CENTER TO GRAND FORKS 345 KV TRANSMISSION LINE PROJECT

ENVIRONMENTAL ASSESSMENT

November 2010

U.S. Department of Agriculture
Rural Utilities Service

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List of Abbreviations

Abbreviation	Definition
AC	Alternating Current
ACSR	Aluminum conductor steel reinforced
ACSS	Aluminum conductor steel supported
AES	Alternatives Evaluation Study
APLIC	Avian Power Line Interaction Committee
ATV	All-terrain vehicle
BMP	Best Management Practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CPI	Center Pivot Irrigation
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
dB	Decibel
dBA	A-weighted decibel
DC	Direct Current
DOT	Department of Transportation
EA	Environmental Assessment with scoping
EHS	Extra High Strength
EMF	electric and magnetic field
EMI	Electromagnetic Interference
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973, as amended
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FPPA	Farmland Protection Policy Act
GAP	Gap Analysis Data
GIS	Geographic Information System
G&T	generation and transmission
HVDC	high voltage direct-current
Hz	Hertz
IEEE	Institute of Electrical and Electronics Engineers
kV	kilovolt
MCS	Macro-Corridor Study
Minnkota	Minnkota Power Cooperative, Inc.
MW	Megawatt
NDGF	North Dakota Game and Fish Department

Abbreviation	Definition
NDPR	North Dakota Parks and Recreation Department
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electricity Safety Council
NHI	Natural Heritage Inventory
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NMPA	Northern Municipal Power Agency
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
OPGW	Optical Ground Wire
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PLOTS	Private Lands Open to Sportsmen
PPA	power purchase agreements
Project	Center to Grand Forks Transmission Line Project
PSC	North Dakota Public Service Commission
ROC	Region of Comparison
ROW	Right-of-Way
RUS	Rural Utilities Service
SHPO	State Historic Preservation Office
Square Butte	Square Butte Electric Cooperative
SSURGO	Soil Survey Geographic soils data
STATSGO	General State Soil Geographic
SWPPP	Storm Water Pollution Prevention Plan
TNC	The Nature Conservancy
TW	Trapezoidal wire
USACE	U.S. Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
VEC	Valued environmental components
WDA	Wildlife Development Area
WHO	World Health Organization
WMA	Wildlife Management Area
WPA	Waterfowl Production Area
Young 2	Milton R Young Station Unit 2

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Executive Summary

Introduction

Minnkota Power Cooperative, Inc. (Minnkota) is requesting financing from the U.S. Department of Agriculture (USDA) Rural Utilities Service (RUS) to construct an electric transmission line and associated facilities in North Dakota, called the proposed Center to Grand Forks 345 kV Transmission Line Project (Project). The RUS, an agency that administers the USDA's Rural Development Utilities Program, is required to complete an environmental analysis prior to approving financial assistance. In accordance with the Environmental Policy and Procedures for Implementing the National Environmental Policy Act (NEPA) (7 Code of Federal Regulations (CFR) Part 1794), the proposed Project is classified as an Environmental Assessment with scoping (EA). This EA discusses the purpose and need, the reasonable and feasible alternatives considered, along with a detailed description including maps of the proposed action. A review of the affected environment within the Study Area, the environmental consequences of the proposed action, and planned mitigation of the potential environmental impacts are also included.

Purpose and Need

Over the past ten years, Minnkota's load has grown at a rate of 2.9 percent annually (Alternative Evaluation Study). In addition, Minnkota's 2009 Load Forecast study showed that load will continue to grow at a rate of approximately 1.9 percent annually over the next 25 years (Minnkota 2010a). In order to adequately serve this future load growth, Minnkota must increase its baseload generation resources. In particular, additional baseload generation is needed by the winter of 2013 to address an increased need for electricity use to serve new residences, commercial accounts, and pipeline pumping projects (Minnkota 2010a).

To address the need for additional baseload generation resources, Minnkota recently entered into an agreement to amend an existing power purchase agreement (PPA) with Minnesota Power, a division of ALLETE, and Square Butte Electric Cooperative (Square Butte). Pursuant to this agreement, Minnesota Power released to Minnkota the rights to its share of generation from the Square Butte-owned Milton R Young Station Unit 2 (Young 2) power station. This allows Minnkota to increase its allocation of generation from Young 2 from 50 percent to 100 percent over the next several years. In return, Minnkota has agreed to release its rights for transmitting power from Young 2 on the Square Butte high-voltage direct-current (HVDC) transmission line that terminates near Duluth, Minnesota.

Thus, as a result of the agreement, Square Butte sold ownership of the HVDC transmission line to Minnesota Power. The agreement between Minnkota, Minnesota Power, and Square Butte provide Minnkota with an additional baseload power supply without the need to construct a new coal-fired plant, and provide Minnesota Power with existing transmission facilities to develop and deliver substantial wind energy from North Dakota to its consumers in Minnesota.

The agreement with Minnesota Power and Square Butte will enable Minnkota to begin acquiring additional baseload generation from Young 2 in early 2013. However, because the existing Square Butte HVDC transmission line will no longer be available to carry the full generation output of Young 2, the power generated by Young 2 will need to be transmitted via the alternating-current (AC) transmission system to Minnkota's service territory in eastern North Dakota and western Minnesota.

Regional transmission-system studies for the eastern North Dakota and northwestern Minnesota area since 2005 have demonstrated the need for improvements due to systemic voltage instability and load serving issues. In addition, these studies have found that the existing AC transmission system is already operating at capacity without any additional load growth. System studies indicate that additional transmission into the northeastern part of North Dakota from the area of concentrated generation in central North Dakota is the preferred alternative in order to address these issues within Minnkota's service territory.

Minnkota conducted an Alternative Evaluation Study (AES) for the proposed Project, which discussed system alternatives for addressing Minnkota's Young 2 output transmission requirements utilizing the AC transmission system. The system alternatives discussed in this EA are included in Chapter 2, Alternatives. Regional transmission studies and Minnkota-specific system studies have shown that the best solution for addressing Minnkota's transmission requirements, as well as for meeting the voltage stability and load-serving capability needs of the Red River Valley region, is to construct a new transmission facility.

The proposed Project would provide a direct link to Minnkota's service territory, while providing a major improvement to the regional transmission grid and a sound technical solution to the northern Red River Valley voltage stability issue which is document in the AES. The proposed Project could also support wind generation development in North Dakota. Therefore, the proposed Project would be the optimal alternative to address Minnkota's and the region's needs.

Project Description

Minnkota proposes to construct a 345 kV transmission line from Center to Grand Forks, North Dakota. The proposed Project would consist of the following major components:

- 345 kV High Voltage Transmission Line – Approximately 260 miles (based on the average of the three routes) of new transmission line. No permanent access road would be located within the right-of-way (ROW).
- Center 345 kV Substation Upgrades – Most upgrades (circuit breakers, dead-end structures, new transformer and associated bus work, switches and associated foundations, steel structures, and control panels) would occur within the existing substation's fenced boundary. A line reactor for open line voltage control may also be required. If the reactor is required, a 22,500 square foot (0.5 acre) expansion to the north end of the substation, beyond the existing fenced boundary, would be needed.
- Additional 230 kV Tie Line – Approximate 1,500-feet-long Tie Line would parallel the existing tie line on Minnkota-owned property. It is required to complete the transmission-to-transmission interconnection between the Square Butte 230 kV Substation and Center 345 kV Substation.
- Square Butte 230 kV Substation Upgrades – Existing 230 kV circuit breakers and line terminal equipment would be re-allocated to the new 345 kV interconnect.
- Prairie Substation Upgrades – All upgrades (circuit breakers, dead-end structures, transformers and associated bus work, switches, associated foundation, steel structures, and control panels) would occur within the existing substation's fenced boundary.

- Fiber Optic Regeneration Stations – Four fiber optic regeneration stations with permanent access roads would be require along the transmission line route to re-amplify the protection and control signals carried in the optical ground wire (OPGW).
- Proposed Project Access and Crossings of State Highway - The proposed transmission line would cross state highways at 45 locations. Construction access to the proposed route alternatives may take place at the 45 crossing locations. Ten of the 45 potential construction access locations may require a temporary impact within North Dakota Department of Transportation ROW.
- Staging Areas – Up to 14 temporary staging areas may be established for the proposed Project. Twelve staging areas would be located along the proposed route, one staging area would be located at the Center 345 kV Substation, and one staging area would be located at the Prairie Substation.
- Relocation of Transmission Line Structures at the Center 345 kV Substation - Relocate sections of the Center to Jamestown 345 kV Transmission Line and existing 230 kV Tie Line
- Relocation of Transmission Line Structures at the Prairie Substation - Relocate a section of the Prairie to Western Area Power Administration (WAPA) Substation 230 kV Transmission Line
- Underground of Distribution Lines - Where site specific considerations require, such as areas where line clearance may be an issue or other ROW concerns, Minnkota would bury existing distribution lines within the distribution line's existing ROW.

Proposed Routes

Three 1,000-foot-wide route alternatives have been proposed for the Project. The proposed route alternatives are shown in Figure 2.4-2. Route alternative descriptions are as follows:

- Route A – This proposed route is approximately 247-miles-long and follows the northern portion of the macro-corridors. The proposed route begins at the Center 345 kV Substation heading east crossing the Missouri River and continues north on the west side of Wilton, North Dakota. The proposed route continues north crossing Interstate 83 and heading north parallel to State Highway 41. Then heads east crossing the McClusky Canal, James River, and Sheyenne River. Route A then heads north and turns northeast near Aneta, North Dakota, and continues east to the Prairie Substation near Grand Forks, North Dakota.
- Route B – This proposed route is approximately 270-miles-long and follows the southern portion of the macro-corridors. The proposed route beings at the Center 345 kV Substation heading east across the Missouri River. It heads north along the west side of Interstate 83 and State Highway 41 eventually traveling north parallel to State Highway 41. Route B turns east near State Highway 200 and crosses the McClusky Canal near McClusky, North Dakota. The proposed route continues east along section lines and heads north near Goodrich, North Dakota, turning east near State Highway 3, the turns south east of Hurdsfield, North Dakota, and continues east on the south side of Interstate 52. Route B then turns north on the west side of Interstate 29 and continues north to the Prairie Substation.

- Route C – This proposed route is approximately 250-miles-long and follows the central portion of the macro-corridors. This proposed route begins at the Center 345 kV Substation heads north and then turns east to State Highway 83 on the eastside of the Missouri River, north of Wilton, North Dakota. The proposed route heads north on the west side of State Highway 41, turns east, and crosses the McClusky Canal near McClusky, North Dakota. The proposed route continues east parallel to State Highway 200. Continuing east, the proposed route crosses the Sheyenne River and turns north near Sharon, North Dakota, and heads northeast on the south side of Northwood, North Dakota to the Prairie Substation.

In addition to the route alternatives, 38 segment alternatives have been identified as options suggested by landowners and for avoidance or minimization of impacts to certain sensitive areas found along the route alternatives (Figure 2.4-2).

Affected Environment and Potential Impacts

The proposed Project crosses portions of 12 counties in central and eastern North Dakota that are Oliver, Burleigh, McLean, Sheridan, Wells, Foster, Eddy, Griggs, Nelson, Steele, Traill, and Grand Forks counties. The general land cover within the Study Area consists primarily of agricultural lands including cultivated crops and livestock grazing, with dispersed areas of pasture/hay and woodland. Agriculture is one of the most important industries in North Dakota. Cultivated croplands increase as the proposed Project moves east towards the Red River Valley, with approximately 60 percent cropland from Center, North Dakota (Center 345 kV Substation) to Mercer, North Dakota, to nearly 90 percent cropland from the Sheyenne River to Grand Forks, North Dakota (Prairie Substation). The primary cultivated crops include wheat, soybeans, and corn. Cattle are the lead livestock production in North Dakota. Center pivot irrigation units are commonly found within the Study Area.

Prairies and wetlands are more prevalent in the western portion of the Study Area, toward the Missouri River. Historically, North Dakota was mostly prairie land cover. In the western portions of the Study Area prairie covers more land and decreases towards the Sheyenne River and Red River Valley. Wetlands occur throughout the Study Area as the proposed Project traverses the Prairie Pothole Region of the upper Midwest. Wetlands are typically small, isolated depressions, but may also be found along drainages, rivers, and streams. Wetlands cover nearly 12 percent of the land within the western portion of the Study Area, and decrease to about 5 percent in the eastern portion due to increased cultivated crops. Wooded areas are not prevalent in North Dakota as the historic land cover was prairie. Currently, the most common wooded areas are shelterbelts around residences and buildings. The major rivers may have a wooded, riparian fringe.

The Study Area contains undulating terrain in the western section within the Prairie Pothole region and near major rivers; otherwise the eastern half is nearly level within the Red River Valley. Major watercourses within the Study Area include the Missouri, James, and Sheyenne rivers.

The new transmission facilities would traverse primarily agricultural land. It is estimated that permanent easement ROW totaling between 4,498 and 4,900 acres of land would be required for the transmission line. The proposed routes are anticipated to permanently impact about 3.0 acres of land. The potential voluntary displacement of up to two homes may occur near the ROW within the routes, depending on final ROW location. Placement of the 150-foot-wide ROW within the 1,000-foot-wide route would reduce impacts to homes or be able to avoid homes

within the route. Where it is not possible to provide a 500-foot setback between the final ROW and an occupied residence, Minnkota would work with the landowner to obtain a waiver to allow for transmission line placement within 500 feet of their home. No involuntary displacement of homes would occur. Landowner compensation would be established by individual easements.

Approximately 3.0 acres of direct impacts are anticipated to occur to land cover (cropland and pasture), soils, and vegetation. Minnkota would span the Missouri and Sheyenne rivers to avoid direct impacts to the rivers. A cultural resources survey of the final route alignment is proposed prior to construction to avoid affects upon archaeological and historic facilities. Potentially one Waterfowl Production Area may be impacted by Route A and Minnkota would work with land managers to reduce impacts. Socioeconomic impact is primarily positive due to the increase tax base of the county.

Public and Agency Coordination

Minnkota pursued a public outreach effort that provided opportunities for landowner and other stakeholders to be involved in the routing process. Minnkota engaged landowners, interested members of the public, federal, and state agencies, and local government units. Table ES-1 shows a summary of the scoping efforts to date.

Table ES-1. Summary of Scoping Efforts

Event	Date	Location	Attendance
Tribal River Crossing Review	September 22-23, 2009	Bismarck, ND - Field trip to Sheyenne and Missouri River Crossings	Rural Utilities Service No Tribal Attendance
Public Scoping Meetings	November 16 – 19, 2009	Grand Forks, ND – Alerus Center Cooperstown, ND – City Hall Carrington, ND – Chieftain Conference Center McClusky, ND – Community Hall Wilton, ND – Memorial Hall Center, ND – Civic Center Building	187 people signed in
Agency Scoping Meeting	November 19, 2009	Bismarck, ND – U.S. Fish and Wildlife Service Office	Bureau of Reclamation North Dakota Parks and Recreation North Dakota State Water Commission U.S. Army Corps of Engineers U.S. Fish and Wildlife Service North Dakota State Historic Preservation Office Federal Highway Administration Rural Utilities Service
30-Day Scoping Comment Period	November 20 – December 18, 2009	NA	26 official public comment received (does not include mapping comments made during open house meetings)
Section 106 Consultation Meeting	April 22, 2010	Bismarck, ND	Wahpekute Sisseton Wahpeton Oyate Mill Lacs Band of Ojibwe Rural Utilities Service North Dakota SHPO

Event	Date	Location	Attendance
Section 106 Consultation Meeting – Tribal River Crossing Review	June 8-10, 2010	Bismarck, ND – Field trip to Sheyenne, James and Missouri River Crossings	Rural Utilities Service
Tribal Consultation Meeting	August 17, 2010	Standing Rock Sioux Tribe, Fort Yates, ND and Conference Call	Sisseton Wahpeton Oyate Standing Rock Sioux Rural Utilities Service

Permitting Process/Timeline

Minnkota would be required to obtain approvals from a variety of federal, state, and local agencies prior to construction. Agencies with primary approval/permitting authority include RUS and North Dakota Public Service Commission (PSC). Other federal and state agencies include: United States (U.S.) Fish and Wildlife Service, U.S. Army Corps of Engineers, Federal Aviation Administration, U.S. Department of Agriculture – Natural Resources Conservation Service, Environmental Protection Agency, North Dakota (ND) Department of Health, ND Department of Emergency Management, ND Parks and Recreation Department, ND State Water Commission, State Historical Society of North Dakota, ND State Highway Patrol, and ND State Land Department, and ND Department of Transportation. Chapter 6 identifies the permits and approvals that may potentially be required by federal agencies, the state of North Dakota, counties, and townships, respectively. This preliminary listing of regulatory requirements is subject to change as the proposed Project proceeds.

1.0 Introduction

Minnkota Power Cooperative, Inc. (Minnkota) is a generation and transmission (G&T) cooperative serving 11 rural electric distribution cooperatives. Minnkota is requesting financing assistance from the U.S. Department of Agriculture (USDA) Rural Utilities Service (RUS) to construct an electric transmission line and associated facilities in central and northeast North Dakota. The RUS, an agency that administers the USDA's Rural Development Utilities Program, is required to complete an environmental analysis prior to approving financial assistance. In accordance with RUS' Environmental Policy and Procedures for Implementing the National Environmental Policy Act (NEPA) (7 Code of Federal Regulations (CFR) Part 1794), the proposed Center to Grand Forks 345 kV Transmission Line Project (Project) is classified as an Environmental Assessment with scoping (EA). This EA discusses the purpose and need, the reasonable and feasible alternatives considered, along with a detailed description including maps of the proposed action. A review of the affected environment within the Study Area, the environmental consequences of the proposed action, and planned mitigation of the potential environmental impacts are also included.

1.1 Minnkota Power Cooperative, Inc.

Minnkota is a wholesale electric generation and transmission cooperative headquartered in Grand Forks, North Dakota. Incorporated on March 28, 1940, Minnkota provides, on a nonprofit basis, wholesale electric service to 11 retail/member-owner distribution cooperatives, which are the members and owners of Minnkota. The member systems' service areas encompass 34,500 square miles in northwestern Minnesota and the eastern third of North Dakota. The member systems serve approximately 125,000 of the 300,000 residents in the area. These cooperatives also serve more than 116,000 retail customers including many of the region's schools, farms, homes, and businesses.

The primary source of baseload generation for the rural cooperatives is the Milton R. Young Generation Station located approximately 24 miles northwest of Bismarck, North Dakota, near the community of Center, North Dakota. As operating agent for the Northern Municipal Power Agency (NMPA) members, Minnkota also represents NMPA's 30 percent share of the output from the Coyote Station near Beulah, North Dakota. NMPA is the energy supplier for 12 municipal utilities located within the Minnkota service area. In addition, Minnkota has acquired, through power purchase agreements (PPAs) with large wind developers, significant North Dakota-based wind energy resources, totaling about 357 megawatt (MW) nameplate capacity.

1.2 Agency Action

The RUS, an agency which administers the U.S. Department of Agriculture's Rural Development Utilities Programs, may provide financing assistance for the construction of these facilities. RUS is following its policies and procedures, 7 CFR Part 1794 Environmental Policy and Procedures for implementing the NEPA, in order to assure compliance with NEPA and related laws, regulations, and executive orders. In doing so, RUS worked with the local, state, and federal agencies with expertise in their resources, as well as Native American tribes and interested consulting parties to evaluate the potential environmental impacts of the proposed Project. Prior to RUS making a decision on approving a loan for the proposed Project, an EA for the proposed Project must be completed. Following RUS guidance, Minnkota began the project development process by preparing an Alternative Evaluation Study (AES) to identify the proposed Project's purpose and need and alternatives for meeting capacity requirements and

also prepared a Macro-Corridor Study (MCS) to begin the process of identifying a corridor for potential routes. A scoping process was initiated to provide the public, federal, and state agencies, and local governments with information regarding the description, need, and potential project locations or routing, identify concerns of the proposed Project, discuss compliance and permitting requirements, and gather information to be addressed in the RUS environmental review and documentation. Comments received during the scoping process are summarized in a Scoping Report. The MCS, AES, and Scoping Report prepared for the proposed Project can be found at: http://www.usda.gov/rus/water/ees/ea.htm#Minnkota_Power_Cooperative,_Inc._

1.3 Purpose and Need

Over the past 10 years, Minnkota's load has grown at a rate of 2.9 percent annually (Alternative Evaluation Study). In addition, Minnkota's 2009 Load Forecast study showed that load will continue to grow at a rate of approximately 1.9 percent annually over the next 25 years (Minnkota 2010a). In order to adequately serve this future load growth, Minnkota must increase its baseload generation resources. In particular, additional baseload generation is needed by the winter of 2013 to address an increased need for electricity use to serve new residences, commercial accounts, and pipeline pumping projects (Minnkota 2010a).

To address the need for additional baseload generation resources, Minnkota recently entered into an agreement to amend an existing PPA with Minnesota Power, a division of ALLETE, and Square Butte Electric Cooperative (Square Butte). Pursuant to this agreement, Minnesota Power released to Minnkota the rights to its share of generation from the Square Butte-owned Milton R Young Station Unit 2 (Young 2) power station. This allows Minnkota to increase its allocation of generation from Young 2 from 50 percent to 100 percent over the next several years. In return, Minnkota has agreed to release its rights for transmitting power from Young 2 on the Square Butte high-voltage direct-current (HVDC) transmission line that terminates near Duluth, Minnesota.

Thus, as a result of the agreement, Square Butte sold ownership of the HVDC transmission line to Minnesota Power. The agreement between Minnkota, Minnesota Power, and Square Butte provide Minnkota with an additional baseload power supply without the need to construct a new coal-fired plant, and provide Minnesota Power with existing transmission facilities to develop and deliver substantial wind energy from North Dakota to its consumers in Minnesota.

The agreement with Minnesota Power and Square Butte will enable Minnkota to begin acquiring additional baseload generation from Young 2 in early 2013. However, because the existing Square Butte HVDC transmission line will no longer be available to carry the full generation output of Young 2, the power generated by Young 2 will need to be transmitted via the alternating-current (AC) transmission system to Minnkota's service territory in eastern North Dakota and western Minnesota.

Regional transmission-system studies for the eastern North Dakota and northwestern Minnesota area since 2005 have demonstrated the need for improvements due to systemic voltage instability and load serving issues. In addition, these studies have found that the existing AC transmission system is already operating at capacity without any additional load growth. System studies indicate that additional transmission into the northeastern part of North Dakota from the area of concentrated generation in central North Dakota is the preferred alternative in order to address these issues within Minnkota's service territory.

The need of this proposed Project is to address future load growth, system voltage stability, and load serving issues in Minnkota's service territory. In order to accommodate this future load growth, Minnkota must increase its baseload generation resources.

Minnkota conducted an AES for the proposed Project, which discussed system alternatives for addressing Minnkota's Young 2 output transmission requirements utilizing the AC transmission system. The system alternatives discussed in this EA are included in Chapter 2, Alternatives. Regional transmission studies and Minnkota-specific system studies have shown that the best solution for addressing Minnkota's transmission requirements, as well as for meeting the voltage stability and load-serving capability needs of the Red River Valley region, is to construct a new transmission facility. The proposed Project is needed to replace the capability of transmitting the output of Young 2 over an existing HVDC transmission line, and to improve regional electrical system reliability.

The proposed Project would provide a direct link to Minnkota's service territory, while providing a major improvement to the regional transmission grid and a sound technical solution to the northern Red River Valley voltage stability issue which is document in the AES. The proposed Project could also support wind generation development in North Dakota. Therefore, the proposed Project would be optimal alternative to address Minnkota's and the region's needs.

1.4 Proposed Project Description

Minnkota is proposing to construct, operate, and maintain approximately 260 miles of 345 kilovolt (kV) transmission line in North Dakota between the Center 345 kV Substation (located northeast of the Milton R. Young Generation Station, near Center, North Dakota) and the Prairie Substation (located west of Grand Forks, North Dakota).

1.4.1 345 kV High Voltage Transmission Line

The proposed Project consists of approximately 260 miles (based on the average length of typical routes within the macro-corridors) of new, high-voltage AC transmission line to run from the Center 345 kV Substation at the Milton R. Young Generation Station located about 4.5 miles southeast of the town of Center, North Dakota, in Oliver County, to the Prairie Substation located about 0.5 mile west of the city of Grand Forks, North Dakota in Grand Forks County. A crossing of the Missouri River in central North Dakota would be required. The proposed Project would deliver energy from existing baseload generation to Minnkota's cooperative members. While final engineering and design have not been completed, the line would likely be constructed with single-pole steel structures. Typical structures would be approximately 140-feet-high and placed approximately 1,000-feet apart. The typical right-of-way (ROW) for a single pole 345 kV line would be approximately 150-feet-wide. No permanent access road would be located within the ROW.

