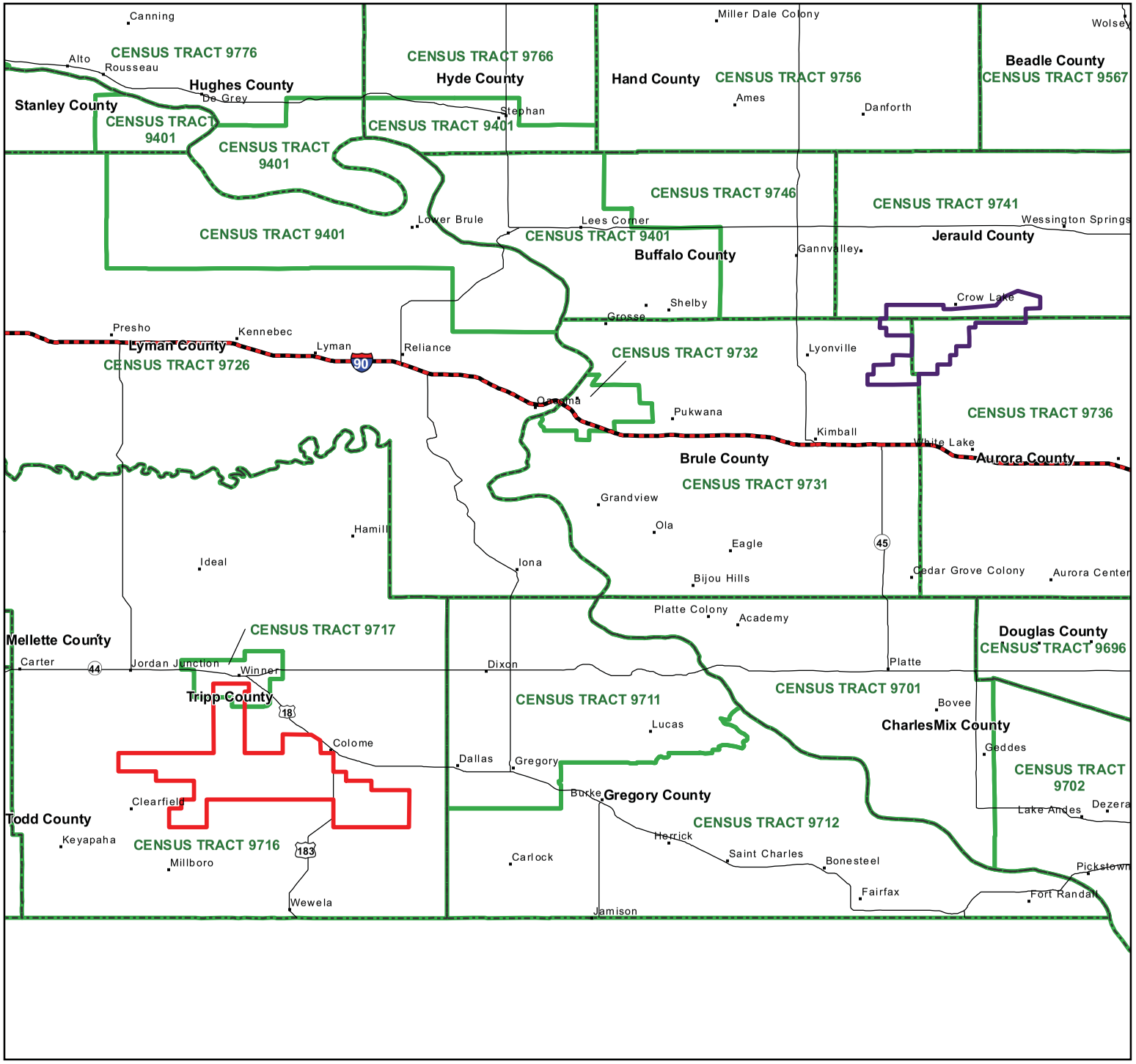
This section identifies existing minority populations, low-income populations and tribal communities, defined as follows:

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**.



Alternatives

- Crow Lake
- Winner
- State/US Highway
- I-90
- County Boundary
- Census Tract

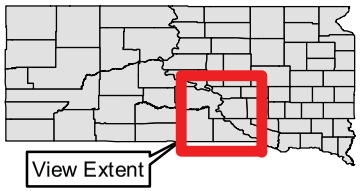


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Figure 3.11-1

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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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