It is anticipated that each phase wire would consist of bundled conductors composed of two 959.6 kcmil (thousand circular mils) Suwannee TW (trapezoidal wire) type ACSR (aluminum conductor steel reinforced) cables. Each conductor has an outside diameter of 1.1 inches, which has an equivalent diameter of 959,600 circular mils. The trapezoidal configuration reduces air gaps between the strands. Suwannee TW type ACSR consists of seven steel wires at the center surrounded by 26 trapezoidal shaped aluminum strands. Two shield wires, also known as lightning protection wires, are planned. One shield wire would be optical ground wire (OPGW) on one side and 0.5-inch Extra High Strength (EHS) steel cable as the installed shield wire on the other side. OPGW consists of 24 strands of single mode fiber optics conductors in a steel

tube wrapped with ten strands of steel wire around the fiber optic tube. The conductor size may need to be modified once a preferred route is selected and additional electrical optimization studies are completed. Table 1.4-1 outlines typical characteristics of a 345 kV transmission line structure.

Table 1.4-1. Typical Characteristics of 345 kV Transmission Line Structures

345 kV Transmission Line	Details
Voltage (kV)	345 kV
ROW width (feet)	150
Approximate Span length (feet)	1,000
Range of structure heights (feet)	130 - 150 (single circuit)
Number of structures per mile	5 – 7
Minimum ground clearance beneath conductor (feet)	35 – 40
Depth of concrete footings for the poles (feet)	30 – 40
Diameter of concrete footings for the poles (feet)	7 – 10
Average area of permanent disturbance per structure (square feet)	78.5

1.4.2 Center 345 kV Substation Upgrades

The Center 345 kV Substation is located about 4.5 miles southeast of the town of Center, North Dakota, and about 1 mile east of the Milton R. Young Generation Station in Oliver County. Most upgrades would occur within the existing substation's fenced boundary (ownership shared with Otter Tail Power Company). This would involve installing new 345 kV circuit breakers, 345 kV dead-end structures, a new 345/230 kV transformer and associated bus work, new 345 kV switches and associated foundations, steel structures, and control panels. A line reactor for open line voltage control may also be required. If the reactor is required, a 22,500 square foot (0.5 acre) expansion to the north end of the substation, beyond the existing fenced boundary, would be needed.

1.4.3 230 kV Tie Line

This approximately 1,500-foot-long 230 kV Tie Line would parallel the existing tie line on Minnkota-owned property. It would be needed to complete a transmission-to-transmission interconnection between the Square Butte 230 kV Substation and the Center 345 kV Substation. The existing tie line and substations are located about 4.5 miles southeast of the town of Center, North Dakota, and about 1 mile east of the Milton R. Young Generation Station in Oliver County.

1.4.4 Square Butte 230 kV Substation

The Square Butte 230 kV Substation is located about 4.5 miles southeast of the town of Center, North Dakota, and about 1 mile east of the Milton R. Young Generation Station in Oliver County. Existing 230 kV circuit breakers and line terminal equipment would be re-allocated from the existing HVDC tie line to the new 345 kV interconnect as part of the agreement with Minnesota Power. This activity would be completed within the existing substation footprint.

1.4.5 Prairie Substation Upgrades

The Prairie Substation is located about 0.5 miles west of the city of Grand Forks, North Dakota in Grand Forks County. All upgrades would occur within the existing Minnkota-operated

substation's fenced boundary. This would involve installing new 345 kV circuit breakers, 345 kV dead-end structures, two new and one relocated 345/230 kV transformers and associated bus work, new 345 kV switches and associated foundations, steel structures, and control panels. New 230 kV circuit breakers would be added to accommodate interconnecting with the existing 230 kV ring bus. Existing transmission line termination would need to be moved to convert the ring bus into a breaker-and-a-half bus arrangement.

1.4.6 Fiber Optic Regeneration Stations

Four fiber optic regeneration stations would be required along the transmission line route to re-amplify the protection and control signals carried in the optical ground wire (OPGW) fiber optic. Each station would require a 12-foot by 18-foot fenced area, small control building to house the electronic equipment, and a 75-foot-long by 16-foot-wide permanent access road. These four stations would be placed at the base of a structure within the permanent 150-foot-wide ROW. They would be about 75-feet from the nearest section line road.

1.4.7 Proposed Project Access and Crossings of State Highways

The proposed transmission line would cross state highways at 45 locations. Construction access to the proposed route alternatives may take place at the 45 crossing locations. Ten of the 45 potential construction access locations may require a temporary impact within North Dakota Department of Transportation (DOT) ROW. Please see Section 3.1 of this EA for more detail on the crossing and access locations.

1.4.8 Staging Areas

Up to 14 temporary staging areas may be established for the proposed Project. Eight of the 14 staging areas would be used for material storage and pre-assembly work and up to 6 of the 14 staging areas may be used for a portable concrete batch plant site. Six of the material storage staging areas would be located along the proposed route and would be about 10-acres in size, one 10-acre staging area would be located at the Center 345 kV Substation, and one 10-acre staging area would be located at the Prairie Substation. The six staging areas used for portable concrete batch plant sites would be about 5-acres in size. Each staging area would be a temporary impact. The staging area would involve accepting and storing the delivery of equipment and materials necessary to construct the new transmission line facilities. Construction office trailers may be located within the staging areas. Concrete batch plants may be co-located with the material storage sites. These areas would be selected for their location, access, security, and ability to efficiently and safely warehouse supplies. The areas are chosen to minimize excavation and grading. Disturbed areas would be restored to pre-construction condition or per landowner agreement. The staging areas outside of the proposed transmission line ROW would be obtained from affected landowners through rental agreements.

1.4.9 Relocation of Transmission Line Structures at the Center 345 kV Substation

Relocate two existing Minnkota-owned transmission line sections. The two relocated line segments and addition of new structures would facilitate changing termination of the lines within the substation. All relocated structures would occur on Minnkota-owned property. Relocation would involve:

- Relocate the Center to Jamestown 345 kV Transmission Line. Overall line length would not change.

  - Remove existing structures including: (#2: Deadend, #1B: Tangent, #1A: Deadend).
  - Replace the existing #2: Deadend structure with a deadend structure at the same location.
  - Relocate the existing #1B: Tangent and #1A: Deadend structures about 50 feet south of the existing locations.
  - Replace conductor between structures.
- The existing 230 kV Tie Line would terminate in a new bay within the substation. The new bay is approximately one span length south of the existing termination point.
  - Add three new structures and terminate at the new bay (two deadends and one tangent).
  - Replace conductor between structures.

1.4.10 Relocation of Transmission Line Structures at the Prairie Substation

Relocate the existing Xcel Energy-owned 230 kV transmission line section. The relocated line segment and addition of new structures would facilitate changing termination of the line within the substation. All relocated structures would occur on Minnkota-owned property. Relocation would involve:

- Relocate the Prairie Substation to Western Area Power Administration's (WAPA) 230 kV Transmission Line from a bay located in the northeast corner of the existing substation to a new termination point on the west side of the substation.
  - Remove the existing deadend structure going into the north side of the substation and replace with a tangent structure at the same location.
  - Add a new deadend structure to the northwest corner of the substation.
  - Add a new deadend structure to the west side of the substation near the new termination point on the west side of the substation.
  - Replace conductor between new structures.

1.4.11 Underground of Distribution Lines

Where site specific considerations require, such as areas where line clearance may be an issue or other ROW concerns, Minnkota would hire the local distribution cooperative to bury existing distribution lines within the distribution line's existing ROW. Typically, underground distribution lines would be installed by direct plow into the ground or directional drill under roads, driveways, and other permanent aboveground obstacles. Typical work progression would be that a trenching vehicle with a plow blade attachment drives the ROW and the plow blade slices through the ground, burying line that either feeds through a chute in the blade or is pulled behind the blade and into the ground. The blade path would be closed by driving the trenching vehicle over the opening. The distribution lines would be buried from 24 to 48 inches deep.

Ground disturbance is temporary and limited to a small slit by the path of the blade and the track of the trenching vehicle. Temporary ground disturbance area would be about 6- to 8-foot-wide for the trenching vehicle path plus 1- to 2-foot-wide for the plow blade disturbance for the length of the buried line. If directional drilling methods are used, the temporary disturbance area would be about 15 feet wide by 20feetlong at either end of the drilling site.

Underground distribution lines require that junction load break centers or switching centers are placed aboveground for maintenance and repair purposes. Typically, these junction centers require a permanent aboveground metal box that is about 2 feet wide by 3 feet long in size, but may be up to 3 feet wide by 6 feet wide. Installation of a junction centers would require temporary disturbance to an area of about 20 feet diameter.

Should it be necessary to bury distribution lines, the vegetation impacts would be minimal and the areas would be reviewed for cultural resources.

1.5 Proposed Project Facilities

In general, a high-voltage transmission line consists of three phases, each at the end of a separate insulator string (or delta string configuration), all physically supported by structures. Each phase consists of one or more conductors. When more than one conductor is used to make up a phase, the term "bundled" conductors is used. Conductors are metal cables consisting of multiple strands of steel and aluminum wire wound together. There are also two shield wires strung above the electrical phases to prevent damage from lightning strikes. These cables are typically less than one inch in diameter. The shield wire can also include fiber optic cable that allows a path for substation protection equipment to communicate to equipment at other terminals on the transmission line. Transmission lines are constructed on a ROW, whose width is primarily dependent on structure design, span length, and the electrical safety requirements associated with the transmission line's voltage.

1.5.1 Transmission Structure and Right-of-Way Design

Transmission Structure

Single pole, self-weathering steel single circuit structures are proposed for the majority of the proposed Project (Diagram 1-1). The self-weathering steel oxidizes or rusts to form a dark reddish brown surface coating to protect the structure from further weathering. The steel single poles are placed on large concrete foundations, which would be wider than the pole base. Final design and geotechnical investigations may warrant the use of special structures to avoid sensitive areas, comply with reasonable landowner desires, or accommodate special engineering circumstances. For example, crossing the Missouri River may warrant a different structure.

Each of the three phase wires would consist of bundled conductors composed of two 959.6 kcmil Suwannee TW type ACSR cables or conductors of comparable diameter. Each conductor has an outside diameter of 1.1 inches. Suwannee TW type ACSR consists of seven steel wires at the center surrounded by 26 trapezoidal shaped aluminum strands. Two shield wires, also known as lightning protection wires, are planned. One shield wire would be OPGW on one side, and 0.5-inch EHS steel cable on the other side. OPGW consists of 24 strands of single mode fiber optics conductors in a steel tube wrapped with ten strands of steel wire around the fiber optic tube.

Table 1.5-1 summarizes the structure designs and foundations for the single pole structures that would be used for the majority of the proposed Project. Information about the Missouri River structures is also provided.

The proposed transmission line would be designed to meet all relevant state codes, National Electric Safety Code (NESC), RUS standards, and other standards that Minnkota has adopted. Appropriate standards would be met for construction and installation and all applicable safety procedures would be followed during and after installation.

Diagram 1-1. Structure Photo

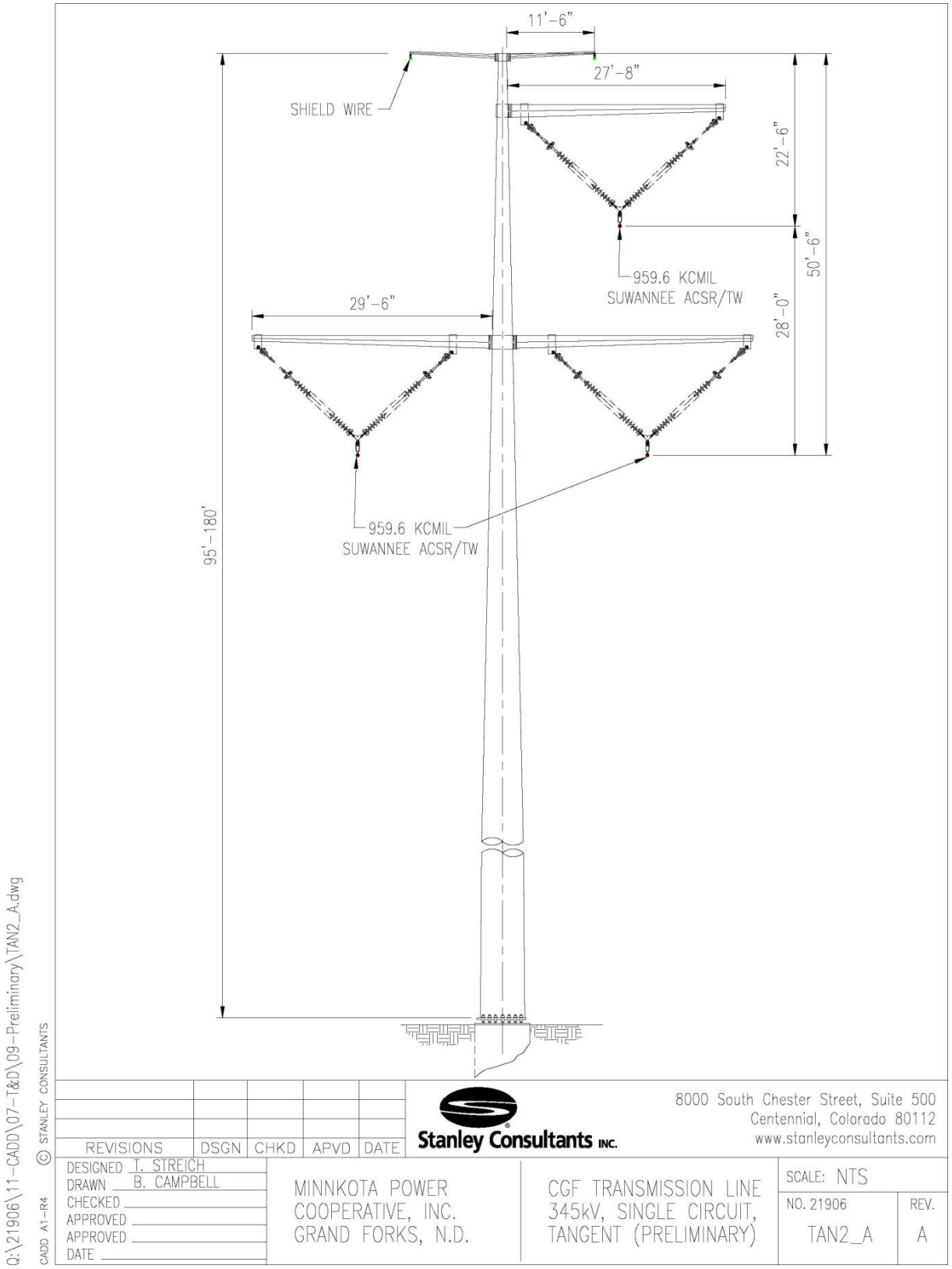


Table 1.5-1. Structure Design Summary

Line Type	Structure Type	Structure Material	ROW Width (ft)	Structure Height (ft)	Foundation Diameter (ft)	Span Between Structures (ft)
Proposed Project	Single Pole Davit Arm	Steel	150	130-150	7-10	1,000
Missouri River	Single Pole Davit Arm	Steel	150	160-200	10-12	1,700-2,400
Missouri River	Three Pole	Steel	150	150-170	10-12	1,700-2,400

Right-of-Way Design

The majority of the new 345 kV transmission line facilities would be built with single pole structures, which typically require a 150-foot-wide ROW for the length of the transmission line. In some limited instances, where specialty structures are required for long spans additional ROW may be needed for the transmission line. The additional ROW would be stated in the easement agreement with the landowner. When the transmission line is placed cross-country across private land, an easement for the entire ROW (150 feet in width) would be acquired from the adjacent landowner(s). Minnkota would locate the poles as close to property division lines as reasonably possible.

It is intended that the proposed Project would not share ROW with existing features, but rather would parallel ROWs of existing features. Throughout the route development process, Minnkota sought to identify areas to parallel existing linear features including roads. Identification of opportunities to parallel existing linear features minimizes the proliferation of new corridors.

Given the terrain in the area, construction of access roads outside of the 150-foot-wide ROW would not be needed. If obstructions exist that are completely blocking ingress and/or egress along the 150-foot-wide ROW corridor, such as flowing creeks, Minnkota would arrange with landowners to use existing field roads or create access from state and county highways, to access the structure locations.

Minnkota land agents would work individually with property owners to purchase easements for the new 345kV line if the RUS approves the loan application and the NEPA process is complete. Minnkota would pay just compensation for easements, and landowners would retain ownership of the property. Under the agreement, property owners could not place any permanent structures within the easement corridor that would restrict complete access and maintenance of the line or ROW.

In addition to the ROW, the fiber optic regeneration sites would be purchased in fee and separate from ROW easements. These sites would likely be located near road crossings to provide all-weather access to the sites.

1.5.2 Right-of-Way Preparation, Construction, Restoration, and Maintenance Procedures

Right-of-Way Preparation

Primarily agricultural and pasture lands would be crossed by the proposed Project. For safety purposes, tree and shrub clearing may be required in some areas in the 150-foot-wide ROW.

However, where safety requirements permit, low growing trees and shrubs would remain (generally less than 15 feet in height). Significant amounts of grading would not be anticipated for preparation of the transmission ROW. Some grading would be required for the fiber optic regeneration stations and their associated access roads.

Transmission Construction Procedures

Construction would begin after all federal, state, and local approvals are obtained, property and ROWs are acquired, soil conditions are established, and final design is completed. The precise timing of construction would consider various requirements that may be in place due to permit conditions, weather conditions, and available workforce.

Transmission line structures are generally designed for installation at existing grades. Typically, structure sites with 10 percent or less slope would not be graded or leveled. At sites with more than 10 percent slope, working areas would be graded level or fill would be brought in for working pads. If the landowner permits, it is preferred to leave the leveled areas and working pads in place for use in future maintenance activities. If the landowner does not wish to leave the area leveled, the site would be graded back to its original condition as much as possible, and all imported fill would be removed.

There may be up to 14 staging areas that would be established for the proposed Project and involves delivering the equipment and materials necessary to construct the new transmission line facilities. The materials would be stored at staging areas until they are needed for construction. These areas would be selected for their location, access, security, and ability to efficiently and safely warehouse supplies. The areas are chosen to minimize excavation and grading. The staging areas outside of the transmission line ROW would be obtained from affected landowners through rental agreements.

Structures would be delivered to either the staked location or a staging area. If the structures are delivered to the location where they would be installed, they would be placed on the ROW out of the clear zone of any adjacent roadways or designated pathways.

After the ROW is prepared and it is installation time, the poles are generally moved from the staging areas and delivered to the staked location. The structures would be placed within the transmission line ROW until the structure is set. Insulators and other hardware are attached while the structure is on the ground. The structure is then lifted, placed, and secured using a crane.

Minnkota proposes that all structures would have a concrete foundation. Concrete trucks are required to bring concrete from a concrete batch plant. Portable concrete batch plants may be utilized by the foundation contractor for the proposed Project. The foundation contractor will be responsible for the batch plants. Batch plants may be located within staging areas. If batch plants are located away from a staging area the foundation contractor would be responsible for all appropriate permits and agreements. Holes would be drilled in preparation for concrete. Drilled pier foundations may vary from 7 to 10 feet in diameter for the proposed Project structures and 10 to 12 feet in diameter for the Missouri River structures, and 20 to 40 (or more) feet deep, depending on soil conditions. After the concrete foundation is set, the structure is bolted to it.

Most of the construction activity would be limited to the area immediately around each structure. Little additional ground disturbance is needed at the structure sites. The total area temporarily disturbed in the vicinity of each structure is expected to be confined to an area of

about 60 feet in diameter (2,827 square feet). No permanent access roads would be constructed for the proposed Project; however, temporary construction access roads would be needed to access structure locations and would be located within the ROW. If a temporary access road is needed outside of the ROW, Minnkota would use existing public and private roads where possible. Where no existing roads provide access and if needed, temporary access roads up to 30-feet-wide would be constructed and located through disturbed uplands (e.g., farmed land) once any necessary access easements have been secured from the landowner(s).

Once the structures have been erected, conductors would be installed by establishing stringing setup areas within the ROW. These areas are usually established every two miles along the route. Conductor stringing operations require brief access to each structure to secure the conductor wire to the insulator hardware and to install shield wire clamps once final sag is established. Stringing equipment generally consists of wire pullers, tensioners, conductor reels, shield wire reels, and sheave blocks. Stringing operations involve pulling lightweight cables or ropes through the stringing sheaves located at every structure site. This cable or rope would be used to pull the conductors through the sheaves under sufficient tension to keep the conductor from coming into contact with the ground. Temporary guard or clearance poles would be installed as needed over existing distribution or communication lines, streets, roads, highways or other obstructions, after any necessary notifications are made and permits obtained. This ensures that conductors would not obstruct traffic or contact existing energized conductors or other cables.

Restoration Procedures

During construction, crews would attempt to limit ground disturbance wherever possible. Upon completion of construction activities, landowners would be contacted to determine if any damage has occurred as a result of the proposed Project. If damage has occurred to crops, fences, or the property, Minnkota would fairly reimburse the landowner for the damages sustained. In some cases, Minnkota may engage an outside contractor to restore the damaged property to as near as possible to the pre-construction condition. Disturbed areas would be restored to their pre-construction condition to the maximum extent practicable or required by regulatory agencies. Post-construction reclamation activities include removing and disposing of debris, dismantling all temporary facilities (including staging areas), leveling or filling tire ruts, alleviating soil compaction, and reseeding non-cultivated areas disturbed by construction activities with vegetation similar to that which was removed.

Erosion control measures would be implemented as necessary to minimize runoff during construction. Specific measures would be determined once final design of the route is complete, and a field review is made to determine any areas of concern. Erosion control measures such as silt fencing, straw bale fencing, mulching, seeding, or mesh fabric overlay would be installed when and where appropriate. Access routes to structure locations would be reviewed prior to the mobilization of equipment so erosion concerns can be avoided or minimized. Construction crews exercise caution when equipment is within 50 feet of streams and rivers and would not drive equipment through streams or rivers that the transmission line crosses.

Maintenance Procedures

Transmission infrastructure has very few mechanical elements and is built to withstand normal weather extremes. With the exception of severe weather, such as tornadoes and heavy ice storms, transmission lines rarely fail. They are automatically taken out of service by the operation of protective relaying equipment when a fault is sensed on the system; such interruptions are

usually only momentary. Scheduled maintenance outages are also infrequent. As a result, the average annual availability of transmission infrastructure is very high, in excess of 99 percent.

Minnkota would quarterly use the ROW to perform inspections usually by fixed wing aircraft, to maintain equipment and to make repairs over the life of the proposed Project. Minnkota would also conduct routine maintenance to remove undesired vegetation that may interfere with the safe and reliable operation of the proposed line.

1.5.3 Easement/Right-of-Way Acquisition

For transmission lines, utilities typically acquire easement rights to accommodate the facilities. The evaluation and acquisition process includes title examination, initial owner contacts, survey work, document preparation, and payment.

The first step in the ROW process is to identify all persons and entities that may have a legal interest in the real estate upon which the facilities would be built. To compile this list, a ROW agent would complete a public records search of all land involved in the proposed Project. A title report is then developed for each parcel to determine the legal description of the property and the owner(s) of record of the property and to gather information regarding easements, liens, restrictions, encumbrances, and other conditions of record.

The next step is evaluation of a specific parcel. After landowners are known, a ROW representative contacts each property owner or the property owner's representative. The ROW agent describes the need for the transmission facilities, how the specific project may affect each parcel, and seeks information from the landowner about any specific construction concerns. The ROW agent may also request the owner's permission for survey crews to enter the property to conduct preliminary survey work. Permission may also be requested to take soil borings to assess soil conditions and determine appropriate foundation design. Surveys are conducted to locate ROW corridors, natural features, man-made features, and associated elevations to be used during the detailed engineering of the transmission line. All surveys would be performed by experienced professionals.

The ROW agent then prepares an offer for the property owner(s) based on just compensation for the rights to build, operate, and maintain the transmission facilities within the easement area and reasonable access to the easement area. Otherwise, the ROW agent may obtain options to purchase ROW for the proposed route. The agent may also provide maps of the transmission line route or site and the landowner's parcel and offer compensation for the transmission line easement. The landowner is allowed a reasonable amount of time to consider the offer and present any material that the owner believes is relevant to determining the property's value.

Utilities are usually able to work with the landowners to address their concerns and an agreement is reached for the utilities' purchase of land rights. The ROW agent prepares all of the documents required to complete each transaction. Required documents may include: easement, purchase agreement, or contract and deed. If an agreement cannot be made, condemnation may be used.

Once all ROW has been obtained and the construction phase begins, individual property owners would be advised of construction schedules, needed access to the site, and any vegetation clearing required for the proposed Project. The ROW would be cleared of the amount of vegetation necessary to construct, operate, and maintain the proposed transmission line, and landowners would be compensated for damages. To ensure safe construction of the transmission line, special consideration may be needed for fences, crops, or livestock. For

instance, fences may need to be moved or temporary or permanent gates may need to be installed; crops may need to be harvested early; and livestock may need to be moved. In each case the ROW agent coordinates these processes with the landowner, who is compensated for damages.

Where possible, temporary staging areas would be located within the ROW and limited to previously disturbed or developed areas. When additional property is temporarily required for construction, rental agreements may be obtained from landowners for the duration of construction. These temporary easements would be limited to special construction access needs or additional staging areas required outside of the proposed ROW.

1.5.4 Associated Facilities

Fiber Optic Regeneration Stations

The other facilities associated with the proposed Project would be four fiber optic regeneration (or repeater) stations placed about 50 to 60 miles apart. Each station would require a 12 foot by 18 foot fenced area with a small control building to house the electronic equipment. The building would need to be heated and air conditioned. It would house the electronic equipment plus a battery bank for backup power. The building would be located as close to an existing road as possible. An all-weather permanent access road to the building would be needed.

1.6 Missouri River Crossing

The Missouri River crossing may require a specialty structure. A steel single pole or three pole structure may also be used. The single pole would be of similar configuration with the remaining proposed Project structures, only taller. The three pole structures would be shorter, but have three poles or a pole for each phase wire

1.7 Project Cost

The proposed Project costs include the survey, engineering, materials, construction, ROW, and Project management associated with the transmission line and substations. The proposed Project has two major cost components. The transmission line portion of the proposed Project is estimated on a cost per mile basis and the substation portion is estimated on a facilities improvement cost basis.

The three route lengths are estimated to be between 250 and 270 miles. The average length of the three routes reviewed that met the minimum avoidance area impact criteria is about 260 miles. The ultimate line length cannot be established until the route has been determined and the ROW acquisition process is substantially completed. The Project cost estimate has been developed using a shortest case, typical case, and longest case scenario that helps demonstrate the impact of the final route and ultimate line length impact to the overall Project cost. Table 1.7-1, below, provides the total Project cost estimate (2009 dollars) for three line length options.

Table 1.7-1. Center to Grand Forks Transmission Project Options Cost Estimates

Option	Line Length (Miles)	Line Cost	Project Total
Center to Prairie Shortest Case	250	$275,000,000	$312,000,000
Center to Prairie Typical Case	260	$286,000,000	$323,000,000
Center to Prairie Longest Case	270	$297,000,000	$334,000,000

Note: All options are based on 795 ACSR conductor, mono-pole structures, an assumed line cost of $1,100,000 per mile and an estimated cost of $37,000,000 for substation upgrades.

The substation costs represent estimated expenditures at three existing facilities. The estimate for modifications to the Center 345 kV Substation is $14 million, of which $3 million is for substation improvements and $11 million represents the cost of two new 345/230 kV 360 MVA power transformers.

The estimate for modifications to the Prairie Substation is $22 million of which $11 million is for improvements and additions and $11 million is for two new transformers equivalent to the two Center units.

Cost estimates for third party impacts are not included in the Project estimate at this time as the base Project is anticipated to cause minimal impact to the existing transmission system.

Operations and Maintenance

The primary operating and maintenance cost for a transmission line is the cost of inspections, usually done quarterly by air and by ground once a year. Annual operating and maintenance costs for transmission lines vary depending upon the setting, the amount of vegetation management necessary, storm damage occurrences, structure types, materials used and the transmission line's age. For 115 kV through 345 kV transmission lines, past experience has shown that annual costs are approximately $300 to $500 per mile.

Substations require a certain amount of maintenance to keep them functioning in accordance with the accepted operating parameters and the NESC. Transformers, circuit breakers, batteries, protective relays, and other equipment need to be serviced periodically in accordance with the manufacturer's recommendation. The site itself must be kept free of vegetation and drainage must be maintained.

1.8 Project Schedule

An expected permitting and construction schedule for the proposed Project is outlined below.

Environmental Assessment – Fall 2010

RUS Determination – Winter 2010

North Dakota Public Service Commission (PSC) Determination – Spring 2011

Pre-Construction Activities – Spring 2011

Construction Start – Spring 2011

Project Completion – Summer 2013

2.0 Alternatives Analysis

This section describes the proposed Project and alternatives considered in this EA. Alternatives to the proposed Project were screened to assess the ability of the alternatives to meet the identified need for the proposed Project and to provide a comparison of the impacts of different alternatives in meeting the identified need for the proposed Project. Based upon this screening, a No-Action Alternative and three route alternatives are evaluated in this EA. In addition to these four alternatives, a number of system and segment alternatives were considered, but not evaluated in detail. System Alternatives are discussed in Section 2.2 of this EA and within the AES. Segment Alternatives not evaluated in the EA are described in Section 2.4.

Rural Utilities Service Planning Documents

Following RUS guidance, Minnkota began the project development process by preparing the AES to identify the proposed Project's purpose and need and alternatives for meeting capacity requirements and also prepared a MCS to begin the process of defining a study area and potential routes.

The AES explains the need for an action and discuss alternative methods that have been considered to meet that need. The AES identifies the electrical issues that an action is proposed to address and identifies and analyzes several alternatives to the action, such as upgrades of the existing power system, new transmission, new generation, PPA, load management, or energy conservation. The AES should explain each alternative in sufficient detail so that interested agencies and the public can gain a general understanding of each alternative. The AES should explain which alternative is considered the best for fulfilling the need for the action. It should be clearly explained why certain alternatives are unacceptable or less than optimal.

An MCS defines an action's study area, shows the endpoints for a proposed transmission line project, and develops macro-corridors within which a proposed transmission line project may be located. Within the study area, alternative corridor routes should be developed based on environmental, engineering, economic, land use, and permitting constraints. Corridors may vary in width from a few hundred feet up to a mile. The use of existing rights-of-way or double circuiting of existing electric transmission lines should be addressed as appropriate.

The AES, MCS, and Scoping Report are a part of the RUS scoping process to support their proposed action. The intent of these documents is to provide information about the proposed action to the public and to facilitate public participation in the NEPA process.

Alternative Evaluation Study

The AES was approved by the RUS and released for public review in October 2009. As outlined in the AES, since the transaction and modified PPAs with Minnesota Power and Square Butte, and the transfer of the existing HVDC line to Minnesota Power, eliminated the need for new generation and any additional power purchases, load management, or energy conservation, the only relevant alternatives are those associated with transmission capacity to move the generation to the load source(s).

The AES discussed the following transmission alternatives to the proposed Project: (1) a no-action alternative that focuses on using the existing AC system for the output of Young 2, (2) a 230 kV line from Center to Grand Forks, and (3) various configurations of a 345 kV line from Center to the Red River Valley, including an eastern terminus of Fargo at the Maple River Substation instead of Grand Forks.

2.1 Project Alternatives

Several alternatives to the proposed Project were identified during Minnkota's development of the proposed Project and during the public scoping process carried out by RUS. Two types of alternatives to the proposed Project were developed and evaluated:

- System alternatives, which look at alternative means for meeting the stated need of the proposed Project.
- Route alternatives, which review alternative routes to get from one end point to another.

2.2 System Alternatives

The AES analyzed transmission alternatives to the Project (i.e. No Action, 230 kV Line, and 345 kV Line from Center to Fargo) to provide the required load serving capability to meet anticipated customer demand into the future and to provide voltage stability support for the northern Red River Valley (Table 2.2-1). For detailed information regarding the system alternatives, refer to the Section 3 of the AES published October 2009.

Table 2.2-1. System Alternatives

Action	Description
No Action	Young 2 Generation is placed on existing system
New Transmission - 230 kV Center to Grand Forks	Transmission line consisting of a 230 kV line from the Center Substation, Center, to the Prairie Substation, Grand Forks
New Transmission - 345 kV Center to Grand Forks	Transmission line consisting of a 345 kV line from the Center Substation, Center, to the Prairie Substation, Grand Forks
New Transmission - 345 kV Center to Fargo	Transmission line consisting of a 345 kV line from the Center Substation, Center, to the Maple River Substation, Fargo
Optional Corridor Concept for Interconnection Requests	Tap the proposed 345 kV transmission line to Grand Forks, near Finley, North Dakota, and develop a 345 kV line section between Finley and Fargo. Develop a new 345 kV substation near Finley.
Underground Transmission Line	Underground construction of the entire 345 kV transmission line

2.2.1 No Action

The "No Action" Alternative would place Young 2 generation on the existing system. The substantial wind generation development at the Square Butte bus and subsequent reallocation of Young 2 outlet, results in significant steady state and dynamic stability impacts on the AC transmission system in the North Dakota coal field region. Study efforts were completed in June 2009 to evaluate these impacts. The studies have revealed the "no transmission addition" option is not feasible due to the dynamic stability and steady state impacts on the North Dakota AC transmission system. Study results show that a new transmission line is required to transition the output of Young 2 off of the Square Butte HVDC line and onto the AC system. Based on this EA, if the proposed Project is not constructed it may cause other facilities to be built.

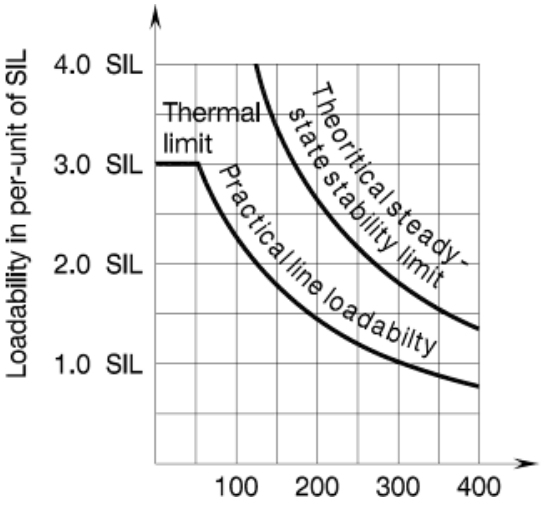
2.2.2 New Transmission - 230 kV Center to Grand Forks

Minnkota conducted a study in 2005[1] to assess the options for providing a transmission outlet for a possible third unit addition at the Milton R Young Station. At that time, the assumed generator size was 250 MW and the output was assumed to be delivered to Grand Forks. Even at 250 MW, a 230 kV line resulted in a significant increase in power flowing through WAPA's transmission system. A new 230 kV line for the full output of Young 2 (455 MW) would cause far more serious impacts to the existing AC system.

In addition, a transmission line's ability to transport increasing amounts of electric power is referred to as the line's loading limit. It is generally constrained by the line's thermal limit. When a transmission line is short, the impedance of the conductor is smaller and therefore the line can be loaded up to its capacity, or thermal limit, and still maintain stable voltage (steady state stability). The longer the transmission line becomes, however, the higher the impedance of its conductor and the lower its ability to maintain acceptable steady state voltage. In short, as a line's length increases its practical loading limit becomes less than its thermal limit, resulting in a longer line providing less load-serving capacity than a shorter line of the same voltage. Diagram 2-1 below illustrates the relationship between line length and practical loadability.

Due to the length of the proposed line and the amount of output from Young 2, it has been concluded that 230 kV is not an acceptable voltage.

Diagram 2-1. Transmission Line Loadability Limits



Note: The above transmission line loadability curve is for 60 Hz uncompensated overhead lines, and based on Figure 6.1.2 from Power System Analysis and Design, Glover/Sarma, at 217 (PWS Publishers 1987). "SIL" refers to "surge impedance load," which is the power delivered to an electric load that is equal to a transmission line's characteristic impedance. For a 230 kV line, the SIL is approximately 145 MW.

2.2.3 New Transmission - 345 kV Center to Grand Forks

The Center to Grand Forks 345 kV Line is the best performing transmission alternative to meet Minnkota's load serving needs as well as provide voltage support for the northern Red River

[1] Young 3 Transmission Study Report with Generator Cruise Rating of 250 MW; Tim Bartel, Senior Systems Engineer, Minnkota Power Cooperative, Inc., January 11, 2005

Valley and Bemidji, Minnesota, areas. This conclusion is based on the technical analyses previously performed by regional planners and by feasibility studies recently performed for Minnkota by its consultant.

This line would provide voltage support to the Bemidji area and the Red River Valley. The stability performance for the 345 kV line from Center to Grand Forks requires less mitigations compared to the 345 kV from Center to Fargo and the voltage stability performance significantly increases voltage stability performance in the Red River Valley and Bemidji areas. In addition, when the proposed Fargo to St. Cloud 345 kV line is considered it could address the intended need of that area.

2.2.4 New Transmission - 345 kV Center to Fargo

Stability performance is acceptable with a new 345 kV line from Center to Fargo and meets the MAPP criteria. There are required mitigations that may include capacitor additions at the Groton, South Dakota, 345 kV Substation, a Static VAR Compensator (SVC) at Jamestown or Maple River, and a capacitor at Jamestown or Maple River. The voltage stability limits are lower for the 345 kV line from Center to Fargo compared to the 345 kV line from Center to Grand Forks alternative creating less demand for the Center to Fargo line.

Voltage stability performance was compared for the two 345 kV AC transmission alternatives. Based on study results, it can be concluded that the introduction of a 345 kV source into the Grand Forks area significantly increases voltage stability performance in the Red River Valley and Bemidji, Minnesota areas. This alternative, in general, exhibits higher voltage stability limits compared to the Fargo alternative. In cases where these alternatives had previously exhibited similar performance (without the proposed CapX 2020 Fargo to St. Cloud 345kV line), results show that the addition of the Fargo to St. Cloud line tilts the balance more in favor of the 345 kV Center to Grand Forks alternative.

2.2.5 Underground Transmission Line

Undergrounding of transmission lines similar in size to the proposed Project is seldom used because of the significant construction, operation, and maintenance issues, and the resulting cost. Undergrounding of electric utility infrastructure is a technically feasible option, especially for lower voltage distribution lines. It is common today to see lower voltage distribution lines that connect to homes and businesses buried directly in the ground using less invasive construction methods. In the case of distribution lines, undergrounding offers aesthetic and environmental benefits while posing relatively few construction, maintenance, and operations challenges.

However, the complexity and cost of undergrounding increases as the voltage increases. As a result, undergrounding is seldom used for transmission facilities of the size of the proposed Project. A Minnesota Department of Commerce – Office of Energy Security review of proposed high voltage transmission lines, showed that the cost for underground construction has been between five and 15 times greater than the cost for a similar overhead transmission line. The cost for underground construction depends upon a variety of factors specific to a project, but represents the more complicated engineering, increased construction time, specialized material, and specialized labor requirements.

Minnkota has estimated the transmission line cost for the proposed Project to be about $1.1 million per mile in 2009 dollars. The estimated cost range for the same voltage line to be placed underground is $5.5 to $16.5 million per mile. This cost range for an underground line

does not include the cost for substations, with the large inductors that are necessary approximately every 20 miles to counteract the greater line charging currents associated with undergrounding. In addition, there are increased line losses and maintenance expenses incurred throughout the useful life of an underground line that makes its cost versus an overhead line even greater.

Because of the significantly greater expense, typically installation of underground transmission has been limited to locations where physical circumstances allow no other option or where overhead construction is prohibited. Examples include congested downtown centers where there is no space available between city streets and adjacent buildings for adequate clearance.

While underground lines reduce visual impacts (other than at the overhead/underground transition locations) and may minimize surface impacts after construction, there are distinct environmental consequences. The predominant environmental impact from the construction, operation, and maintenance of underground transmission lines arises from the need to develop and maintain a ROW totally cleared of woody vegetation. The construction activities for an overhead line are concentrated around the line's structures, with the areas between structures left relatively undisturbed except for the removal of trees that could interfere with the energized conductors. A narrow pathway between structures is often all that is necessary to string the conductors. With underground construction, however, the entire ROW must be cleared for construction activities along the entire length of the corridor. This increases impacts to wetland areas due to the installation of access roads capable of supporting heavy construction equipment, trenching activities, and cable installation. These wetland impacts would be permanent if a drivable road were constructed to allow quick access to repair the underground line in the event of an incident taking it out of service.

Additional facilities are required for underground transmission line construction to control the thermal performance of the underground line. With larger capacity lines, gas-insulated line technology must be employed to provide the adequate heat removal capabilities that are necessary. Typical overhead transmission lines are bare conductor, and ambient temperature and wind across the lines are adequate to remove and disperse heat from the line. In underground lines, a separate cooling system is required to remove and disperse heat away from the enclosed underground containment. Cooling systems have only been employed on short underground transmission systems, and have not been used on longer line length applications. A transmission line of the length being considered on the proposed Project would require multiple cooling systems for the entire length of the line.

Underground lines also present challenging reliability and service issues. While overhead lines are subject to more frequent outages than underground lines, service is usually quickly restored by the automatic re-closing of circuit breakers, resulting in only a momentary outage of the transmission line. The lower incidence of outages with underground cables is offset by the fact that the outages are much longer. This is because re-closing circuit breakers is not recommended until it is verified that there is no fault in the underground cable.

Restoration of a faulted underground line also takes much longer due to the difficulty in locating the fault and accessing the site to make repairs. Repairing failures in high voltage extruded dielectric cables is typically not done. Instead, the cable is completely replaced between man-hole splice points that are generally located every 1,500 to 2,000 feet along the cable. This is expensive and very time consuming, with restoration taking several weeks or longer depending upon the location and difficulty of access. Replacing cable involves bringing in heavy equipment,

including cable reels weighing 30,000 to 40,000 pounds, during all seasons of the year. If the failure is in a splice, it may be feasible to make a repair at the splice location without having to replace large quantities of cable, but access is still required for equipment and personnel. If the fault occurs in a wetland area where all-season roads are not maintained, restoration can be further delayed as matting is installed to gain access to the manholes used to replace the failed cable.

RUS reviewed the AES and determined that none of the system alternatives evaluated were able to meet the identified need as well or at a comparable cost as the proposed Project.

2.3 Development of Route Alternatives

2.3.1 Study Area

As discussed in Section 1.3, in 2008-2009 Minnkota identified a need for additional power generation in northeast North Dakota and northwest Minnesota. Transmission constraints in this area were also threatening the stability of the regional transmission system. Minnkota defined one Study Area, rectangular in shape, that encompassed an area from the Young 2 Station near Center, North Dakota, (in the west) to Grand Forks and Fargo, North Dakota (in the east) (Figure 2.3-1).

2.3.2 Preliminary Study Corridors

The Study Area was narrowed into preliminary study corridors, based upon the criteria identified in the bulleted list below (Figure 2.3-1). At first, the preliminary study corridors were developed to terminate in Grand Forks and Fargo. Through project development, Fargo was eliminated as an end point because initial load modeling indicated that the greater Grand Forks area had more load constraints. Therefore, corridors to Fargo were eliminated. The preliminary study corridors were developed by considering the following criteria:

- Parallel existing rights-of-way (transmission lines, pipelines, railway, or roads), survey lines, section/field lines, and natural division lines;
- Avoid populated areas;
- Avoid major environmental natural features (Lake Ashtabula, Jamestown Reservoir, National Wildlife Refuges, Wildlife Management Areas, Wildlife Development Areas);
- Cross major rivers at areas where there is an existing transmission line crossing;
- Avoid public airports;
- Maximize transmission system reliability (e.g. maintain maximum distance from existing Minnkota system transmission lines);
- Minimize length; and
- Follow PSC Exclusion and Avoidance Criteria – State designated exclusion and avoidance criteria as listed in North Dakota Administrative Code in Article 69-06-08-02, Transmission Facility Corridor and Route Criteria (Appendix A)

The purpose of this activity was to identify potential constraints (natural or human resources that conflict with the location of new transmission line facilities) and opportunities (locations or areas well suited for the location of new transmission line facilities) this data was considered when developing the macro-corridors. Generally, constraint areas would be avoided, or at least

minimized during the macro-corridor development process, and opportunities would be used, to the extent practicable, to develop route corridors between the two substations. Within the backdrop of constraints and opportunities, practical considerations such as total project length and potential cost issues are also considered.

2.3.3 Macro-Corridor Study

The preliminary study corridors were refined into macro-corridors (Figure 2.3-2). The MCS provides information about environmental, land use, social, cultural, and permitting factors for the macro-corridors within the Study Area. The macro-corridors evaluated in the proposed Project typically are about 6-miles-wide, with some portions of the macro-corridors being 8-miles-wide, such as near the Young 2 Station and the Prairie Substation (Figure 2.3-2).

2.3.4 Rural Utilities Service Scoping Report

Minnkota engaged the public to help refine the macro-corridors and develop route alternatives. Minnkota voluntarily hosted three rounds of public open house meetings within the proposed Project area. In addition to public open house meetings, Minnkota used a project-specific Web site and project-specific information line to reach interested members of the public.

Following public and agency review of the AES and MCS, RUS held public and agency scoping meetings across the macro-corridors to gain input on opportunities and constraints within the macro-corridors. The goal of the public meeting was to provide the public with information regarding the proposed Project, answer questions, and identify concerns regarding the potential environmental impacts that may result from construction and operation of the proposed Project. The goal of the agency meeting was to provide federal and state agencies with information regarding the description, need, and potential locations or routing, discuss compliance and permitting requirements, and cover the range of issues to be addressed in the environmental documents.

RUS released a Scoping Report for the proposed Project in March 2010. The Scoping Report summarized the public scoping process and inter-agency consultation regarding the macro-corridors and potential Project alternatives. Based upon the scoping process, the Scoping Report identified the issues and alternatives to be evaluated in this EA. The Scoping Report can be found at http://www.usda.gov/rus/water/ees/ea.htm#Minnkota_Power_Cooperative,_Inc._

2.4 Route Alternatives

Federal agencies require that the EA evaluate potentially viable route alternatives. Within this EA, information is presented for three 1,000-foot-wide route alternatives located within the macro-corridors. Detailed route maps are located in Appendix B. The route alternatives are summarized in the following subsections. The basis for the preferred route selection is discussed in Chapter 4.

2.4.1 Route Segment Selection Criteria

Transmission planning, designing, engineering, and environmental criteria were used to develop alternative routes for the proposed Project. State and federal regulatory requirements as well as input from stakeholders were considered. Route segments were developed within the macro-corridors by considering the following:

- **Follow existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries when feasible** – Minnkota used geographic

information system (GIS) mapping and field verification to identify existing rights-of-way (transmission lines, pipelines, railroads, roads, etc.), and natural division and field boundaries.

- **Minimize length** – Minimizing the length of a route generally decreases its impacts on the environment. In some situations, however, a longer route or route segment was chosen to avoid specific, undesirable impacts.
- **Avoid populated areas where feasible** – One of the most common comments received at the public meetings was that residences should be avoided where possible. Per PSC Rules, a route would not be constructed within 500 feet of an occupied home unless a waiver is agreed to.
- **Avoid major environmental features where feasible** – Major natural features such as threatened and endangered species, water bodies and wetlands, wooded draws, trees rows, state parks, state Wildlife Management Areas (WMAs), federal Waterfowl Production Areas (WPAs), and federal Wildlife Development Areas (WDAs) were identified, mapped, and avoided where feasible.
- **Avoid known historic and cultural resources areas, where feasible** – Known historic and cultural resources areas were identified, mapped, and avoided where feasible.
- **Maximize transmission system reliability and promote system redundancy where feasible** – Both the routing of the proposed Project in close proximity to existing lines or double-circuiting it with existing lines were considered. In some cases, however, there were system reliability and safety concerns that supported keeping the proposed Project separate. Routing options were excluded from further consideration that double-circuited or paralleled an existing transmission line that would compromise system reliability or violate North American Electric Reliability Corporation (NERC) standards.
- **Avoid agricultural production** – Consideration was given to avoiding center pivot irrigation systems where feasible.
- **Avoid airports and other conflicting land uses** – Minnkota worked with federal and state agencies and local governments to identify and map land uses that could conflict with the proposed Project. These included airports, WMAs, WPAs, WDAs, trails, sensitive state and federal management areas, and tribal-owned lands. These land uses were avoided where feasible.
- **North Dakota Public Service Commission Exclusion and Avoidance Criteria** – State designated exclusion and avoidance criteria as listed in North Dakota Rule 69-06-08-02, Transmission Facility Corridor and Route Criteria. Refer to Appendix A for PSC rules.

In addition, consideration was given to comments received during public information meetings and agency meetings, which echoed many of the points discussed above. These comments included:

- Utilize existing rights-of-way where feasible;
- Avoid or minimize impacts to residences and population centers;

- Minimize impact to property values;
- Avoid or minimize impacts to water resources and wildlife;
- Avoid state and federal managed lands;
- Minimize impacts at the Missouri and Sheyenne river crossings;
- Avoid or minimize conflicts with adjacent land uses such as mining, wind energy facilities, center pivot irrigations, and sensitive species; and
- Avoid or minimize impacts to historic and cultural resources.

Chapter 3.0 provides an evaluation of the potential environmental impacts for each route alternative under consideration. All route segments and associated environmental information considered in the route selection process are included in Appendix C.

2.4.2 Route Segments Used to Develop Route Alternatives

Route segments consist of narrower areas, approximately 1,000-feet-wide, located within the macro-corridors. Route segments narrowed the macro-corridors into more manageable areas within which natural and human resources could be quantified and compared. The objective was to identify potential route segments that minimized impacts on natural and human resources and provided cost-effective Project options. The route segments would be joined to form a route.

In order to provide flexibility within the route segments for the eventual location of the actual route alternatives and segment alternatives, while keeping the route and segment alternatives manageable in size, route segments approximately 1,000 feet wide were developed. The entire area within the macro-corridors was reviewed to determine if areas suitable for route segments were present. That is, investigation of the macro-corridors was not limited only to the central area of the macro-corridors, but the northern, southern, and all areas between were considered. Route segments were developed to avoid constraints, take advantage of opportunities, consider public and agency comments, and use all portions of the macro-corridors as appropriate.

Following the identification of the route segments, a screening process was used to identify and compare the route segments appropriate for more detailed evaluation. This entire process resulted in the selection of three route alternatives and 38 segment alternates for the proposed Project. The route alternatives should provide reliable electric power, while minimizing overall adverse impacts on the human and natural environment in a cost-effective manner.

Ultimately, a network of about 191 route segments and the 230 kV Tie Line was established for the development of routing options between the Center 345 kV Substation and the Prairie Substation (Figure 2.4-1). The large number of segments is due to the many combinations of route segments that could be combined to complete a transmission line from the Center 345 kV Substation to the Prairie Substation. There are possible route alternatives and segment alternatives variations in the northern, central, and southern portions of the macro-corridors.

The route segments were developed in similar fashion to the macro-corridors. Route segments took advantage of existing infrastructure (section lines, field lines, and roadways) to the extent practicable, while avoiding constraints such as municipalities, homes, state lands, federal lands, and engineering limitations.

The route segment evaluation was focused on determining a reasonable route alternative that minimized overall impacts to natural and human environments and was economical and feasible from an engineering standpoint. Route segments with high environmental and/or human

impacts were screened in the analysis and eliminated from further consideration. The route alternatives were chosen from the remaining segments based on a combination of factors including impacts and feasibility. For each route alternative, a representative alignment was created and used in the evaluation process to more accurately represent the affects of a new transmission line within each alternative.

Minnkota developed three routes alternatives and 38 segment alternatives (Figure 2.4-2). A description of the route alternatives and segment alternatives is provided below. This EA evaluated these routes based on a variety of engineering, social, and natural resource criteria. These criteria reflected the natural and human resources present within the Study Area, engineering and economic considerations, and the concerns expressed by federal, state, and local resource agencies and the public.

2.4.3 Route Segments Considered But Eliminated

Minnkota reviewed many potential route segments during the route development process. Minnkota determined that some route segments were not feasible based on design and engineering standards, therefore, these segments were eliminated from consideration and not studied in the EA. Segments were eliminated in the course of route selection for one or more of the following reasons: to avoid human settlement, to avoid major environmental and cultural features, to avoid large water body crossings, to avoid center pivot irrigation systems, to minimize corner structures, and to minimize Project length. See Route Segment Selection Criteria (Section 2.4.1) for a more detailed discussion of route selection. The following segments were reviewed but eliminated from inclusion in the route alternative analysis: Segments 004, 018, 021,027, 030, 038, 042, 043, 046, 047, 048, 052, 057, 058, 069, 073, 078, 079, 083, 085, 086, 087, 097, 102, 104, 107, 109, 118, 122, 124, 126, 139, 142, 143, 147, 149, 150, 152, and 155. Figure 2.4-1 displays the segments considered for elimination. Descriptions of the eliminated route segments are provided in Table 2.4-1.

Table 2.4-1. Eliminated Route Segments

Segment ID	Length (Miles)	Reason Eliminated	Description
S004	1.0	Since segment S097 was eliminated the south end of the segment has no connection to a route.	Heads north cross country for approximately 1 mile. The segment parallels a 41.6 kV line for approximately 0.5 mile
S018	18.9	Additional miles, potential leks, cross 230 kV twice, within 1.5 miles of Westerlind Airport	Heads north for approximately 9 miles parallel to 5th Ave NW along the Sheridan/McLean County Line and turns east for approximately 9 miles
S021	0.8	Large water body crossing	North and south segment that runs cross country for approximately 0.8 miles
S027	1.9	Historic facility within an eighth of a mile	A north-south segment along 116.5 Ave NE on the west side of the Sheyenne River.
S030	58.1	Large number of homes, close to municipalities, center pivot irrigation	Heads east-west mostly along State Highway 200 north of Route C.
S038	5.8	No connection on the west end due to S124 being eliminated, avoid Lake Jessie to the south, and populated area	An east-west segment on the north side of Lake Jessie along State Highway 65.
S042	3.5	No connection on the east or west due to S038 and S043 being eliminated	An east-west segment that is parallel to State Highway 65

Segment ID	Length (Miles)	Reason Eliminated	Description
S043	7.5	Homes and archaeological resources located within 200 and 400 feet of proposed segment and crosses Pickard Lake Creek and the Sheyenne River	An east-west segment that is parallel to State Highway 65 and 45 for approximately 5 miles and crosses the Sheyenne River
S046	5.5	No connection on the east due to S057 and S058 being eliminated	Runs north-south and then east-west along quarter-section lines. North of the Ronningen WPA and crosses State Highway 45.
S047	1.0	Eliminated to reduce length and structures	Heads north along 13th St NE for 1 mile.
S048	4.5	Crosses the Sheyenne River with large riparian area and is located near many archaeological sites	Heads east along a quarter-section line across the Sheyenne River to the Griggs/Steele County line, then south for 1 miles along the county lines, the east for 1 mile along Center St.
S052	11.5	Crosses the 345 kV line, cultural resources sites, homes, wooded area, boat landing and camp site	Segment heads west to east cross country along a quarter-section line for approximately 11.5 miles and crosses the Missouri River
S057	4.2	No connection on the east or west due to S058 and S059 being eliminated, archaeological resources	Segments heads east-west along a quarter-section line, then diagonally northeast cross-country crossing the Sheyenne River to 6th St NE where it heads east-west crossing Horse Hill
S058	5.0	No connection to the north because S057 was eliminated, located near an archaeological resource, and crosses the Sheyenne River	Heads north-south and then west-east crossing the Sheyenne River along quarter-section lines.
S069	1.0	No connection to the north and south due to S043 and S057 being eliminated and steep topography	Heads north-south along a quarter-section line about 05 miles east of the Griggs/Steele County Line
S073	1.5	No connection to the east or north due to S069 being eliminated and steep topography	Runs east-west along section lines along the same line as 8th St NE in Steele County
S078	3.5	No connection to the south due to S083 being eliminated	Heads north-south along section line and 122 Ave NE parallel to a gas lines
S079	3.0	No connection to the north due to S083 being eliminated, located directly next to archaeological site	Heads north-south along section line parallel 122nd Ave NE in Steele County
S083	33.0	Located near homes and archaeological resources	Runs east-west along 3rd St NE north of Route C
S085	4.0	Located within 400 feet of a residence	Heads east-west along quarter-section lines between 19th St NE and 20th St NE in Nelson County and 1st Ave NE and 2nd Ave NE in Grand Forks County
S086	3.0	No connection to the north due to S087 being eliminated	Heads south along section lines and 155th Ave NE in agricultural land
S087	6.4	No connection to the north due to S086 being eliminated and multiple crossings of the Goose River	Heads north along section lines and 155th Ave NE in agricultural land then east on 5th St NE

Segment ID	Length (Miles)	Reason Eliminated	Description
S097	3.5	Close proximity to future development near the city of Wilton.	Heads east cross country for approximately 1.5 miles crossing 41st St NW and then heads north cross country for approximately 2 miles crossing 18th St SW, 230 kV WAPA transmission line, gas pipeline. The segment parallels an existing 41.6 kV line for the northern 0.4 mile.
S102	5.0	Since segment S097 was eliminated, the west end has no connection to a route. Located 1 mile north of the City of Wilton.	Heads east-west cross country and following field lines for approximately 4 miles and turns to head north for approximately 1 mile cross country. Crosses the DMVW railroad tracks and Highway 83
S104	1.4	Diagonal, congested area with transmission line, pipeline and field irrigation	Heads northeast on a diagonal cross country crossings a 41.6 kV transmission line, State Highway 83, field irrigation system, Yanktonai Creek, 230 kV WAPA transmission line and a pipeline.
S107	4.0	Homes located within 200 and 400 feet of proposed route centerline.	Heads east-west cross country for approximately 4 miles between 16th St SW and 15th St SW and crosses the DMVW railroad tracks and 14th Ave SW.
S109	1.0	Since segment S102 was eliminated, the south end has no connection to a route and bisects cropland.	Heads north for approximately 1 mile cross country along a quarter-section line and crosses 15th St SW in McLean County.
S118	2.0	Residence	Heads south 1 mile along 1st Ave NE and then east 1 mile along 2nd St NE, crossing the McClusky Canal
S122	2.5	Residence and many trees	Runs east-west along 9th street NE in Griggs County
S124	2.4	No connection to the west or north since S124 and S126 were eliminated, crosses the Northern Pacific Railroad and about 0.75 mile south and east of Binford	Heads east-west along 9th St NE and north-south parallel to State Highway 1
S126	2.0	No connection to the south because S124 was eliminated, the line crosses Long Lake, and cultural resources	Heads diagonal northeast-southwest on a cross country alignment north of State Highway 65 and across Long Lake
S139	3.0	Close proximity to residence and crosses the Middle Branch Goose River	Runs north-south parallel to State Highway 32
S142	6.0	Golden Lake WMA, Shaw WPA, Wigen WPA, Thykeson WPA, Erickson WPA, and Golden Lake with many residences located about 1 mile away	Runs north-south for about 5 miles along a quarter-section line between 137th Ave NE and 138th Ave NE and east-west for 1 mile along a quarter-section line
S143	6.0	Crosses the Goose River with large wooded riparian area, archaeological site	Heads east-west for about 4.5 miles along a quarter-section line between 13th St NE and 14th St NE then north-south for 1.5 miles along a quarter-section line between 143rd Ave NE and 144th Ave NE. Crosses the Goose River.

Segment ID	Length (Miles)	Reason Eliminated	Description
S147	3.4	No connection to the east due to S150 being eliminated, crosses the English Coulee	Runs east-west along quarter-section lines between 8th Ave NE and 9th Ave NE
S149	3.7	No connection to the west due to S147 and S150 being eliminated	Runs east-west for about 0.2 miles, then north-south for about 1 mile along 19th St NE and east-west for 2.5 miles along a quarter-section line between 9th Ave NE and 10th Ave NE
S150	3.1	No connection to the south due to S147 being eliminated, many residences near segment	Runs north-south parallel to 19th Street SE in Grand Forks County
S152	3.5	Near residences and archaeological resources	Heads north-south along 19th Street NE and turns west for 0.25 mile
S155	5.8	Near many residences, archaeological resources, and crosses gas line	Runs north-south along quarter-section lines to the Western 230 kV line, then diagonal along the Western line, the east-west along a quarter-section line north of 15th Ave NE

2.4.4 No Action Alternative

Under the No Action Alternative, the proposed Project would not be constructed. No land would be used for transmission or substation facilities, and there would be no changes to the existing environment in the Study Area. As discussed in Section 2.2, above, the No Action Alternative does not meet the identified purpose and need for the proposed Project. A No Action Alternative is evaluated in this EA in accordance with the Council on Environmental Quality NEPA regulations (40 CFR 1502.14) requiring review of a no action alternative.

2.4.5 Route A Alternative

Route A is shown on Figure 2.4-2 and on Detailed Route Maps in Appendix B. This route is approximately 247-miles-long and follows the northern portion of the macro-corridors. The following is a description of the route from west to east starting at the Center 345 kV Substation to the Prairie Substation.

The route proceeds northwest out of the Center 345 kV Substation for about 1 mile to the quarter-section line, then proceeds due east along the quarter-section line for about 8 miles, before turning northeast on a cross-country route to the Missouri River. This route crosses the Missouri River about one mile north of the existing HVDC transmission line. After crossing the Missouri River and State Highway 1804, the route proceeds north along the section line for about 3 miles, then east along the quarter-section line for 2 miles, then north for 4 miles along a section line, and east for about 5.5 miles along a quarter-section line to within 0.5 mile west of State Highway 41. The route proceeds north for about 8.5 miles parallel to State Highway 41, turns east for 2 miles along State Highway 41, and follows State Highway 41 to the north for about 9 miles; within this segment the route spans the McClusky Canal. The route turns east for 2 miles along 3rd Street NW to the McLean/Sheridan County line. The route proceeds diagonally, cross-country for about 8 miles to the eastside of Center St. in Sheridan County. At that point the route proceeds east about 0.25 mile north of 10th St NE for about 28.5 miles to State Highway 3, crossing the McClusky Canal and State Highway 14, then proceeds north for about 2 miles along State Highway 3. The route turns east along 12th St NE for about 15.5 miles, crossing U.S. Highway 52, then turns north for about 1.5 miles on a quarter-section line.

The route turns east along a quarter-section line for about 29 miles, crossing State Highway 30 and U.S. Highway 281; where it turns south for 1 mile to the quarter-section line, and continues east for 4 miles along the quarter-section line to turn south for 0.5 mile to 12th St NE (Foster/Eddy County line) where it travels 12 miles to the east. To bypass the towns of McHenry and Binford, the route goes south for 3 miles, then east for 12.5 miles along 3rd St NE/9th St NE, and north for 3 miles to 12th St NE. Along 12th St NE, the route heads east for about 12.5 miles, across the Sheyenne River and State Highway 45, to about 0.5 mile east of 120th Ave NE in Steele County where the route travels north for about 7 miles on the quarter-section to Aneta. At Aneta, the route goes northeast, diagonally, cross-country for about 6 miles to 6th Ave NE in Grand Forks County. The route travels east along 6th Ave NE for about 17 miles, then north for 3 miles along the quarter-section line (about 0.5 mile west of 31st St NE), then east along the quarter-section line (between 8th Ave NE and 9th Ave NE) for about 9 miles. Then turns to proceed northeast, diagonally, cross-country for about 3.5 miles, then north for about 4 miles on the west side of 19th St NE, where it turns east for 7 miles into the Prairie Substation. The segments that make up Route A are included in Table D-1 in Appendix D.

2.4.6 Route B Alternative

Route B is shown on Figure 2.4-2 and on Detailed Route Maps in Appendix B. This route is approximately 270-miles-long and follows the southern portion of the macro-corridors. The following is a description of the route from west to east starting at the Center 345 kV Substation to the Prairie Substation.

The route proceeds northwest out of the Center 345 kV Substation for about 1 mile to the quarter-section line, then proceeds due east along the quarter-section line for about 12.5 miles across the Missouri River. This route crosses the Missouri River adjacent to the existing HVDC transmission line. After crossing the Missouri River, the route jogs north and east several times to avoid the City of Wilton by turning north to cross State Highway 1804 along a section line for about 4 miles, then turns east along the quarter-section line for 1 mile, then north for 3 miles along a section line, east for 1 mile along the section line, north for 1.5 miles along a section line, and east for about 5.5 miles along a quarter-section line to within 0.5 mile west of State Highway 41. The route proceeds north for about 8.5 miles parallel to State Highway 41, turns east for 2 miles along State Highway 41, and follows State Highway 41 to the north for about 9 miles; within this segment the route spans the McClusky Canal. The route turns east for 10 miles along 3rd Street NW into Sheridan County, then south for 1 mile along 2nd Ave NE, and turning east along 2nd St NE for about 19 miles to 21st Ave NE, crossing State Highway 14, in Sheridan County. The route goes north along 21st Ave NE for about 2 miles, to 4th St NE, where it turns east for 5 miles to go north for 1.5 miles along 26th Ave SE (Wells County) to the quarter-section (north of 5th St NE). The route travels east on the quarter-section (north of 5th St NE) for about 7.5 miles, crossing State Highway 3, then turns south for about 4 miles, crossing State Highway 200, to turn east on the quarter-section line (north of 1st St NE and south of State Highway 200) for about 29 miles. To avoid the city of Carrington, the route turns south for 1 mile along a quarter-section line (west of 63 rd Ave SE in Foster County) to a quarter-section line (north of 6th St SE), where the route travels east for 28 miles, then north for 1 mile along a quarter-section line (east of 90th Ave SE). The route turns east at a quarter-section line (north of 5th St SE) for 7 miles, then turns south for 1 mile, east for 3 miles, then south for 0.5 mile to Center St. in Griggs County. The route travels east along Center St. for 6 miles, to turn south for 0.5 mile along a section line, then turns east along a section line for 10.5 miles to avoid the city of Cooperstown, then north for 2.5 miles to State Highway 200. The route travels east along

State Highway 200 for 4 miles into Steele County. The route turns south for 2 miles along a quarter-section line (east of 120th Ave NE to Center St, where the route goes east for about 39.5 miles, to near Hillsboro. The route turns north along a quarter-section line for about 34 miles, then east for 1 mile, and north for about 11 miles into the Prairie Substation. The segments that make up Route B are included in Table D-2 in Appendix D.

2.4.7 Route C Alternative

Route C is shown on Figure 2.4-2 and on Detailed Route Maps in Appendix B. This route is approximately 250-miles-long and follows the central portion of the macro-corridors. The following is a description of the route from west to east starting at the Center 345 kV Substation to the Prairie Substation.

The route proceeds northwest out of the Center 345 kV Substation for about 1 mile to the quarter-section line. Then proceeds due east along the quarter-section line for about 1.5 miles to a quarter-section line (west of 32nd Ave SW in Oliver County) where the route turns north for about 5.5 miles to 17th St SW, where the route continues east for about 8 miles to near the Cross Ranch State Nature Preserve. At this point, the route crosses the Missouri River on a diagonal, northeast alignment to 16th St SW. The route travels east along 16th St SW for about 3 miles, then north for 0.5 mile on 19th St NW to the quarter-section line (north of 16th St NW) where it heads east for 2.5 miles, then north along 16.5 Ave SW for 7 miles. The route continues diagonally, cross-country for about 5.5 miles to 4th St SW in McLean County near the McClusky Canal. The route crosses the canal and travels north for about 0.5 mile to 3rd St SW, turning west for about 0.5 mile to 10th Ave SW. The route travels north along 10th Ave SW for about 6 miles to 3rd St NW. The route turns east for 11.5 miles along 3rd Street NW into Sheridan County, then south for 1 mile along 2nd Ave NE, and turning east along 2nd St NE for about 19 miles to 21st Ave NE, crossing State Highway 14, in Sheridan County. The route goes north along 21st Ave NE for about 2 miles to 4th St NE, where it turns east for 5 miles to go north for 1.5 miles along 26th Ave SE (Wells County) to the quarter-section (north of 5th St NE). The route travels east on the quarter-section (north of 5th St NE) for about 8 miles, crossing State Highway 3, then turns north for about 0.5 mile to 6th St NE. The route turns east along the 6th St NE for about 11 miles, then north along 45th Ave SE for about 1.5 miles to a quarter-section line between 7th and 8th Streets NE. The route travels east along the quarter-section line for about 22 miles, then south along State Highway 281for about 0.5 mile to 1st St NE in Foster County. The route continues east along 1st St NE for about 26 miles, then turns north on State Highway 20 for about 2 miles to 3rd St NE (Foster County)/9th St NE (Griggs County), where it travels east for about 3.5 miles, then south for 0.5 mile along a quarter-section line, then east along a quarter-section line (north of 8th St NE in Griggs County) for 6 miles. The route turns north along a quarter-section line for 3.5 miles to avoid Binford, then turns east along 12th St NE for 24.5 miles crossing the Sheyenne River and State Highway 45. Just east of Sharon, the route turns north along 127th Ave NE for about 7.5 miles into Grand Forks County, then turns east along a quarter-section line (north of 1st Ave NE) for about 20.5 miles, crossing State Highway 18. The route turns north along a quarter-section line (between 26th St NE and 27th St NE) for about 3 miles, then turns east along a quarter-section line (between 4th Ave NE and 5th Ave NE) for about 10 miles, then north along a quarter-section line (between 16th St NE and 17th St NE) for about 8 miles, crossing State Highway 15, then turns east for about 3 miles along a quarter-section line (between 12th Ave NE and 13th Ave NE), then north for about 4 miles along a quarter-section line (between 13th St NE and 14th St NE) into the Prairie Substation. The segments that make up Route C are included in Table D-3 in Appendix D.

2.4.8 Segment Alternatives

In addition to the three route alternatives, Minnkota proposed 38 segment alternatives. The segment alternatives were formed from a combination of route segments that were not used to develop the route alternatives. The route segments used to develop the segment alternative is shown in Table 2.4-2. The segment alternatives serve as options suggested by landowners and for avoidance or minimization of impacts to certain sensitive areas found along the route alternatives. All segment alternatives were analyzed within Chapter 3 of this EA. All route segments and associated environmental information considered are included in Appendix C. The segment alternatives are labeled 1 through 38 and summarized in Table 2.4-2. Figure 2.4-2 shows the segment alternatives.

Table 2.4-2. Segment Alternatives Evaluated in the EA

Segment Alternative	Route Segments	Description	Associated Route Alternative
A01	S171	Diagonal northeast cross country segment through cropland for 1.6 miles crossing 32nd Ave SW. Serves as an alternative.	C
A02	S172	Heads east cross country on section line for 8 miles then diagonals northeast for 0.7 mile. Serves as a southern alternative.	A, B
A03	S059	Diagonals southeast cross county for 1.6 miles then heads east for 2.6 miles, turns northeast for 0.4 mile crossing of Missouri River then turns north for 1.1 miles. Serves as an alternate Missouri River crossing.	B
A04	S167	Diagonals northeast for 0.9 mile, then turns east for 1.7 miles including a 0.5 mile wide Missouri River crossing. Serves as an alternate Missouri River crossing.	A
A05	S111	Heads northeast on a diagonal cross country crossing the DMVW railroad. Serves as alternative.	A, B, C
A06	S115	Heads east along section line and 13th St SW for 4 miles. Serves as a crossover.	A, B, C
A07	S168	Heads 6.5 miles north along section line then diagonals northeast 6.6 miles cross country. Serves as a western option.	A, B, C
A08	S008	Heads east cross country for approximately 3 miles crossing State Hwy 41. Segment then heads north cross country for approximately 4.3 miles crossing a 230 kV transmission line and McClusky Canal. Serves as an eastern crossing of McClusky Canal.	A, B
A09	S169	Heads west to east cross country for approximately 1 mile. Serves as crossover for Alternative A07.	A, B, C
A10	S010	Heads west to east cross country for approximately 1.5 miles. Provides crossover to Alternative A11.	A, B, C
A11	S011	Heads west to east cross country for approximately 1 mile. Provides crossover to Alternative A10.	A, B, C
A12	S170	Heads north along 11th Ave SW and section line for 6 miles then turns east for 0.9 mile. Serves as a western alternative.	A, B, C

Segment Alternative	Route Segments	Description	Associated Route Alternative
A13	S014	Heads north cross country for approximately 6 miles and crosses Center St. Serves as eastern alternative.	A, B, C
A14	S017	Heads east cross country for approximately 1 mile and then heads north cross country for approximately 6 miles and crosses Center St. Serves as eastern alternative.	A, B, C
A15	S050	Heads north parallel to Center Ave for approximately 6.8 miles. Segment crosses 5th St NE and 9th St NW. Serves as crossover.	A, B, C
A16	S161	Heads north along Center Ave. Serves as an alternative.	A
A17	S162	Heads east cross country for approximately 0.4 mile. Serves as an alternative.	A
A18	S020, S121	Heads northeast for 1.2 miles then turns east for 28.9 miles following 11th St NE and section line. Crosses McClusky Canal and North Dakota Highway 14. Serves primarily as a northern alternative.	A
A19	S049	Heads north along 45th Ave SE. Serves as a crossover. .	A, C
A20	S034	Heads east 2.5 miles along Eddy/Foster County line, then south 3 miles. Serves as an alternate point of inflection.	A
A21	S039, S127	Heads east cross country for 3.2 miles, turns northeast for 0.3 mile then follows section line for 3.6 miles. Serves as a southern alternative.	A, C
A22	S130	Heads east along section line for 0.5 mile then turns north along 10th Ave NE for 1 mile. Joins Alternative A21.	A, C
A23	S040, S041, S044, S051, S056	Heads south along half section line for 2.5 miles, turns east at half section line for 3.5 miles, crosses ND 45 and turns north for 1.5 miles crossing ND 65, heads east for 7.5 miles crossing Sheyenne River and ND 45. Serves as alternate crossing of Sheyenne River.	A, C
A24	S067	Heads north cross country along half section line. Serves primarily as crossover that joins Alternative A22.	A, B, C
A25	S068, S072	Heads north-south cross country along half section line for 1 mile then turns east-west along section line for 1.5 miles. Serves as crossover.	A, B, C
A26	S070, S074, S076, S077	Heads north cross country along half section line for 4.5 miles crossing a 69 kV line. Turns east at half section line for 1.5 miles the turns north along 122nd Ave NE for 2.5 miles crossing a 41.6 kV line. Serves a crossover.	A, B, C
A27	S080, S140, S141, S144, S145	Heads east for 16 miles, generally following 9th St NE crossing BNSF railroad, 230 kV line, and Middle Branch Goose River. Turns north for 3 miles following 138th Ave NE, jogs east along 12th St NE for 1 mile. Turns north along 139th Ave NE for 3 miles crossing Beaver Creek and Goose River. Heads east for 4.5 miles along 15th St NE, then turns north for 4.5 miles cross country along half section line, crossing 69 kV line and BNSF railroad. Serves as southern alternative for Routes A and C or northern alternative for Route B.	A, B, C

Segment Alternative	Route Segments	Description	Associated Route Alternative
A28	S134, S136	Heads east for 2.3 miles along 18th St NE/Steele-Nelson County line, then 3.1 miles cross country north along section line. Serves as alternative.	A
A29	S138	Heads 2.9 miles north along 124th Ave NE, then 2.3 miles east along section line. Serves as alternative.	A
A30	S165	Diagonals northeast cross country through cropland and tree rows. Serves as alternative.	A
A31	S166	Diagonals northeast cross country through cropland. Serves as alternative.	A
A32	S093	Heads east-west along 5th Ave NE. Serves as a crossover.	B, C
A33	S173, S183	Diagonals northeast cross country crossing the Sheyenne River for 1 mile, then 0.5 mile east along half section line, then 0.5 mile north along half section line. Parallels 13th St NE for approximately 2.5 miles, and then parallels State Highway 45 for approximately 2.1 miles. Serves as an alternative.	A, C
A34	S174	Diagonals southeast 0.4 mile cross country, then 0.4 mile east crossing the Sheyenne River, then 0.3 mile northeast cross country. Serves as an alternative.	A, C
A35	S175	Heads 1 mile east-west parallel to 8th Ave NE. Serves as an alternative.	A
A36	S186	Diagonals northeast cross country through cropland for approximately 0.7 mile. Serves as an alternative.	A
A37	S187	Heads 7 miles east-west parallel to 8th Ave NE, then diagonals 0.9 mile northeast cross country. Serves as an alternative.	A
A38	S189	Heads northeast for approximately 0.5 mile and then turns east crossing the railroad and Missouri River for approximately 1 mile, turns north for approximately 0.6 mile. Serves as an alternative Missouri River crossing.	A, B

2.4.9 230 kV Tie Line

This approximately 1,500-foot-long 230 kV Tie Line would parallel the existing tie line on Minnkota-owned property. It would be needed to complete a transmission-to-transmission interconnection with the Square Butte 230 kV Substation. All route alternatives would include the 230 kV Tie Line. Figure 2.4-3 shows the 230 kV Tie Line 1,000-foot-wide route.

3.0 Environmental Analysis

This section describes the environmental setting as it relates to each route alternative and segment alternative considered under the proposed Project. The resources and environmental settings included for analysis within this section were identified during the scoping process for the proposed Project. The following subsections are divided into discussions about the description of the resource, potential impacts from the proposed Project, and potential mitigation measures.

The description of the resource describes the resources and environmental settings found in the Study Area. For purposes of analysis, the Study Area is the general area around the route and segment alternatives. The route is defined as the 1,000-foot-wide route proposed for each of the build alternatives (Route Alternatives A, B, and C and Segment Alternatives A01 through A38). Table 3.0-1 provides a summary of the temporary and permanent impact for each route alternatives.

The Study Area includes portions of 12 counties in central and eastern North Dakota that are Oliver, Burleigh, McLean, Sheridan, Wells, Foster, Eddy, Griggs, Nelson, Steele, Traill, and Grand Forks counties. The general land cover within the Study Area consists primarily of agricultural lands including cultivated crops and livestock grazing, with dispersed areas of pasture/hay and woodland. Agriculture is one of the most important industries in North Dakota. Cultivated croplands are more prevalent in the east towards the Red River Valley, with approximately 60 percent cropland from Center, North Dakota, (Center 345 kV Substation) to Mercer, North Dakota, to nearly 90 percent cropland from the Sheyenne River to Grand Forks, North Dakota (Prairie Substation). The primary cultivated crops include wheat, soybeans, and corn. Cattle are the lead livestock production in North Dakota. Center pivot irrigation units are commonly found within the Study Area.

Prairies and wetlands are more prevalent in the western portion of the Study Area, toward the Missouri River. Historically, North Dakota was mostly prairie land cover. Prairie covers more land in the western portions of the Study Area and decreases towards the Sheyenne River and Red River Valley. Wetlands occur throughout the Study Area with a higher concentration in the Prairie Pothole Region of the upper Midwest. Wetlands are typically small, isolated depressions, but may also be found along drainages, rivers, and streams. Wetlands cover nearly 12 percent of the land within the western portion of the Study Area, and decrease to about 5 percent in the eastern portion due to increased cultivated crops. Wooded areas are not prevalent in North Dakota, as the historic land cover was prairie. Currently, the most common wooded areas are shelterbelts around residences and buildings. The major rivers may have a wooded, riparian fringe.

The Study Area contains undulating terrain in the western section within the Prairie Pothole region and near major rivers; otherwise, the eastern half is nearly level within the Red River Valley. Major watercourses within the Study Area include the Missouri, James, and Sheyenne Rivers.

Table 3.0-1. Route Alternatives Summary Table

Impact		Route A	Route B	Route C
	Total Length (mile)	247.4	269.6	250.4
	Length (feet)	1,306,386	1,423,274	1,322,101
	Total ROW Acres	4,498	4,900	4,552
	Approximate Number of Structures	1,309	1,425	1,324
Temporary Impacts	Temporary Structure Impact (acres)	84.7	92.3	85.7
	Access Road Impact (acres)	397.7	433.3	402.4
	Staging Areas (8) (acres)	80	80	80
	Batch Plants (6) (acres)	30	30	30
	Fiber Optic Regeneration Station Access Roads (4) (acres)	0.16	0.16	0.16
	Highway Access Road (acres)	0.00	0.03	0.01
	Center 345 kV Substation Expansion (acres)	0.52	0.52	0.52
	230 kV Tie Line Structures Impact (acres)	0.34	0.34	0.34
	230 kV Tie Line Access Road Impact (acres)	0.47	0.47	0.47
	Total Temporary Impact (acres)	**593.8**	**637.0**	**599.6**
	Percent of ROW – Temporary Impact	**13.22**	**13.02**	**13.19**
Permanent Impacts	Permanent Structure Impact (acres)	2.4	2.6	2.4
	Fiber Optic Repeater Station (4) (acres)	0.02	0.02	0.02
	Fiber Optic Repeater Station Access Roads (4) (acres)	0.08	0.08	0.08
	Center 345 kV Substation Expansion (acres)	0.52	0.52	0.52
	230 kV Tie Line Access Road Impact (acres)	0.01	0.01	0.01
	Total Permanent Impacts (acres)	**2.98**	**3.19**	**3.01**
	Percent of ROW – Permanent Impacts	**0.07%**	**0.07%**	**0.07%**
	Restricted Tillage Area (acres)	7.1	7.7	7.1

The impact discussion describes the potential effects from the proposed Project alternatives. Under the No Action Alternative there would be no changes to the existing conditions in the route and segment alternatives; all resources would remain as-is and are not discussed within this chapter, except within the Socioeconomic Section (Section 3.14). For each of the route alternatives, Minnkota identified a feasible 150-foot-wide ROW that could be located within the 1,000-foot-wide route. The impact analysis was conducted assuming the placement of the feasible 150-foot-wide ROW identified by Minnkota. For those segment alternatives for which a feasible ROW has not been identified, analysis was conducted assuming the placement of the ROW along the centerline of the 1,000-foot-wide route. A discussion of the proposed Project alternatives is presented in Chapter 2.4 Route Alternatives.

Temporary and permanent impacts associated with the 230 kV Tie Line and the Center 345 kV Substation expansion are included in route alternatives impact discussions. Temporary impacts associated with highway access areas and all staging areas are included with the route alternatives impact discussions.

Temporary and permanent impacts associated with the relocation of transmission line structures at the Center 345 kV Substation and Prairie Substation are not included with the route

alternatives impact discussions, since any impact would occur on previously disturbed Minnkota-owned property and within an area of the same land use; therefore, impacts would be the same as existing conditions.

The following assumptions were used to estimate resource impacts on land cover, vegetation, soils, prime farmland, and managed resource areas:

- A 1,000-foot span distance between structures.
- Temporary impacts would include: a 30-foot radius for each structure and foundation (about 2,826 square feet per structure), a 15-foot-wide access road which would follow the proposed centerline, six staging areas along the line (approximately 10 acres each), two end staging areas at the substations (approximately 10 acres each), six potential batch plant staging areas (approximately 5 acres each), four 30-foot-by-57-foot access roads to the fiber optic regeneration stations, one 20-foot-by-20-foot and one 20-foot-by-40-foot highway access road on Route B, and one 20-foot-by-20-foot highway access road on Route C.
- Permanent impacts would include: a 5-foot radius for each structure and foundation location (~78.5 square feet per structure), four 12-foot-by-18-foot fiber optic regeneration stations, and four 16-foot-by-75-foot access roads for fiber optic regeneration stations.
- Temporary impacts for the 230 kV Tie Line would include a 50-foot diameter area around each pole of three 3-pole structures (3,909 square feet per structure) and one 2-pole H-frame structure (2,936 square feet per structure). Poles in each structure are spaced 20-feet apart.
- Permanent impacts for the 230 kV Tie Line would include a 7-foot diameter area around each pole of three 3-pole structures (115.5 square feet per structure) and a 5-foot diameter area around each pole of one 2-pole H-frame structure (39.3 square feet per structure).
- A Restricted Tillage Area was added as a permanent impact to each structure location on tillable land. This area was added to the calculated impacts on tillable land as a farmer may not wish to farm the land any closer than five feet from the structure base. The additional area buffer (5-foot radius) would be added to structure locations on tillable land (about 235.5 square feet per structure). Therefore, the total permanent impact of each structure on tillable land equals a 10-foot radius (about 314 square feet per structure).

The final location and width of a ROW for the proposed Project is unknown at the time this EA was prepared, and will be prescribed in the PSC's Route Permit for the proposed Project.

Due to discussions with landowners and landowner preference, portions of the final alignment may be located beyond the 1,000-foot-wide route and segment alternatives that are discussed within this EA. However, in general, the majority of the final alignment would likely remain with the same landowner and would likely have the same land use as the route and segment alternative. Therefore, if portions of the final alignment are located beyond the 1,000-foot-wide route and segment alternatives, impacts of the final alignment would be consistent with what is addressed within this EA.

The mitigation discussion identifies potential measures to reduce or eliminate anticipated impacts for each resource area. Mitigation measures are not discussed for identified potential effects that are either not anticipated to occur under construction or operation of the proposed Project or are anticipated to result in a positive effect. The mitigation discussion includes typical high voltage transmission line permit conditions issued by state and federal agencies, mitigation strategies proposed by Minnkota and additional mitigation measures that may be warranted.

3.1 State Highway Crossing and Construction Access Locations

The proposed transmission line would cross state highways at 45 locations. Construction access to the proposed route alternatives may take place at the 45 crossing locations. Ten of the 45 potential construction access locations may require a temporary impact within DOT ROW. No permanent impacts are anticipated. Table 3.1-1 displays the state highway crossing and access locations from west to east and potential impacts. Figure 3.1-1 displays the highway construction and access locations. Temporary impacts by resource are included within Environmental Analysis in Chapter 3.0.

Table 3.1-1. State Highway Crossing and Construction Access Locations

Crossing Number	ND Hwy	Route	North or East Access[1]	South or West Access[1]	Temporary Impact Anticipated	Description of Temporary Impact
1	25	C	Drive off access	Existing field access	No	NA
2	25	A/B	Drive off access	Existing field access	Yes	Remove & replace fence east side
3	1804	C	Existing field access	Existing field access	No	NA
4	1804	A	Existing field access	Existing field access	No	NA
5	1804	B	Drive off access	Drive off access	Yes	Remove & replace fence east side
6 / 7	83	A/B	Drive off access	Drive off access	Yes	Remove & replace fence both sides
8 / 9	83	C	Drive off access	Existing field access	Yes	Remove & replace fence east side
10	41	A/B	Access from side road	Drive off access	No	NA
11	41	C	Drive off access	Drive off access	No	NA
12	200	A	Drive off access	Access from side road	No	NA
13	14	A	Existing field access	Existing field access	No	NA
14	14	B/C	Drive off access	Drive off access	No	NA
15	200	B/C	Existing field access	Access from side road	No	NA
16	3	B/C	Existing field access	Existing field access	No	NA
17	3	A	Drive off access	Access from side road	No	NA
18	200	B	Temporary access needed	Temporary access needed	Yes	20x20 foot temporary access with culverts (both). Water on both sides of road.
19	52	C	Drive off access	Temporary access needed	Yes	20x20 foot temporary access with no culvert

Crossing Number	ND Hwy	Route	North or East Access[1]	South or West Access[1]	Temporary Impact Anticipated	Description of Temporary Impact
20	52	A	Access from side road	Drive off access 500 feet south	No	NA
21	30	C	Existing field access	Existing field access	No	NA
22	30	A	Drive off access	Existing field access	No	NA
23	281	B	No access due to railroad	Existing field access	Yes	Gravel/build-up of east side access
24	281	C	Existing field access	Existing field access	No	NA
25	281	A	Existing field access	Existing field access	No	NA
26	20	B	Existing field access	No access, field access to ROW 800 feet south	No	NA
27	20	A/C	Existing field access	Existing field access	No	NA
28	1	A/C	Existing field access	Existing field access	No	NA
29	1	B	No access due to water	Existing field access	Yes	Gravel/build-up of east side access. Water east side with no access for 150 feet from road.
30	200	B	Existing field access	Existing field access	No	NA
31	200	B	Temporary access needed	Access from side road	Yes	20x40 foot temporary access with culvert
32	32	A/C	Access from side road	Access from side road	No	NA
33	32	A	Existing field access	Existing field access	No	NA
34	32	B	Existing field access	Existing field access	Yes	East side would need some compaction. Water on east side of road
35	32	C	Existing field access	None Required (access from ROW)	No	NA
36	18	B	Existing field access	Existing field access	No	NA
37	200	B	Drive off access	Drive off access	No	NA
38	15	B	Drive off access	Drive off access	No	NA
39	15	C	Drive off access	Existing field access	No	NA
40	18	C	Existing field access	Existing field access	No	NA

Crossing Number	ND Hwy	Route	North or East Access[1]	South or West Access[1]	Temporary Impact Anticipated	Description of Temporary Impact
41	15	A	Existing field access	Existing field access	No	NA
42	18	A	Drive off access	Drive off access	No	NA
43	1806	A	Drive off access	Drive off access	No	NA
44	1806	B	Drive off access	Drive off access	No	NA
45	1806	C	Drive off access	Drive off access	No	NA

1 Existing field access - Construction access would be via existing field access which are adequate in size and strength to handle construction equipment.

Drive off access - Construction access would be through existing shoulder which is shallow enough and has adequate strength to handle construction equipment.

Access from side road - Construction access would not be along highway, but rather would access ROW via side road close to crossing location.

Temporary access needed - Construction access would require the building of a temporary access, which would be removed and land restored following completion of construction. Additional notes indicate if there is need for culvert to facilitate drainage or water flow.

None Required - Construction access would be from opposite direction and along ROW, no access along that side of highway.

3.2 Land Use

The routes include portions of 12 counties in central and eastern North Dakota, which are primarily dominated by rural agricultural land use, i.e. pasture or cropland and nearby farmsteads. Less common types of land use in the vicinity of the routes include small farm-based towns, utility scale wind power generation, utility ROWs, airports, aggregate mining, and wildlife habitat. Larger urban areas are generally not present outside of Carrington, Cooperstown, and Grand Forks.

Data sources used to analyze land use in the vicinity of the proposed routes include local, state, and federal agencies, nonprofit organizations, and field work conducted by Minnkota's consultant. Land use and land cover data were gathered from the North Dakota Gap Analysis Program (GAP) data (Figure 3.2-1) (Strong et al). GAP land cover definitions are included within Table C-2 (Appendix C). Detailed route maps (Appendix B) display these features at larger scales. All spatial analyses and mapping were completed using the ArcInfo license of ESRI® ArcMap™ 9.3.

3.2.1 Description of Resources

Agriculture

Land use within the Study Area primarily consists of agricultural production of cultivated crops and livestock with some dispersed areas used for hay production. The highest yield resources include wheat, corn, soybeans, hay, barley, and sunflowers. Livestock operations include mostly cattle and hogs farms. Cultivated croplands generally increase as the proposed Project moves east towards the Red River Valley. Percent crop cover ranges from approximately 60 percent cropland along the portions of the routes running between Center and Mercer, to nearly 90 percent cropland along the portions of the routes running between the Sheyenne River and Prairie Substation. As demonstrated by the high percentage of farmland across each route, agriculture is one of the most important industries in North Dakota. Figure 3.2-1 displays the extent of agricultural land use in the vicinity of the proposed Project.

Agriculture is the primary land-based economic resource in the Study Area. According to the North Dakota 2007 Agricultural Statistics published by the USDA, North Dakota ranks 18th among the states in total crop cash receipts. In 2002 there were an estimated 30,619 farms in North Dakota, and in 2007 the number increased by 4 percent to an estimated 31,970 farms. Four of the counties within the Study Area (Grand Forks, McLean, Traill, and Wells) are ranked in the top 20 for the states total value of agricultural products sold (USDA 2010).

In 2005, North Dakota had a total of 159 certified organic farms and ranked second in the country for number of certified organic cropland acres. North Dakota is the leader in production of organic oilseeds (flax and sunflowers), producing 50 percent of the total U.S. production (North Dakota Organic Advisory Board 2010).

Table 3.2-1 summarizes farmland, cropland, and agricultural production for all counties within the Study Area based on 2007 USDA census data. The primary crop is wheat, and additional high production crops include hay, soybeans, corn, and barley. The number of farms increased in all counties from 2002 to 2007 with the exception of Sheridan and Oliver counties. Grand Forks County is ranked third in the state for highest total agricultural products sold.

Center pivot irrigation systems are commonly found within the Study Area to supplement natural rainfall (Figure 3.2-2).

Table 3.2-1. Agricultural Statistics for Counties within the Study Area

Statistic	Burleigh	Eddy	Foster	Grand Forks	Griggs	McLean	Oliver	Nelson	Sheridan	Steele	Traill	Wells
Number of Farms in 2007 (in 2002)	1,026 (946)	366 (325)	310 (309)	973 (863)	479 (423)	1,001 (918)	273 (307)	651 (598)	390 (393)	342 (318)	460 (427)	618 (579)
Average Farm Size in 2007 (acres) (in 2002)	857 (915)	1,029 (1,073)	1,290 (1,239)	848 (876)	848 (896)	1,162 (1,193)	1,384 (1,315)	845 (889)	1,282 (1,193)	1,175 (1,261)	1,182 (1,240)	1,225 (1,154)
Land Acreage in Farmland in 2007 (in 2002)	879,542 (865,524)	376,620 (348,786)	399,912 (382,932)	825,552 (755,592)	406,115 (379,022)	1,162,923 (1,094,748)	377,904 (403,619)	550,121 (531,591)	500,070 (468,745)	401,959 (401,035)	543,650 (529,647)	757,008 (668,049)
Total Market Value of Agricultural Products Sold in 2007 (in 2002)	$82,236 ($45,060)	$47,231 ($21,189)	$94,959 ($39,716)	$255,594 ($144,840)	$63,305 ($29,735)	$163,440 ($84,271)	$53,389 ($22,579)	$85,369 ($41,198)	$52,488 ($24,677)	$102,344 ($52,199)	$182,870 ($100,962)	$144,758 ($61,275)
2007 Market Value of Crops Sold	$50,682	$38,658	$75,607	$233,477	$56,624	$145,847	$24,326	$77,333	$43,742	$99,946	$177,193	$132,852
2007 Market Value of Livestock and Other Uses Sold	$31,555	$8,573	$19,352	$22,118	$6,680	$17,593	$29,063	$8,036	$8,746	$2,397	$5,677	$11,906
Top Crop Items by Acres	Wheat, Hay, Sunflower seed	Wheat, Soybeans, Hay	Soybeans, Wheat, Corn	Wheat, Soybeans, Corn	Wheat, Soybeans, Corn	Wheat, Canola, Hay	Wheat, Hay, Corn	Wheat, Soybeans, Barley	Wheat, Hay, Barley	Soybeans, Corn, Wheat	Soybeans, Corn, Wheat	Wheat, Soybeans, Corn

Source: USDA, National Agricultural Statistics Service (NASS), 2007 Census of Agriculture

GPS

GPS navigation systems are becoming more common on farm equipment. GPS units collect location data from at least three or more satellites at any given time. The accuracy of the location data is dependent on the number of satellites and the strength of the signal. Since satellites are in constant motion above the earth, GPS units are constantly picking up and dropping satellites. At times there might be instances when the GPS unit is not able to connect to enough satellites and the required accuracy is not met.

In 2002 the Institute of Electrical and Electronics Engineers (IEEE) published a study that investigated the effects of overhead power-lines on GPS receivers with respect to the effects of EMI (electromagnetic interference) generated by two mechanisms: corona noise and gap discharges. Measurements evaluated whether the GPS signal could be scattered by overhead conductors and if EMI could adversely affect the signal received.

The test conducted in the study by IEEE used a Trimble GPS receiver near a 345 kV line to see if corona noise and gap discharge could affect the "lock" a receiver had on the satellite constellation above. They made multiple measurements in fair and foul weather conditions and also under double circuit twin-conductor transmission lines.

The study reported that exposure to corona noise or gap discharge noise did not cause a loss of satellite signal lock. They did however note that the receiver may lose lock due to temporary poor satellite configurations, which may happen from many different sources, including poor satellite constellation (less than four visible satellites) and/or outages to the base station or transmitter.

On rare occasions, a transmission line structure may cause a temporary drop in accuracy due to blocking a view to one satellite, but this would only occur if the receiver, structure, and satellite are in a line, which is rare. Connection is usually restored within minutes and the GPS units return to normal function.

Forestry

The routes and the segment alternatives are located primarily in grassland and cultivated land with some forested areas adjacent to farmsteads, waterways, and within state- and federally managed lands. There are no economically important forestry resources within the proposed routes or segments alternatives.

Human Settlement

Human settlement in the Study Area has largely been developed to support agricultural industries. Farmsteads are widely distributed, but are typically located along rural roads running along section lines. In general, farmstead density increases as the proposed Project moves from west to east. Small, farm-based communities are located within 1 mile of the proposed routes; these communities range in size from unincorporated areas with a few houses to more established, incorporated municipalities. Incorporated municipalities within 1 mile of the proposed routes include Aneta (population 284), Sharon (population 109), Northwood (population 959), Goodrich (population 163), Thompson (population 1,006), and Binford (population 201). Three larger communities are within the vicinity of the routes: Carrington (population 2,268), Cooperstown (population 1,053), and Grand Forks (population 49,321). Populations listed were obtained from the 2000 census. In addition to homes, more developed communities may include other structures such as businesses, schools, government facilities, churches, and cemeteries.

Areas of human development are not generally considered compatible with transmission line development. As such, North Dakota has established a 500 foot setback from occupied residences (NDCC Rules 69-06-08-02).

Incorporated areas are displayed on Figure 3.2-2, while detailed home locations and cemetery locations are contained on the detailed route maps in Appendix B.

Existing Infrastructure

Developed infrastructure in the vicinity of the routes include federal, state, county, and township roads; utility scale wind farm development; utility ROWs; airports; radar facilities; and railroads. In some cases, existing infrastructure along the proposed routes is a compatible land use, while others infrastructure, such as airports and center point irrigation (CPI) systems is not. Figure 3.2-2 displays the location of various infrastructure types in the vicinity of the proposed routes. The route maps in Appendix B display these features in more detail.

Wind farm development is increasing in North Dakota. There are three existing wind farm developments within the vicinity of the routes. Most wind farm development is located in the west region of the Study Area due to favorable wind conditions, availability of land and proximity to existing transmission lines. The exact size and location of future wind farm development are unknown, although according to landowners, wind development companies are actively discussing projects with them.

Existing ROWs (transmission lines, pipelines, railway, or roads) present opportunities for paralleling as these features are typically disturbed corridors and are considered compatible with the construction and operation of new transmission lines. In some cases, these ROWs may present siting challenges or have to be spanned.

Airports are present in the vicinity of the proposed routes. Most of these facilities are county or city airports, but there are smaller private airstrips within the Study Area. Portions of proposed routes fall within Airport Zone D of the Grand Forks International Airport.

Mining Resources

North Dakota's most important mined products are petroleum, coal, and natural gas. Other mined products include sand, gravel, clays, and salt. Of these, only sand and gravel are produced within the vicinity of the proposed route and segment alternatives. These aggregate mines are often expanding and operated on by heavy machinery. Transmission line development may be compatible with aggregate resource extraction, if structure placement and overhead lines would not interfere with future operations at the mining facility. The DOT maintains a database of aggregate resources; however, the database may not be updated regularly. Consequently, recently established aggregate resources may not be included in the database, and areas not under active resource extraction may still be included. DOT aggregate resource data were verified to the extent possible during field work and by using 2009 National Agricultural Imaging Program aerial photography. The detailed route maps (Appendix B) display the location of gravel pits and other mines in the vicinity of the proposed Project.

Coal surface mines are present in the vicinity of the western routes, but are not crossed by the proposed routes.

Tourism

Minnkota identified tourism activities that are located within the proposed routes and segment alternatives along with resources within the vicinity that may be indirectly impacted by the

proposed Project because of viewshed effects or alteration of the landscape. The majority of tourism opportunities along the routes and the segment alternatives are associated with recreational resources including state WMAs, federal WPAs, Bureau of Reclamation's Chain of Lakes Recreation Area, Cross Ranch State Park, Missouri River, Private Lands Open to Sportsmen (PLOTS), and the North Country National Scenic Trail. Refer to Section 3.15 for a discussion of the recreation resource information along the routes and segment alternatives.

Conservation Areas

U.S. Fish and Wildlife Service (USFWS) grassland and wetland easements and Natural Resource Conservation Service (NRCS) – Conservation Reserve Program (CRP) and Conservation Reserve Enhancement Program (CREP) parcels are also present along the routes. These areas have been assigned various levels of legal protection, which generally prohibit development. These areas are intended to serve as wildlife habitat, to protect rare natural features or to preserve water quality. USFWS and NRCS easements typically retain private ownership and are generally considered confidential by these agencies. As such, information about the location and scope of potential impacts to these resources is limited.

The proposed Project would not cross any National Forest or National Grassland areas. Minnkota's consultant coordinated with the USFWS to determine the preliminary extent of grassland and wetland easement parcels. Minnkota would coordinate with the USFWS to determine exact locations of grassland and wetland easement parcels for the ROW process. Grassland easements are surface easements that minimize impacts to land cover. Wetland easements protect the wetland basin(s) within the easement land. Figure 3.2-3 shows the USFWS easements within a one-mile-wide buffer of the center of the route. The USFWS has retained wetland easements on a number of parcels within the proposed Project area. Table 3.2-2 shows the number and acreage of USFWS easements within the routes. Table 3.2-3 shows the number and acreage of USFWS easements within the segment alternatives.

Table 3.2-2. USFWS Easements within the Route Alternatives

Easement Type	Route A		Route B		Route C	
	Number of Easements in ROW	Acres of Easements in ROW	Number of Easements in ROW	Acres of Easements in ROW	Number of Easements in ROW	Acres of Easements in ROW
Grassland	0	0	1	48	1	48
Grassland and Wetland	3	134	5	229	7	298
Wetland	88	Unknown*	74	Unknown*	74	Unknown*
Total	**91**	**Unknown**	**80**	**Unknown**	**82**	**Unknown**

**Wetland easements are mapped at parcel level, but wetland easements only apply to the wetland basins with the parcel.*

Table 3.2-3. USFWS Easements within the Segment Alternatives

Segment Alternative	Easement Type							
	Number of Total Easements	Acres of Total Easements	Number of Grassland	Acres of Grassland	Number of Grassland and Wetland	Acres of Grassland and Wetland	Number of Wetlands	Acres of Wetland*
A01	0	-	0	0	0	0	0	-
A02	0	-	0	0	0	0	0	-
A03	0	-	0	0	0	0	0	-
A04	0	-	0	0	0	0	0	-
A05	0	-	0	0	0	0	0	-
A06	0	-	0	0	0	0	0	-
A07	3	-	0	0	0	0	3	-
A08	3	-	0	0	0	0	3	-
A09	0	-	0	0	0	0	0	-
A10	1	-	0	0	0	0	1	-
A11	0	-	0	0	0	0	0	-
A12	4	-	0	0	2	249	2	-
A13	11	-	0	0	2	61	9	-
A14	11	-	0	0	1	57	10	-
A15	11	-	0	0	0	0	11	-
A16	2	-	0	0	0	0	2	-
A17	1	-	0	0	0	0	1	-
A18	13	-	0	0	1	11	12	-
A19	0	-	0	0	0	0	0	-
A20	6	-	0	0	0	0	6	-
A21	8	-	0	0	0	0	8	-
A22	1	-	0	0	0	0	1	-
A23	5	-	0	0	0	0	5	-
A24	1	-	0	0	0	0	1	-
A25	1	-	0	0	0	0	1	-
A26	0	-	0	0	0	0	0	-
A27	5	-	0	0	0	0	5	-
A28	4	-	0	0	0	0	4	-
A29	3	-	0	0	0	0	3	-
A30	0	-	0	0	0	0	0	-
A31	0	-	0	0	0	0	0	-
A32	0	-	0	0	0	0	0	-
A33	1	-	0	0	0	0	1	-
A34	0	-	0	0	0	0	0	-
A35	0	-	0	0	0	0	0	-
A36	0	-	0	0	0	0	0	-
A37	0	-	0	0	0	0	0	-
A38	0	-	0	0	0	0	0	-

**Wetland easements are mapped at parcel level, but wetland easements only apply to the wetland basins with the parcel.*

PLOTS is a voluntary program offered to landowners by the North Dakota Game and Fish Department (NDGF), which provides landowners with monetary compensation for allowing public access to their land for fishing or hunting. Land parcels are typically enrolled in the PLOTS program for two to three years, but some are under a long-term agreement. The location of these parcels is made public by the NDGF. Some CRP parcels are enrolled in the PLOTS program; therefore, locations are within the state's GIS data, although not all CRP parcels are participating. PLOTS lands are displayed on Figure 3.2-4 and the detailed route maps in Appendix B.

The Nature Conservancy (TNC) and Ducks Unlimited own property along the routes, which is used specifically to provide habitat for rare species native to North Dakota and nesting areas for waterfowl along the migratory pathway. These areas are generally concentrated near the Missouri River. TNC lands are displayed on Figure 3.2-4 and the detailed route maps in Appendix B.

State Surface Tracts

The North Dakota State Land Department (NDLD) manages the State Surface Tracts and School Trust lands in North Dakota, which were granted at statehood for the support of primary and secondary education. Several Surface Tracts are located within the proposed route and segment alternatives. Some of these tracts have identifiable assets in addition to the current pastureland use, such as aggregate deposits, potential for wind tower placement, or cultivated land. The NDLD provided a listing of two groups of School Trust land: (1) Tracts not recommended for the electric transmission line, and (2) Tracts that can accommodate the electric transmission line. Figure 3.2-4 displays these tracts. Table 3.2-4 and Table 3.2-5 identify the tracts within the route and segment alternatives and route ROW, respectively.

Table 3.2-4. State Surface Tracts within Route and Segment Alternatives

Route/Segment Alternative	NDLD Recommendation						Total	
	Not Recommended		Minimally Impacted		Not Addressed			
	Count	Acres	Count	Acres	Count	Acres	Count	Acres
A	7	231.0	4	119.5	2	37.0	13	387.5
B	6	164.7	3	86.7	1	36.7	10	288.1
C	8	222.3	4	124.3	3	73.7	15	420.3
A02	0	0.0	0	0.0	2	72.8	2	72.8
A07	0	0.0	0	0.0	2	54.5	2	54.5
A13	0	0.0	2	59.0	0	0.0	2	59.0
A14	0	0.0	2	60.6	0	0.0	2	60.6
A15	0	0.0	2	61.4	0	0.0	2	61.4
A18	1	18.3	2	60.3	1	37.2	4	115.8
A19	0	0.0	1	1.0	0	0.0	1	1.0

Table 3.2-5. State Surface Tracts within the Route and Segment Alternative Right-of-Way

Route/Segment Alternative	NDLD Recommendation						Total	
	Not Recommended		Minimally Impacted		Not Addressed			
	Count	Acres	Count	Acres	Count	Acres	Count	Acres
A	5	29.6	2	18.3	0	0.0	7	47.8
B	3	18.7	2	9.6	1	9.0	6	37.2
C	5	22.9	3	18.7	1	9.0	9	50.6
A02	0	0.0	0	0.0	2	18.2	2	18.2
A07	0	0.0	0	0.0	2	2.8	2	2.8
A13	0	0.0	2	7.1	0	0.0	2	7.1
A14	0	0.0	2	8.9	0	0.0	2	8.9
A15	0	0.0	1	9.1	0	0.0	1	9.1
A18	1	4.5	1	9.1	1	9.1	3	22.7
A19	0	0.0	1	0.2	0	0.0	1	0.2

3.2.2 Impacts

Agriculture

The proposed Project would result in permanent and temporary impacts to agricultural land. Permanent impacts would occur as a result of structure placement along a route centerline. Impacts to these resources were determined by estimating the number of structures that would fall into areas being used for agricultural purposes. During construction, temporary impacts, such as soil compaction and crop damage within the ROW, may occur. Land use along each Route Alternative is displayed on Figures 3.2-1, 3.2-2, and 3.2-3.

Route A

Table 3.2-6. Agricultural Land Use in Route A Right-of-Way

GAP Land Cover Category	Route A			
	Acres in ROW	Percent of ROW	Temp Impacts	Permanent Impacts
Cropland	2,502.4	55.6	330.8	1.7
Pasture	767.1	17.1	101.4	0.5
Total Agricultural Area	**3,269.5**	**72.7**	**431.8**	**2.2**

Source: ND GAP data (Strong et al).

Like the other routes, land use along Route A is dominated by agricultural cropland, which totals 55.6 percent of the area within the ROW (Table 3.2-6). The most common form of agricultural land use along the route is row crops. Although agricultural land use along this route is common, the only land permanently removed from production would be the area directly affected by structure placement; the area directly under the transmission line that is outside of the structure would continue to be used for agriculture. Where appropriate, the proposed route would follow existing field edges or cross fields in a manner designed to minimize impacts to plowing and harvest patterns or as discussed with the landowner in the easement agreement.

If construction takes place outside of the winter months, temporary impacts to agriculture could occur as a result of construction activity. These impacts could include, but are not limited to, loss of planting opportunity, crop damage, and soil compaction. Minnkota would work directly with landowners to minimize impacts and to provide appropriate compensation for lost planting opportunities and crop damage. If necessary, compacted soils would be restored using a deep tillage practice, such as sub-soiling.

An effect of the proposed Project may be potential interference with agricultural activities, such as maneuvering equipment around structures and aerial spraying.

Route B

Table 3.2-7. Agricultural Land Use in Route B Right-of-Way

GAP Land Cover Category	Route B			
	Acres in ROW	Percent of ROW	Temp Impacts	Permanent Impacts
Cropland	2,958.1	60.4	385.1	1.9
Pasture	756.5	15.4	98.5	0.5
Total Agricultural Area	**3,714.6**	**75.8**	**483.6**	**2.4**

Source: ND GAP data (Strong et al).

Like the other routes, land use along Route B is dominated by agricultural cropland, which totals 60.4 percent of the area within the ROW (Table 3.2-7). Although agricultural land use along this route is common, the only land permanently removed from production would be the area directly affected by structure placement; the area directly under the transmission line that is outside of the structure would continue to be used for agriculture. Where appropriate, the proposed route would follow existing field edges or cross fields in a manner designed to minimize impacts to plowing and harvest patterns or as discussed with the landowner in the easement agreement.

If construction takes place outside of the winter months, temporary impacts to agriculture could occur as a result of construction activity. These impacts could include, but are not limited to, loss of planting opportunity, crop damage, and soil compaction. Minnkota would work directly with landowners to minimize impacts and to provide appropriate compensation for lost planting opportunities and crop damage. If necessary, compacted soils would be restored using a deep tillage practice, such as sub-soiling.

An effect of the proposed Project may be potential interference with agricultural activities, such as maneuvering equipment around structures and aerial spraying.

Route C

Table 3.2-8. Agricultural Land Use in Route C Right-of-Way

GAP Land Cover Category	Route C			
	Acres in ROW	Percent of ROW	Temp Impacts	Permanent Impacts
Cropland	2,657.2	58.4	350.5	1.8
Pasture	778.8	17.1	102.7	0.5
Total Agricultural Area	**3,436.0**	**75.5**	**453.2**	**2.3**

Source: ND GAP data (Strong et al).

Like the other routes, land use along Route C is dominated by agricultural cropland, which totals 58.4 percent of the area within the ROW (Table 3.2-8). Although agricultural land use along this route is common, the only land permanently removed from production would be the area directly affected by structure placement; the area directly under the transmission line that is outside of the structure would continue to be used for agriculture. Where appropriate, the proposed route would follow existing field edges or cross fields in a manner designed to minimize impacts to plowing and harvest patterns or as discussed with the landowner in the easement agreement.

If construction takes place outside of the winter months, temporary impacts to agriculture could occur as a result of construction activity. These impacts could include, but are not limited to, loss of planting opportunity, crop damage, and soil compaction. Minnkota would work directly with landowners to minimize impacts and to provide appropriate compensation for lost planting opportunities and crop damage. If necessary, compacted soils would be restored using a deep tillage practice, such as sub-soiling.

An effect of the proposed Project may be potential interference with agricultural activities, such as maneuvering equipment around structures and aerial spraying.

Segment Alternatives

Table 3.2-9 summarizes agricultural land use within the segment alternatives.

Table 3.2-9. Agricultural Land Use in Segment Alternative Right-of-Way

Segment Alternative	Acres in ROW			Percent in ROW			Temporary Impacts (acres)			Permanent Impacts (acres)		
	Cropland	Pasture	Total Agricultural Area	Cropland	Pasture	Total Agricultural Area	Cropland	Pasture	Total Agricultural Area	Cropland	Pasture	Total Agricultural Area
A01	17.8	0.9	**18.7**	60.2	3.0	**63.2**	1.9	0.1	**2.0**	0.0	0.0	**0.0**
A02	48.9	29.7	**78.6**	30.8	18.7	**49.5**	5.2	3.2	**8.4**	0.0	0.0	**0.0**
A03	12.1	24.7	**36.8**	11.7	23.9	**35.6**	1.3	2.7	**4.0**	0.0	0.0	**0.0**
A04	10.0	10.7	**20.7**	21.3	23.0	**44.3**	1.1	1.2	**2.3**	0.0	0.0	**0.0**
A05	7.2	7.6	**14.8**	18.8	20.0	**38.7**	0.8	0.8	**1.6**	0.0	0.0	**0.0**
A06	38.3	23.6	**61.9**	52.5	32.3	**84.8**	4.1	2.5	**6.6**	0.0	0.0	**0.0**
A07	69.3	50.5	**119.8**	29.2	21.3	**50.4**	7.4	5.4	**12.7**	0.0	0.0	**0.1**
A08	39.3	40.6	**80.0**	29.7	30.6	**60.3**	4.2	4.4	**8.6**	0.0	0.0	**0.0**
A09	16.0	0.7	**16.7**	91.6	3.9	**95.5**	1.7	0.1	**1.8**	0.0	0.0	**0.0**
A10	11.7	4.1	**15.7**	41.9	14.6	**56.5**	1.3	0.4	**1.7**	0.0	0.0	**0.0**
A11	10.2	2.5	**12.7**	56.8	13.9	**70.7**	1.1	0.3	**1.4**	0.0	0.0	**0.0**
A12	32.9	25.9	**58.8**	26.2	20.6	**46.9**	3.5	2.8	**6.3**	0.0	0.0	**0.0**
A13	26.1	24.1	**50.3**	23.9	22.1	**46.1**	2.8	2.6	**5.4**	0.0	0.0	**0.0**
A14	14.0	44.4	**58.4**	10.9	34.8	**45.8**	1.5	4.8	**6.3**	0.0	0.0	**0.0**
A15	41.5	38.3	**79.7**	33.4	30.8	**64.2**	4.5	4.1	**8.6**	0.0	0.0	**0.0**
A16	3.9	1.5	**5.4**	47.7	18.1	**65.8**	0.4	0.2	**0.6**	0.0	0.0	**0.0**
A17	4.7	1.1	**5.8**	64.3	14.4	**78.6**	0.5	0.1	**0.6**	0.0	0.0	**0.0**
A18	262.8	98.4	**361.2**	49.6	18.6	**68.2**	28.2	10.6	**38.8**	0.1	0.1	**0.2**
A19	71	23.3	**94.3**	65.0	21.3	**86.3**	7.6	2.5	**10.1**	0.0	0.0	**0.0**
A20	43.5	17.4	**60.9**	43.3	17.3	**60.6**	4.7	1.9	**6.6**	0.0	0.0	**0.0**
A21	52.8	30.3	**83.1**	40.4	23.2	**63.7**	5.7	3.3	**9.0**	0.0	0.0	**0.0**
A22	20.1	4.1	**24.2**	76.0	15.5	**91.6**	2.2	0.4	**2.6**	0.0	0.0	**0.0**
A23	137.9	53.0	**190.8**	50.6	19.4	**70.0**	14.8	5.7	**20.5**	0.1	0.0	**0.1**
A24	30.6	0.9	**31.5**	85.9	2.5	**88.4**	3.3	0.1	**3.4**	0.0	0.0	**0.0**
A25	41.7	1.8	**43.5**	92.5	3.9	**96.4**	4.5	0.2	**4.7**	0.0	0.0	**0.0**
A26	128.4	8.7	**137.1**	82.8	5.6	**88.4**	13.8	0.9	**14.7**	0.1	0.0	**0.1**
A27	504.8	30.5	**535.3**	87.0	5.3	**92.2**	54.2	3.3	**57.5**	0.3	0.0	**0.3**
A28	89.3	2.5	**91.8**	91.0	2.5	**93.5**	9.6	0.3	**9.9**	0.0	0.0	**0.0**

Segment Alternative	Acres in ROW			Percent in ROW			Temporary Impacts (acres)			Permanent Impacts (acres)		
	Cropland	Pasture	Total Agricultural Area	Cropland	Pasture	Total Agricultural Area	Cropland	Pasture	Total Agricultural Area	Cropland	Pasture	Total Agricultural Area
A29	65.5	7.1	**72.7**	69.7	7.6	**77.3**	7.0	0.8	**7.8**	0.0	0.0	**0.0**
A30	31.8	2.0	**33.8**	91.5	5.9	**97.4**	3.4	0.2	**3.6**	0.0	0.0	**0.0**
A31	22.5	0.2	**22.7**	99.1	0.9	**100**	2.4	0.2	**2.6**	0.0	0.0	**0.0**
A32	32.1	3.1	**35.3**	89.3	8.7	**98**	3.5	0.3	**3.8**	0.0	0.0	**0.0**
A33	77.5	26.1	**103.6**	60.0	20.2	**80.2**	8.3	2.8	**11.1**	0.0	0.0	**0.0**
A34	14.4	3.1	**17.5**	68.2	14.6	**82.8**	1.5	0.3	**1.8**	0.0	0.0	**0.0**
A35	17.7	0.1	**17.8**	99.3	0.7	**100**	1.9	0.0	**1.9**	0.0	0.0	**0.0**
A36	11.3	0.0	**11.3**	94.3	0.0	**94.3**	1.2	0.0	**1.2**	0.0	0.0	**0.0**
A37	90.4	36.0	**126.4**	62.7	25.0	**87.7**	9.7	3.9	**13.6**	0.0	0.0	**0.0**
A38	5.4	9.1	**14.5**	14.1	24.0	**38.1**	0.6	1.0	**1.6**	0.0	0.0	**0.0**

GPS

A transmission line structure may cause a temporary drop in accuracy of a GPS unit due to blocking a view to one satellite, but this would only occur if the receiver, structure, and satellite are in a line, which is rare. Connection is usually restored within minutes and the GPS units return to normal function.

Forestry

No impacts to economically important forestry resources would occur, as these resources are not located within the routes and segment alternatives.

Human Settlement

Table 3.2-10. Number of Homes from Route Alternative Centerline

Distance from Route Centerline[1]	Route A	Route B	Route C
Homes 0 to 75 feet from Route Centerline	1	0	2
Homes 75 to 150 feet from Route Centerline	1	2	0
Homes 150 to 300 feet from Route Centerline	3	2	8
Homes 300 to 500 feet from Route Centerline	6	4	10
Total Homes 0 to 500 feet from Route Centerline (1,000-foot-wide Route)	**11**	**8**	**20**
Homes per Mile (1,000-foot-wide Route)	**0.04**	**0.03**	**0.08**
Homes 500 to 1000 feet from Route Centerline (Beyond but adjacent to the 1,000-foot-wide Route)	32	26	29

[1]A centerline was estimated within the 1000-foot-wide route to identify potential impacts. Shifting of the ROW within the route would reduce impacts to homes or be able to avoid homes within the ROW.

Short-term impacts to residents and local business owners in the Study Area primarily would be related to disruption caused by temporary construction activities, such as noise. Long-term impacts may include displacement of residences or businesses due to location within the proposed Project ROW.

The NESC requires certain clearances between transmission line facilities and buildings for safe operation of the transmission line. Minnkota would acquire ROW for the proposed Project sufficient to maintain clearances required to safely operate the transmission line.

In the event that a structure is located within the ROW required for a new transmission facility, that structure would be displaced; meaning the property would need to be purchased by Minnkota and removed from the area. The potential for displacement varies by route and segment alternative. The house counts provided in following subsection and Table 3.2-10 are provided as a way to compare each route or segment alternative's potential to displace homes; in practice, the routing of transmission lines rarely result in displacement of residences since the line can be usually be shifted to avoid existing residences.

As indicated in Table 3.2-10, Route Alternative C has more residences than Alternative Routes A and B. As expected, the greatest number of residences affected would be located within a distance of 500 -1000 feet, and would be slightly greater for Route A than Route C. The preferred location of the transmission lines is away from residential properties, thus as expected, fewer residences would be located within 0 to 75 feet. As indicated in Table 3.2-10, potential

voluntary displacement of up to two homes may occur near the ROW (0 to 75 feet from Centerline), depending on final ROW location.

Route A

Eleven homes are located within this Route (Table 3.2-10). Minnkota would develop the final ROW alignment to avoid these structures by maximizing the setbacks to the extent practicable. Assuming the final ROW selected continues to avoid these structures, long-term effects on these houses would be visual in nature (see Section 3.11 for a more detailed discussion of visual impacts). These homes, and the 32 homes located 500 to 1,000 feet adjacent to the route, may experience short-term effects during construction such as elevated noise levels and increased vehicle traffic.

Route B

Eight homes are within this Route; these may be visually impacted by the proposed Project (see Section 3.11 for a more detailed discussion of visual impacts). These homes, as well as the 26 residences located 500 to 1,000 feet adjacent to the route, may also experience short-term effects during construction such as elevated noise levels and increased vehicle traffic (Table 3.2-10). This alternative has the lowest density of homes.

Route C

Twenty homes are located within this Route. Assuming the final ROW selected continues to avoid these structures, long-term effects on these houses would be visual in nature (see Section 3.11 for a more detailed discussion of visual impacts). These homes, as well as the 29 residences located 500 to 1,000 feet adjacent to the route, may also experience short-term effects during construction such as elevated noise levels and increased vehicle traffic (Table 3.2-10). This route has the highest density of homes.

Segment Alternatives

Table 3.2-11. Number of Homes from Segment Alternative Centerline

Segment Alternatives	Homes 0 to 75 feet	Homes 75 to 150 feet	Homes 150 to 300 feet	Homes 300 to 500 feet	Total Homes 0 to 500 feet (1,000-foot-wide Route)	Total Homes per Mile (1,000-foot-wide Route)	Homes 500 to 1000 feet (adjacent to 1,000-foot-wide Route)
A01	0	0	0	0	**0**	0.00	0
A02	0	0	1	0	**1**	0.11	1
A03	0	0	0	0	**0**	0.00	0
A04	0	0	0	0	**0**	0.00	1
A05	0	0	0	0	**0**	0.00	0
A06	0	0	0	0	**0**	0.00	0
A07	0	0	0	0	**0**	0.00	0
A08	0	0	0	1	**1**	0.14	1
A09	0	0	0	0	**0**	0.00	0
A10	0	0	0	0	**0**	0.00	0
A11	0	0	0	0	**0**	0.00	0
A12	1	0	0	0	**1**	0.14	0
A13	0	0	0	0	**0**	0.00	1
A14	0	0	0	0	**0**	0.00	0

Segment Alternatives	Homes 0 to 75 feet	Homes 75 to 150 feet	Homes 150 to 300 feet	Homes 300 to 500 feet	Total Homes 0 to 500 feet (1,000-foot-wide Route)	Total Homes per Mile (1,000-foot-wide Route)	Homes 500 to 1000 feet (adjacent to 1,000-foot-wide Route)
A15	0	0	0	0	**0**	0.00	1
A16	0	0	0	0	**0**	0.00	0
A17	0	0	0	0	**0**	0.00	0
A18	0	0	3	3	**6**	0.21	2
A19	0	0	0	1	**1**	0.17	1
A20	0	0	1	1	**2**	0.36	1
A21	0	0	0	1	**1**	0.14	3
A22	0	0	0	1	**1**	0.69	0
A23	0	0	1	1	**2**	0.13	0
A24	0	0	0	1	**1**	0.51	1
A25	0	0	0	1	**1**	0.40	0
A26	0	0	0	1	**1**	0.12	1
A27	0	0	1	2	**3**	0.09	1
A28	0	0	1	0	**1**	0.19	0
A29	0	0	0	0	**0**	0.00	2
A30	0	0	0	0	**0**	0.00	0
A31	0	0	0	0	**0**	0.00	0
A32	0	0	0	0	**0**	0.00	0
A33	0	0	0	1	**1**	0.14	0
A34	0	0	0	0	**0**	0.00	0
A35	0	0	0	0	**0**	0.00	0
A36	0	0	0	0	**0**	0.00	0
A37	0	0	0	1	**1**	0.13	0
A38	0	0	1	0	**1**	0.48	1

Existing Infrastructure

Table 3.2-12. Existing Infrastructure near Route Alternatives

Infrastructure Type	Route A	Route B	Route C
Point Features	**Count**	**Count**	**Count**
Communication Towers [1]	1	0	1
Utility Scale Wind Energy Turbines [1]	0	0	4
Cemeteries [1]	1	1	2
Center Pivot Irrigation Systems [2]	7	7	4
Airports [3]	0	3	2
Paralleling ROW	**Miles**	**Miles**	**Miles**
Transmission Line [4]	8.2	2.6	10.1
Highway	12.3	15.6	4.1
Other Roads	43.6	46.2	73.7
Total Length of Route Alternative Parallel to an Existing Corridors	**64.1**	**64.4**	**87.8**

1: Only features located within the route are included in this count.
2: Features located within a 0.5 mile of the route alternative centerline are included in this count.
3: Features located within 1 mile of the route alternative centerline are included in this count.
4: This analysis includes existing transmission lines paralleling highways.

Route A

Table 3.2-12 shows the existing infrastructure within the route alternatives. Route A would not impact airports or wind energy turbines as these features are not located within the Route.

One communication structure is located within the route, but may be avoided by the ROW. The final alignment of the ROW would take into consideration guy lines, which may constrain transmission line placement.

One cemetery is located within this route, but may not be within the ROW.

Seven CPI systems are located within a 0.5 mile of the route alternative centerline. Typically, CPI systems are located in the center of a quarter-section and have a 360 degree rotation for field irrigation. To assess potential impact, point data was used to identify the CPI system locations and a half mile buffer was added to determine the rotation in relation to the route. Depending on the final ROW location and structure placement, the operation of these irrigation systems could be affected. While not expected to completely prevent their operation, structure placement could prohibit complete 360 degree use, as a transmission structure could obstruct the CPI system from making a complete rotation. Not all CPI systems have a 360 degree range.

Paralleling would occur along about 64 miles of the route. The most common type of existing ROW for this route to parallel would be along non-highway roads, such as rural section roads.

Route B

Table 3.2-12 shows the existing infrastructure within the routes. Route B would not impact communication structures or wind energy turbines as these features are not located within the Route.

One cemetery is located within this route, but may not be within the ROW.

Seven CPI systems are located within a 0.5 mile of the route centerline. Typically, CPI systems are located in the center of a quarter-section and have a 360 degree rotation for field irrigation. To assess potential impact, point data was used to identify the CPI system locations and a half mile buffer was added to determine the rotation in relation to the route. Depending on the final ROW location and structure placement, the operation of these irrigation systems could be affected. While not expected to completely prevent their operation, structure placement could prohibit complete 360 degree use, as a transmission structure could obstruct the CPI system from making a complete rotation. Not all CPI systems have a 360 degree range.

Three airports are located within one mile of Route B; one of these airports is public. The public facility is the McClusky Municipal Airport, located approximately 2 miles southwest of McClusky in Sheridan County. The runway of this facility is oriented to the northwest/southeast. By following the orientation of the runway to the southeast, this route is approximately 1.3 miles from the end of the runway. Neither the northwest or southeast approach zones of this airport would be impacted by this route.

The other airports are considered private and are not legally protected. One is located in Griggs County, approximately 3 miles east of the unincorporated community of Sutton. This airstrip is oriented in an east/west manner and would be parallel to the proposed route. The approach zones of this airstrip would not be impacted by this route.

The third airport is private, and is located in Steele County, approximately 1.7 miles west of the Steele/Traill county line. This airstrip is oriented in an east/west manner and runs parallel to this proposed route. The approach zones of this airstrip would not be impacted by this route.

Paralleling of existing infrastructure would occur along about 64 miles of the route. This route would parallel transmission line ROW for the shortest distance of the route alternatives. The most common type of existing ROW for this route to parallel would be along non-highway roads, for example rural section roads.

Route C

Table 3.2-12 shows the existing infrastructure within the routes. One communication structure is located within the route, but avoided by the ROW. The final alignment of the ROW would take into consideration guy lines, which may constrain transmission line placement.

Four utility scale wind energy turbines are located within this route. These turbines are part of a larger wind energy facility located in Oliver County, approximately 8.5 miles northeast of the incorporated municipality of Center. Although turbines are located within the route, the final ROW would avoid the fall distance of the turbine and are not anticipated to impact operation of the wind energy facility.

Two cemeteries are located within this route; one may be within the ROW depending on centerline placement. This cemetery is located in Foster County. Structure placement would avoid impacting this feature or the final ROW alignment would be altered to avoid the cemetery.

Four CPI systems are located within a half mile of the route centerline. Typically, CPI systems are located in the center of a quarter-section and have a 360 degree rotation for field irrigation. To assess potential impact, point data was used to identify the CPI system locations and a half mile buffer was added to determine the rotation in relation to the route. Depending on the final ROW location and structure placement, the operation of these irrigation systems could be affected. While not expected to completely prevent their operation, structure placement could

prohibit complete 360 degree use, as a transmission structure could obstruct the CPI system from making a complete rotation. Not all CPI systems have a 360 degree range.

Two airports are located within one mile of Route C; one is considered public. The McClusky Municipal Airport is located in Sheridan County, approximately 2 miles southwest of McClusky. The runway of this facility is oriented to the northwest/southeast. By following the orientation of the runway to the southeast, this route is approximately 1.3 miles from the end of the runway. Neither the northwest or southeast approach zones of this airport would be impacted by this route.

The privately owned airport is located in Steele County, approximately 1.5 miles west of the municipal boundary of Sharon (incorporated). This airstrip is oriented in a north/south manner and is perpendicular to the proposed route in its vicinity. The route runs between 1,400 feet and 2,400 feet south of the southern end of the runway. Using the Federal Aviation Administration (FAA) standards for utility and visual runways, the maximum structure height in the route ranges between 70 feet along the northern edge of the route to 120 feet along the southern edge. If 130-foot structures are used in this location, this route could impact the southern approach zone of this airstrip.

Paralleling of existing infrastructure would occur along about 88 miles of this route. The most common type of existing ROW for this route to parallel would be along non-highway roads, but it also has the longest stretch of parallel ROW with existing transmission lines.

Segment Alternatives

Table 3.2-13. Existing Infrastructure near Segment Alternatives

Segment Alternatives	Point Features (Count)					Paralleling ROW (Miles)			
	Communication Towers[1]	Utility Scale Wind Turbines[1]	Cemeteries[1]	Center Pivot Irrigation Systems[2]	Airports[3]	Transmission Line[4]	Highway[5]	Other Roads	Total Existing Corridor
A01	0	0	0	0	0	0.0	0.0	0.0	0.0
A02	0	0	1	0	0	0.0	0.0	4.3	4.3
A03	0	0	0	1	0	0.0	0.0	0.0	0.0
A04	0	0	0	1	0	0.0	0.0	0.6	0.6
A05	0	0	0	0	0	0.0	0.0	0.0	0.0
A06	0	0	0	0	0	0.0	0.0	4.0	4.0
A07	0	0	0	0	0	0.0	0.0	2.3	2.3
A08	0	0	0	0	0	0.0	0.0	1.1	1.1
A09	0	0	0	0	0	0.0	0.0	1.0	1.0
A10	0	0	0	0	0	0.0	0.0	1.5	1.5
A11	0	0	0	0	0	0.0	0.0	1.0	1.0
A12	0	0	0	0	0	0.9	0.0	3.5	4.5
A13	0	0	0	0	0	0.0	0.0	0.0	0.0
A14	0	0	0	0	0	0.0	0.0	1.0	1.0

Segment Alternatives	Point Features (Count)					Paralleling ROW (Miles)			
	Communication Towers[1]	Utility Scale Wind Turbines[1]	Cemeteries[1]	Center Pivot Irrigation Systems[2]	Airports[3]	Transmission Line [4]	Highway [5]	Other Roads	Total Existing Corridor
A15	0	0	0	0	0	2.1	0.0	4.7	6.8
A16	0	0	0	0	0	0.0	0.0	0.5	0.5
A17	0	0	0	0	0	0.0	0.0	0.0	0.0
A18	0	0	1	0	0	0.0	0.0	23.1	23.1
A19	0	0	0	0	0	0.0	0.0	4.5	4.5
A20	0	0	1	0	0	0.0	0.0	3.3	3.3
A21	0	0	0	0	0	0.0	0.0	0.7	0.7
A22	0	0	0	0	0	0.0	0.0	1.0	1.0
A23	0	0	1	0	0	0.0	0.5	1.9	2.5
A24	0	0	0	0	0	0.0	0.0	0.0	0.0
A25	0	0	0	0	0	0.0	0.0	1.0	1.0
A26	0	0	0	0	0	0.0	0.0	2.5	2.5
A27	0	0	0	0	0	0.0	0.0	29.9	29.9
A28	0	0	1	0	0	0.0	0.0	5.4	5.4
A29	0	0	0	0	0	0.0	0.0	4.1	4.1
A30	0	0	0	0	0	0.0	0.0	0.0	0.0
A31	0	0	1	0	0	0.0	0.0	0.0	0.0
A32	0	0	0	0	0	0.0	0.0	2.0	2.0
A33	0	0	0	0	0	0.0	2.5	2.5	5.0
A34	0	0	0	0	0	0.0	0.0	0.0	0.0
A35	0	0	0	0	0	0.0	0.0	1.0	1.0
A36	0	0	0	0	0	0.0	0.0	0.0	0.0
A37	0	0	0	0	0	0.0	0.0	2.1	2.1
A38	0	0	0	0	0	0.0	0.0	0.0	0.0

1: Only features located within the route are included in this count.
2: Features located within a half mile of the route centerline are included in this count.
3: Features located within 1 mile of the route centerline are included in this count.
4: This analysis includes existing transmission lines paralleling highways.
5: Highways paralleling transmission lines are not included in this analysis.

Mining Resources

Lignite mining is active near the western terminus of each proposed route, at the BNI Center Mine. The current location of this mine is approximately 6 miles west of the Center 345 kV Substation. The mining operation is expanding south. Impacts to coal mining are not anticipated for any of the Route Alternatives.

Table 3.2-14. Aggregate Resources within Route Alternative

Infrastructure Type	Route A	Route B	Route C
Aggregate Resources (number of mines)	5	2	6

Route A

Five gravel pits are located within Route A; two may be located within the ROW (Table 3.2-14). One is located just north of the Painted Wood Creek crossing in McLean County. This feature was identified based on 2009 aerial photography and appears to be in operation. This feature is approximately 750-feet-wide where it is crossed by the ROW. It is anticipated that this feature could be spanned by the proposed transmission line. Minnkota would work with landowners to minimize potential impacts to future gravel operations.

The second aggregate resource is located in Wells County, located approximately 1 mile east of the Wells/Sheridan county line. This feature was identified based on 2009 aerial photography and appears to be in operation. This feature is approximately 850-feet-wide where it is crossed by the ROW. It is anticipated that this feature could be spanned by the proposed transmission line.

Route B

Two gravel pits are located within Route B; one may be within the ROW (Table 3.2-14). It is located just north of the Painted Wood Creek crossing in McLean County. This feature was identified based on 2009 aerial photography and appears to be in operation. This feature is approximately 750 feet wide where it is crossed by the ROW. It is anticipated that this feature could be spanned by the proposed transmission line. Minnkota would work with landowners to minimize potential impacts to future gravel operations.

Route C

Six gravel pits are located within Route C; one may be located within the ROW (Table 3.2-14). This feature is located in Wells County, approximately 5 miles west of State Highway 30. This feature is under active resource extraction based on the 2009 aerial photography. The extent of this feature where it is crossed by the ROW is unclear. The entire extent of the area is approximately 1,500 feet wide, but it appears as if the western 750 feet of the feature is the only portion under active extraction. The eastern 750 feet of the feature does not appear to be under active extraction. It would be possible to span the western portion of this feature. If this route is selected, Minnkota would coordinate with the landowner to minimize impacts. Minnkota would work with landowners to minimize potential impacts to future gravel operations.

Segment Alternatives

One gravel pit is located within Segment Alternative A23. No other mining resources are located within the other segment alternatives.

Tourism

Refer to Section 3.15 for a discussion on the affects to recreational resources.

Conservation Areas

USFWS maintains grassland and wetland conservation easements within the Route Alternatives. A grassland easement would be impacted by placement of a structure within the easement. A

wetland easement would be impacted by placement of a structure within a wetland under easement, but placement of a structure in the uplands of a wetland easement does not constitute an impact. Minnkota would work with local wetland management districts and landowners to determine the exact location and size of these easements and to avoid or minimize impacts.

Table 3.2-15. USFWS Easements within the Route Alternatives Right-of-Way

Easement Type	Route A		Route B		Route C	
	Number of Easements in ROW	Acres of Easements in ROW	Number of Easements in ROW	Acres of Easements in ROW	Number of Easements in ROW	Acres of Easements in ROW
Grassland	0	0	1	11	1	11
Grassland and Wetland	3	27	3	46	3	54
Wetland	74	Unknown*	55	Unknown*	52	Unknown*
Total	**77**	**Unknown**	**59**	**Unknown**	**56**	**Unknown**

**Wetland easements are mapped at parcel level, but wetland easements only apply to the wetland basins with the parcel.*

Route A

The USFWS maintains grassland and wetland conservation easements within this route. As the locations of these easements are considered confidential, Minnkota's consultant coordinated with this agency to identify potential impacts to these easements. Route A would not impact grassland easements but three grassland and wetland easements (27 acres) are present and 74 wetland easements are present (Table 3.2-15). Table 3.2-16 lists the USFWS easements by segment alternative ROW. The spatial extent of wetland easements was not available at the time this EA was prepared, so acreage of impacts could not be determined. If this route is chosen, Minnkota would work with local wetland management districts and landowners to determine the location of these easements and to avoid or minimize impacts.

The NRCS maintains conservation easements along this route; however, these data are not publically available because they are considered confidential. PLOTS lands were analyzed along the route to determine the impacts to known CRP parcels along the route. Twelve CRP parcels totaling 379 acres fall within Route A. The actual amount of land enrolled in CRP along this route would likely be more extensive. If this route is chosen, Minnkota would work with the local NRCS and landowners to determine the location of these easements and to avoid or minimize impacts.

TNC holdings are not located within one mile of this route.

Route B

The USFWS maintains grassland and wetland conservation easements within this route. As the locations of these easements are considered confidential, Minnkota's consultant coordinated with this agency to identify potential impacts to these easements. Route B has one grassland easement within the ROW totaling 11 acres. Three grassland and wetland easements are also present which total 46 acres. Fifty-five wetland easements are present within the ROW (Table 3.2-15). Table 3.2-16 lists the USFWS easements by segment alternative ROW. The spatial extent of wetland easements was not available at the time this EA was prepared, so acreage of impacts could not be determined. If this route is chosen, Minnkota would work with local

wetland management districts and landowners to determine the location of these easements and to avoid or minimize impacts.

The NRCS maintains conservation easements along this route; however, these data are not publically available because they are considered confidential. PLOTS lands were analyzed along the route to determine the impacts to known CRP parcels along the route. Three parcels totaling 91 acres fall within Route B. The actual amount of land enrolled in CRP along this route would likely be more extensive. If this route is chosen, Minnkota would work with the local NRCS and landowners to determine the location of these easements and to avoid or minimize impacts.

TNC holdings are not located within one mile of this route, although the northern border of the Davis Ranch Preserve is located approximately 2 miles south of this route. Impacts to this preserve are not anticipated.

Route C

The USFWS maintains grassland and wetland conservation easements within this route. As the locations of these easements are considered confidential, Minnkota's consultant coordinated with this agency to identify potential impacts to these easements. Route B has one grassland easement within the ROW totaling 11 acres. Three grassland and wetland easements are also present with total 54 acres. Fifty-two wetland easements are present within the ROW (Table 3.2-15). Table 3.2-16 lists the USFWS easements by segment alternative ROW. The spatial extent of wetland easements was not available at the time this EA was prepared, so acreage of impacts could not be determined. If this route is chosen, Minnkota would work with local wetland management districts and landowners to determine the location of these easements and to avoid or minimize impacts.

The NRCS maintains conservation easements along this route; however, these data are not publically available because they are considered confidential. PLOTS lands were analyzed along the route to determine the impacts to known CRP parcels along the route. Four parcels totaling 215 acres fall within Route C. The actual amount of land enrolled in CRP along this route would likely be more extensive. If this route is chosen, Minnkota would work with the local NRCS and landowners to determine the location of these easements and to avoid/minimize impacts.

TNC owns and maintains the Cross Ranch Preserve located approximately 7 miles south of Washburn in Oliver County. This preserve is broken into three units, North, Central, and South; the South Unit is located within one mile of the route. Portions of the South unit are located within the route, but may be avoided by the proposed ROW. Both the North and Central Units are located approximately 3 miles north of this route and would not be affected.

The Cross Ranch Preserve protects riparian cottonwood forests along the only free-flowing section of the Missouri River in North Dakota. Subsequently, the significance of mixed grass prairie habitat within the untilled landscapes of this location has been recognized. Many rare and unique species can be found within or adjacent to this preserve including federally listed species. For example, the TNC maintains bison herds on the Central and South units of this preserve.

Segment Alternatives

Table 3.2-16. USFWS Easements within the Segment Alternative Right-of-Way

Route/ Segment Alternative	Easement Type							
	Number of Total Easements	Acres of Total Easements	Number of Grassland	Acres of Grassland	Number of Grassland and Wetland	Acres of Grassland and Wetland	Number of Wetland	Acres of Wetland*
A01	0	-	0	0	0	0	0	-
A02	0	-	0	0	0	0	0	-
A03	0	-	0	0	0	0	0	-
A04	0	-	0	0	0	0	0	-
A05	0	-	0	0	0	0	0	-
A06	0	-	0	0	0	0	0	-
A07	2	-	0	0	0	0	2	-
A08	3	-	0	0	0	0	3	-
A09	0	-	0	0	0	0	0	-
A10	1	-	0	0	0	0	1	-
A11	0	-	0	0	0	0	0	-
A12	4	-	0	0	2	34	2	-
A13	11	-	0	0	2	10	9	-
A14	11	-	0	0	1	6	10	-
A15	9	-	0	0	0	0	9	-
A16	2	-	0	0	0	0	2	-
A17	1	-	0	0	0	0	1	-
A18	9	-	0	0	0	0	9	-
A19	0	-	0	0	0	0	0	-
A20	5	-	0	0	0	0	5	-
A21	5	-	0	0	0	0	5	-
A22	1	-	0	0	0	0	1	-
A23	5	-	0	0	0	0	5	-
A24	1	-	0	0	0	0	1	-
A25	1	-	0	0	0	0	1	-
A26	0	-	0	0	0	0	0	-
A27	4	-	0	0	0	0	4	-
A28	2	-	0	0	0	0	2	-
A29	3	-	0	0	0	0	3	-
A30	0	-	0	0	0	0	0	-
A31	0	-	0	0	0	0	0	-
A32	0	-	0	0	0	0	0	-
A33	1	-	0	0	0	0	1	-
A34	0	-	0	0	0	0	0	-
A35	0	-	0	0	0	0	0	-
A36	0	-	0	0	0	0	0	-
A37	0	-	0	0	0	0	0	-
A38	0	-	0	0	0	0	0	-

**Wetland easements are mapped at parcel level, but wetland easements only apply to the wetland basins with the parcel.*

State Surface Tracts

The NDLD indicated that some tracts have identifiable assets in addition to the current pastureland use, such as aggregate deposits, wind tower placement, or cultivated land. Construction of the electric transmission line would have an impact on these assets. There are also some tracts that would not be severely impacted or the future impact from the line is unknown. Table 3.2-17 lists the potential temporary and permanent impacts to the State Surface Tracts.

Table 3.2-17. Potential Temporary and Permanent Impacts to State Surface Tracts from the Route and Segment Alternatives Right-of-Way

Route/Segment Alternative	NDLD Recommendation						Total	
	Not Recommended		Minimally Impacted		Not Addressed			
	Temporary Impacts	Permanent Impacts	Temporary Impacts	Permanent Impacts	Temporary Impacts	Permanent Impacts	Temporary Impacts	Permanent Impacts
A	3.91	0.02	2.41	0.01	0.00	0.00	6.32	0.03
B	2.43	0.01	1.24	0.01	1.17	0.01	4.85	0.02
C	3.03	0.02	2.50	0.01	1.19	0.01	6.69	0.03
A02	0.00	0.00	0.00	0.00	1.95	0.01	1.95	0.01
A07	0.00	0.00	0.00	0.00	0.30	0.00	0.30	0.00
A13	0.00	0.00	0.77	0.00	0.00	0.00	0.77	0.00
A14	0.00	0.00	0.95	0.01	0.00	0.00	0.95	0.01
A15	0.00	0.00	0.98	0.01	0.00	0.00	0.98	0.01
A18	0.49	0.00	0.97	0.01	0.98	0.01	2.44	0.01
A19	0.00	0.00	0.03	0.00	0.00	0.00	0.03	0.00

3.2.3 Mitigation

Agriculture

The final ROW alignment would be designed to minimize impacts to agricultural land use. Several options are available to mitigate for impacts, including:

- Working with the landowner to site the ROW so as to minimize impacts on their property.
- Siting the final ROW along existing field and section edges.
- Crossing fields parallel to existing plowing patterns or by crossing fields at 90 degree angles.
- Constructing the proposed route during the winter months when possible.
- Areas disturbed during construction would be repaired and restored to preconstruction contours as required so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that would facilitate natural revegetation, provide for proper drainage, and prevent erosion.
- Monetarily compensating landowners for crop damage caused by construction or operation and maintenance activities.

For lands currently used for agricultural purposes, land owners may conduct aerial spraying to apply pesticides, fungicides, and fertilizers. Aerial spraying is typically conducted by small aircraft with low flying altitudes. If the proposed Project is constructed on agricultural land, aerial spraying operations would have to maneuver around transmission line structures. After the Project is constructed, aerial sprayers would need to fly over or parallel to transmission lines and aerial application of products directly below the transmission line within the easement may be limited.

Drain tiles may be present along the transmission line route. Minnkota would work with the landowners to identify locations of drainage tiles along the route and would minimize interference with tiling, where possible. In the event that Minnkota locates a tile that the landowner did not discuss, Minnkota would relocate the structure and repair the tile line, if damaged.

GPS

Some landowners use GPS navigation systems on farm equipment. Following construction, Minnkota may provide GPS coordinates for the transmission line structures to landowners, if requested.

Forestry

The proposed Project would be routed to avoid impacts to trees and vegetation to the maximum extent possible. Minnkota would follow the PSC's mitigation ratio of 2:1 for tree impacts.

Human Settlement

Minnkota would develop the final centerline and ROW alignment to avoid occupied homes by maximizing setbacks to the extent practicable within the 1,000-foot-wide route. In some instances, it may be preferable for the ROW to pass within 500 feet of an occupied residence due to other routing factors and, in such cases, Minnkota would work with the landowners affected to obtain a waiver of the 500-foot setback requirement. However, if Minnkota is unable to obtain the requested waiver, a viable route that complies with the 500-foot setback from all occupied residences may be developed within the Route Alternative.

Residents and local business owners in the Study Area primarily would be affected by temporary construction activities and long-term aesthetic changes. In addition, land owners may be affected by changes in land use for creation of the proposed Project ROW. Specifically, agricultural land would be temporarily disrupted during construction. To minimize impacts to landowners, Minnkota has agreed to the following mitigation measures:

- The exact location of structure sites, the ROW, and other disturbed areas would be determined with landowner's input.
- The minimum area necessary would be disturbed.
- Construction activities would be limited to the ROW, unless access permission is obtained from the landowner(s).

Landowner compensation would be established in conjunction with easement acquisition.

Existing Infrastructure

The final ROW alignment would be designed to minimize impacts to existing infrastructure. Mitigation for impacts to public airports, cemeteries, existing wind energy turbines, and

communication structures would not be required as these features would be avoided by the final ROW alignment. CPI systems would be avoided to the extent practicable, and where impacts would occur, Minnkota would work with landowners to ensure that final structure placement accommodates system functionality to the extent practicable.

Minnkota would work with wind developers, pipeline operators, and railway companies to route the transmission line to minimize impacts to their facilities during construction and operation.

Minnkota would continue to work with the FAA and does not anticipate any impacts to airspace and glide slope intercept for public airports along the route and segment alternatives.

Aggregate Mining

The final ROW alignment would be designed to minimize impacts to existing aggregate resources. If impacts are unavoidable, Minnkota would work with landowners and existing mine operations to identify the extent of current and planned mining operations and structure placement could be designed to avoid areas where future extraction is planned, or by increasing the structure height in these areas to accommodate for the operation of large, heavy equipment.

Tourism

Refer to Section 3.15 for a discussion on the potential mitigation measures to recreational resources.

Conservation Areas

The final ROW alignment would be designed to minimize impacts to existing conservation areas. The exact locations of USFWS grassland and wetland conservation easements and NRCS CRP parcels are not currently available. Minnkota would work with the USFWS, local NRCS offices, and landowners to determine the location of these easements and to avoid or minimize impacts. If impacts cannot be avoided, Minnkota would work with the appropriate agency and landowner to determine the appropriate action.

Impacts to TNC's Cross Ranch Preserve would be minimized to the extent practicable. If impacts cannot be avoided by the final alignment, Minnkota would coordinate with TNC.

State Surface Tracts

The final ROW alignment would be designed to minimize impacts to existing resources on State Surface Tracts. Minnkota would work with the NDLD to minimize impacts and would apply for a Right-of-Way Permit from NDLD if an easement is needed to cross State Tracts.

3.3 Soils

Soil Survey Geographic (SSURGO) soils data made available by the NRCS were analyzed using the ArcInfo license of ESRI® ArcMap™ 9.3.1 to determine impacts to prime farmland and to comply with the Farmland Protection Policy Act (FPPA). General State Soil Geographic (STATSGO) soil associations, which consist of groupings of soils with distinctive characteristics, were also reviewed as part of this analysis.

3.3.1 Description of Resources

Soils within the routes range from black loam in the Red River Valley to a more porous, sandy soil in the west. Gravel and cobble are relatively frequent soil components within the western Study Area.

Loam is ideal for agricultural uses because it retains nutrients and allows for water flow. This soil type is commonly considered prime farmland, and covers the majority of the eastern portions of the routes. The sandy, rocky, soil in the west is primarily used as pasture land.

Figure 3.3-1 displays the soil map units across the route and segment alternatives. Figure 3.3-2 displays the location of prime farmlands along the route and segment alternatives. Table 3.3-1 (below), E-1 and E-2 (in Appendix E) summarize the 32 primary STATSGO soil associations for the routes and segment alternatives

Table 3.3-1. STATSGO Soil Associations within Route Alternative

Soil Association	Acres of Soil Type in Route			Percent of Soil Type in Route			Description of Primary Soil Series
	Route A	Route B	Route C	Route A	Route B	Route C	
Bearden-Antler (s4801)	1187.0	74.9	176.7	4.0	0.2	0.6	The Bearden series consists of very deep, somewhat poorly drained, moderately to slowly permeable soils that formed in calcareous silt loam and silty clay loam lacustrine sediments. These soils are on glacial lake plains and have slopes of 0 to 3 percent.
Buse-Barnes (s4751)	279.9	0.0	22.8	0.9	0.0	0.1	The Buse series consists of very deep, well-drained soils that formed in loamy glacial till on moraines. These soils have moderate and moderately slow permeability. They have slopes of 3 to 60 percent.
Fargo (s4719)	0.0	1490.3	0.0	0.0	4.6	0.0	The Fargo series consists of very deep, poorly drained and very poorly drained, slowly permeable soils that formed in calcareous, clayey lacustrine sediments. These soils are on glacial lake plains, floodplains, and gently sloping side slopes of streams within glacial lake plains. Slopes range from 0 to 6 percent.
Forman-Aastad (s4750)	0.0	525.6	525.6	0.0	1.6	1.7	The Forman series consists of very deep, well drained, moderately slowly permeable soils formed in calcareous till. These soils are on till plains and moraines and have slopes ranging from 0 to 30 percent.
Glyndon (s4728)	461.2	204.0	979.0	1.5	0.6	3.2	The Glyndon series consists of very deep, somewhat poorly drained soils that formed in silty glacial lacustrine sediments and delta sediments on glacial lake plains. They have moderate permeability in the upper part and moderately rapid permeability in the lower part. They have slopes of 0 to 3 percent.

Soil Association	Acres of Soil Type in Route			Percent of Soil Type in Route			Description of Primary Soil Series
	Route A	Route B	Route C	Route A	Route B	Route C	
Hegne-Fargo-Bearden (s4722)	0.0	8.4	0.0	0.0	0.0	0.0	The Hegne series consists of very deep, poorly drained soils that formed in clayey calcareous lacustrine sediments on glacial lake plains. These soils have slow or very slow permeability. They have slopes of 0 to 2 percent.
Heimdal-Esmond-Emrick (s4770)	2049.3	682.4	2315.6	6.8	2.1	7.6	The Heimdal series consists of very deep, well drained, moderately permeable soils that formed in calcareous glacial till. These soils are on glacial till plains and moraines. Slope ranges from 0 to 40 percent.
Heimdal-Fram-Emrick (s4768)	1561.8	590.0	1636.4	5.2	1.8	5.4	
Heimdal-Fram-Emrick (s4769)	3540.6	1265.4	1195.8	11.8	3.9	3.9	
Heimdal-Hecla-Embden-Egeland (s4732)	676.6	0.0	438.3	2.3	0.0	1.4	
La Prairie-Fairdale (s4779)	135.6	101.6	114.6	0.5	0.3	0.4	The La Prairie series consists of very deep, moderately well drained, moderately permeable soil that formed in loamy alluvium. These soils are on terraces and bottom lands in stream valleys. Slope ranges from 0 to 6 percent.
Lamoure-La Prairie-Heimdal-Emrick (s4782)	89.2	0.0	0.0	0.3	0.0	0.0	The Lamoure series consists of very deep, somewhat poorly drained, or poorly drained soils formed in silty alluvium on flood plains. Permeability is moderate or moderately slow. Slopes are less than 2 percent.
Lankin-Gilby-Antler (s4739)	587.5	1900.0	1261.9	2.0	5.8	4.2	The Lankin series consists of deep, moderately well drained, moderately slowly permeable soils that formed in lacustrine sediments overlying till. These soils are on glacial lake plains and in interbeach areas and have slopes ranging from 0 to 3 percent.
Lohnes-Claire (s4749)	292.3	0.0	0.0	1.0	0.0	0.0	The Lohnes series consists of very deep, well drained, rapidly permeable soils that formed in coarse and medium sands. These soils are on glacial lake and outwash plains and have slopes ranging from 0 to 15 percent.
Miranda-Larson-Heimdal-Emrick (s4771)	282.0	1875.2	955.8	0.9	5.7	3.2	The Miranda series consists of very deep, moderately well or somewhat poorly drained soils formed in till on uplands. Permeability is very slow. Slopes range from 0 to 9 percent.

Soil Association	Acres of Soil Type in Route			Percent of Soil Type in Route			Description of Primary Soil Series
	Route A	Route B	Route C	Route A	Route B	Route C	
Ojata-Bearden (s4785)	600.2	0.0	0.0	2.0	0.0	0.0	The Ojata series consists of deep, poorly drained, moderately slowly or slowly permeable soils that formed in silty lake sediments. These soils are on slightly depressed flats, swales, and channels in glacial lake and outwash plains and have slopes less than 1 percent.
Overly-Gardena (s4726)	0.0	0.0	345.4	0.0	0.0	1.1	The Overly series consists of very deep, well drained or moderately well drained soils that formed in calcareous sediments. Permeability is moderately slow in the upper part and moderately slow or slow in the substratum. These soils are on glacial lake plains and terraces on valley side slopes. Slope ranges from 0 to 15 percent.
Overly-Great Bend-Beotia-Bearden (s6901)	0.0	89.3	0.0	0.0	0.3	0.0	
Perella-Colvin-Bearden (s3435)	93.1	1657.9	996.3	0.3	5.1	3.3	The Perella series consists of very deep, poorly drained soils that formed in lacustrine sediments. Saturated hydraulic conductivity is moderately high. These soils are in depressions on glacial lake plains. Slope ranges from 0 to 1 percent.
Renshaw-Divide-Arvilla (s4741)	508.2	817.4	465.9	1.7	2.5	1.5	The Renshaw series consists of very deep, somewhat excessively drained soils formed in loamy sediments and the underlying sand and gravel on outwash plains and terraces. Permeability is moderate in the upper part and very rapid in the underlying material. Slopes range from 0 to 25 percent.
Renshaw-Overly-Lankin-Brantford (s4740)	121.4	153.0	314.5	0.4	0.5	1.0	
Sioux-Marysland-Lohnes-Arvilla (s4745)	0.0	0.0	149.8	0.0	0.0	0.5	The Sioux series consists of excessively drained soils formed in sand and gravel on outwash plains, terraces, and eskers. They are very shallow over sandy-skeletal material. Saturated hydraulic conductivity is high or very high. Slopes range from 0 to 40 percent.
Svea-Barnes (s4758)	825.3	4129.2	1847.4	2.8	12.7	6.1	The Svea series consists of very deep, well or moderately well drained soils that formed in calcareous till and local alluvium from the till. Permeability is moderate in the solum and moderate or moderately slow in the C horizon. These soils are on concave positions on till plains and have slopes ranging from 0 to 25 percent.
Svea-Buse-Barnes (s4760)	216.4	417.6	51.7	0.7	1.3	0.2	
Svea-Cresbard (s4764)	636.1	391.1	504.9	2.1	1.2	1.7	
Svea-Cresbard-Cavour-Barnes (s4766)	690.2	203.7	703.8	2.3	0.6	2.3	
Svea-Hamerly-Barnes (s4759)	2253.2	1883.7	1758.8	7.5	5.8	5.8	
Svea-Kloten-Edgeley (s4752)	322.8	318.7	322.8	1.1	1.0	1.1	

Soil Association	Acres of Soil Type in Route			Percent of Soil Type in Route			Description of Primary Soil Series
	Route A	Route B	Route C	Route A	Route B	Route C	
Tiffany-Hecla-Glyndon-Embden (s4729)	205.3	0.0	259.0	0.7	0.0	0.9	The Tiffany series consists of very deep, poorly drained soils that formed in glacial outwash. These soils have moderately high or high saturated hydraulic conductivity. These soils are in depressions and on glaciolacustrine deltas and outwash plains. Slope ranges from 0 to 1 percent.
Tiffany-Swenoda-Barnes (s4730)	260.0	38.7	260.0	0.9	0.1	0.9	
Tonka-Svea-Hamerly-Barnes (s4754)	1066.4	4450.1	1298.0	3.6	13.6	4.3	The Tonka series consists of very deep, poorly drained, slowly permeable soils that formed in local alluvium over till or glaciolacustrine deposits. These soils are in closed basins and depressions on till and glacial lake plains and have slopes of 0 to 1 percent.
Towner-Embden (s4762)	579.4	0.0	628.2	1.9	0.0	2.1	The Towner series consists of very deep, well or moderately well drained soils that formed in wind and water deposited sands over glacial till or lacustrine sediments. Permeability is rapid or moderately rapid in the upper part and moderate or moderately slow in the 2Bk and 2C horizons. These soils are on sand-mantled till or glaciolacustrine plains and have slopes ranging from 0 to 15 percent.
Towner-Swenoda (s4731)	0.0	323.7	0.0	0.0	1.0	0.0	
Trembles-Lohler-Havrelon (s4825)	55.5	107.4	183.7	0.2	0.3	0.6	The Trembles series are very deep, well and moderately well drained soils formed in alluvium. They are on floodplains, bottomlands, and low terraces. Slopes range from 0 to 4 percent.
Ulen-Hecla-Hamar (s4736)	0.0	299.2	0.0	0.0	0.9	0.0	The Ulen series consists of very deep, somewhat poorly drained soils that formed in sandy glaciolacustrine deposits on glacial lake plains. Permeability is rapid. Slopes range from 0 to 3 percent.
Vallers-Svea-Hamerly-Buse-Barnes (s4756)	2013.5	0.0	2059.9	6.7	0.0	6.8	The Vallers series consists of very deep, poorly drained soils that formed in calcareous fine-loamy till on till plains, moraines and lake plains. These soils have moderately slow permeability. Slopes range from 0 to 3 percent.

Soil Association	Acres of Soil Type in Route			Percent of Soil Type in Route			Description of Primary Soil Series
	Route A	Route B	Route C	Route A	Route B	Route C	
Vebar-Reeder-Cabba-Amor (s4829)	158.5	142.5	0.0	0.5	0.4	0.0	The Vebar series consists of well drained, moderately deep, moderately rapidly permeable soils that formed in residuum weathered from soft calcareous sandstone. These soils are on uplands and have slope ranging from 0 to 65 percent.
Velva-LaDelle-Barnes-Arvilla (s4780)	446.3	0.0	0.0	1.5	0.0	0.0	The Velva series consists of very deep, well drained, moderately or moderately rapidly permeable soils that formed in stratified recent alluvium. These soils are on flood plains and low terraces and have slopes of 0 to 6 percent.
Wabek-Ruso (s4820)	266.2	266.2	699.0	0.9	0.8	2.3	The Wabek series consists of very deep, excessively drained, rapidly and very rapidly permeable soils formed in sand and gravel glaciofluvial deposits. These soils are on outwash plains, beach ridges, terraces, and terrace escarpments and have slope of 0 to 45 percent.
Walum-Kensal-Brantford-Binford (s4743)	192.6	0.0	629.2	0.6	0.0	2.1	The Walum series consists of very deep, moderately well drained, soils that formed in glaciofluvial sand and gravel containing appreciable amounts of shale. Permeability is moderately rapid above the sand and gravel and rapid or very rapid in the sand and gravel. These soils are on glacial outwash plains and have slopes ranging from 0 to 3 percent.
Williams-Bowbells (s4786)	1780.0	2235.7	1772.2	5.9	6.9	5.8	The Williams series consists of very deep, well drained, moderately slow or slowly permeable soils formed in calcareous glacial till. These soils are on glacial till plains and moraines and have slope of 0 to 35 percent.
Williams-Nutley (s4798)	0.0	248.2	248.2	0.0	0.8	0.8	
Williams-Tansem-Makoti (s4799)	0.0	0.0	246.6	0.0	0.0	0.8	
Wilton-Williams-Temvik (s4796)	0.0	0.0	603.3	0.0	0.0	2.0	The Wilton series consists of very deep, well drained soils that formed in a silty loess mantle overlying till. Permeability is moderate in the silty loess mantle and moderately slow in the till. These soils are on uplands and have slopes of 0 to 9 percent.
Wilton-Williams-Temvik-Mandan (s4797)	1449.2	1427.9	865.8	4.8	4.4	2.9	

Soil Association	Acres of Soil Type in Route			Percent of Soil Type in Route			Description of Primary Soil Series
	Route A	Route B	Route C	Route A	Route B	Route C	
Wyndmere-Barnes-Arvilla (s4747)	211.5	0.0	280.5	0.7	0.0	0.9	The Wyndmere series consists of very deep, somewhat poorly drained, moderately rapidly permeable soils formed in calcareous moderately coarse and coarse glaciofluvial and glaciolacustrine deposits. These soils are on delta, outwash, and glaciolacustrine plains, and on beach ridges. Slope ranges from 0 to 3 percent.
Wyndmere-Hecla-Embden-Arvilla (s4733)	680.5	1122.5	444.2	2.3	3.4	1.5	
Zahl-Williams (s4792)	1114.7	765.2	964.4	3.7	2.3	3.2	The Zahl series consists of very deep, well drained, moderately slow or slowly permeable soils that formed in calcareous glacial till. These soils are on glacial till plains, moraines, and valley side slopes and have slopes of 1 to 60 percent.
Zahl-Williams-Vida-Bowbells (s4787)	1523.6	1844.8	1614.5	5.1	5.6	5.3	
Zahl-Zahill-Williams-Cabbart-Cabba (s4811)	530.5	599.1	161.6	1.8	1.8	0.5	

Source: U.S. Department of Agriculture, NRCS. 2006.

Potentially Erodible Soils

The North Dakota soil databases do not have attributes to identify erodible or highly erodible soils. In general, soils of 6 percent or greater slope have a higher potential for erosion, if disturbed. Slope was generated from the 30 meter National Elevation Dataset for North Dakota. Tables 3.3-2 and 3.3-3 show the acres and percent of route and segment alternatives that have a 6 percent or greater slope.

Table 3.3-2. Acres and Percent of Route Alternative With a Six Percent or Greater Slope

Route Alternative	Acreage of Route with a Slope of 6 Percent or Greater	Percent of Route with a Slope of 6 Percent or Greater
Route A	3,025	10.1
Route B	2,789	8.5
Route C	2,582	8.5

Table 3.3-3. Acres and Percent of Segment Alternative With a Six Percent or Greater Slope

Segment Alternative	Acreage of Segment Alternative with a Slope of 6 Percent or Greater	Percent of Segment Alternative with a Slope of 6 Percent or Greater
A01	46	23.5
A02	433	40.9
A03	328	47.6
A04	73	23.4
A05	111	43.7
A06	51	10.4
A07	352	22.3
A08	12	1.4
A09	0	0.0
A10	5	2.8
A11	0	0.0
A12	125	14.9
A13	54	7.4
A14	137	16.1
A15	79	9.5
A16	18	32.6
A17	8	17.0
A18	451	12.8
A19	6	0.8
A20	35	5.2
A21	153	17.6
A22	31	17.7

Segment Alternative	Acreage of Segment Alternative with a Slope of 6 Percent or Greater	Percent of Segment Alternative with a Slope of 6 Percent or Greater
A23	378	20.9
A24	10	4.4
A25	38	12.8
A26	92	8.9
A27	97	2.5
A28	1	0.2
A29	20	3.2
A30	0	0.0
A31	0	0.0
A32	0	0.0
A33	79	9.1
A34	37	26.3
A35	0	0.0
A36	0	0.0
A37	2	0.2
A38	33	12.9

Prime Farmland

Federal agencies have a mandate under the FPPA to minimize unnecessary and irreversible conversion of farmland to nonagricultural uses. A Farmland Conversion Impact Rating (Form AD-1006) may need to be completed by the NRCS for the proposed Project.

Soils may be generally classified as Prime Farmland, Prime Farmland if Drained, and Farmland of Statewide Importance. Soils considered prime farmland are widespread throughout the Study Area, but are most densely concentrated along the central and eastern portions of the routes. In general prime farmlands are abundant in and east of Sheridan County. As the proposed routes approach the North Dakota/Minnesota border and Grand Forks, prime farmlands become more concentrated into large contiguous blocks of the landscape. Prime farmlands are less common in the vicinity of the Missouri River (McLean and Oliver counties) and west of Grand Forks in Nelson County.

Soils classified as Prime Farmland if Drained are more common along the eastern portions of the routes. These soils are generally concentrated into two areas. The western block of soils considered Prime Farmland if Drained is oriented along a northwest/southeast axis generally situated between Harvey and Carrington, North Dakota. The eastern block is concentrated in Traill and Grand Forks counties, located southwest of the City of Grand Forks. This eastern block frequently abuts the contiguous blocks of prime farmland to form an expansive block covering nearly all of Traill County and most of the southwestern portions of Grand Forks County.

Soils designated as Farmland of Statewide Importance are less common along the proposed routes. These soils are most common in the vicinity of Finley, North Dakota, in Steele and Grand Forks counties. These soils are not as widespread as prime farmlands at any location.

3.3.2 Impacts

Route and Segment Alternatives

Surface soils would be disturbed by site clearing, grading, and excavation activities at structure locations, pulling and tensioning sites, setup areas, and during the transport of crews, machinery, materials, and equipment over access routes (primarily along the transmission ROW). This disturbance is minimal, and is generally less invasive than typical agricultural practices such as plowing and tilling. Soil compaction would occur on access roads. Construction of the transmission line is expected to disturb 594 to 637 acres of soil, depending on the route (Table 3.3-4). Approximately 3 acres would undergo more permanent impacts due to structure installation (Table 3.3-4). Table 3.3-5 shows the temporary and permanent impacts of the segment alternatives. Minnkota would attempt to utilize existing, disturbed areas for staging areas to the extent practical.

Disturbed soils can be subject to erosion, defined as the detachment and transport of individual soil grains by wind or water. Erosion by wind is related to soil moisture, soil texture, organic matter content, soil structure, vegetative cover, and climate. Wind erosion often occurs on dry, fine sandy soils when vegetation cover is sparse and strong winds are prevalent. Water erosion is related closely to a soil's infiltration capacity and the coherence of the soil particles that comprise the soil. Soil properties that influence water erosion include soil texture, percent organic matter, soil structure, soil infiltration capacity, and soil permeability. Soils containing high proportions of silt and very fine sand are most erodible. Well-drained and well-graded gravels and gravel sand mixtures with little or no silt are the least erodible soils. Water erosion is also influenced by slope length and gradient, as well as frequency, intensity, and duration of rainfall and the amount of time bare soils are exposed. Erosion could be caused by site clearing and earthmoving in addition to natural processes.

During extended periods of saturation, soils can be prone to compaction and rutting. This is primarily expected to occur during construction, but could also occur if heavy equipment is driven over ROWs for maintenance during operation of the Project. Soil compaction has a restrictive action on water penetration, root development, and the rate of oxygen diffusion into soils. Low density and change of vegetation types may be an indirect effect of soil compaction. Soil characteristics that affect soil compaction include soil texture, soil moisture, and grain size. All soil types are susceptible to compaction and would also be susceptible to rutting if construction occurs when the upper layers of these soils are moist or near saturation.

Table 3.3-4. Soil Impacts within Route Alternative Right-of-Way

Route Alternative	Acres of Permanent Impacts	Acres of Temporary Impacts	Total ROW Acres
Route A	3.0	593.8	4,498.0
Route B	3.2	637.0	4,900.4
Route C	3.0	599.6	4,552.2

Table 3.3-5. Soil Impacts within Segment Alternative Right-of-Way

Segment Alternative	Acres of Permanent Impacts	Acres of Temporary Impacts	Total ROW Acres
A01	0.0	3.2	30
A02	0.1	17.1	159
A03	0.1	11.1	103
A04	0.0	5.0	47
A05	0.0	4.1	38
A06	0.0	7.8	73
A07	0.1	25.5	237
A08	0.1	14.2	133
A09	0.0	1.9	17
A10	0.0	3.0	28
A11	0.0	1.9	18
A12	0.1	13.5	126
A13	0.1	11.7	109
A14	0.1	13.7	127
A15	0.1	13.3	124
A16	0.0	0.9	8
A17	0.0	0.8	7
A18	0.3	56.9	530
A19	0.1	11.7	109
A20	0.1	10.8	101
A21	0.1	14.0	130
A22	0.0	2.8	26
A23	0.1	29.3	273
A24	0.0	3.8	36
A25	0.0	4.8	45
A26	0.1	16.6	155
A27	0.3	62.3	580
A28	0.1	10.5	98
A29	0.0	10.1	94
A30	0.0	3.7	35
A31	0.0	2.4	23
A32	0.0	3.9	36
A33	0.1	13.9	129
A34	0.0	2.3	21
A35	0.0	1.9	18
A36	0.0	1.3	12
A37	0.1	15.5	144
A38	0.0	4.1	38

Potentially Erodible Soils

An assessment of slope was conducted to quantitatively determine the potential for erodible soils within the ROW. A slope of 6 percent or greater was used to define those areas with a higher probability for erosion. Slope was generated from the 30 meter National Elevation

Dataset for North Dakota. Route A ROW has the highest acreage of area with slopes of 6 percent of greater, leading to a higher probability for erosion (Table 3.3-6). Table 3.3-7 lists the acreage and percent of segment alternative ROW with a slope of 6 percent or greater.

Table 3.3-6. Acres and Percent of Route Alternative Right-of-Way With a Six Percent or Greater Slope

Route Alternative	Total ROW Acres	Acreage of Route ROW with a Slope of 6 Percent or Greater	Percent of Route ROW with a Slope of 6 Percent or Greater
Route A	4498	451	10.0
Route B	4900	422	8.6
Route C	4552	392	8.6

Table 3.3-7. Acres and Percent of Segment Alternative Right-of-Way With a Six Percent or Greater Slope

Segment Alternative	Total ROW Acres	Acreage of Segment Alternative ROW with a Slope of 6 Percent or Greater	Percent of Segment Alternative ROW with a Slope of 6 Percent or Greater
A01	30	6	21.7
A02	159	59	36.9
A03	103	49	47.5
A04	47	11	24.6
A05	38	17	45.4
A06	73	4	5.0
A07	237	47	19.6
A08	133	4	3.0
A09	17	0	0.0
A10	28	1	2.9
A11	18	0	0.0
A12	126	19	14.8
A13	109	9	8.2
A14	127	21	16.3
A15	124	16	12.5
A16	8	2	24.0
A17	7	2	23.7
A18	530	61	11.5
A19	109	2	1.6
A20	101	7	7.1
A21	130	18	13.7
A22	26	4	15.7
A23	273	56	20.5
A24	36	1	4.0
A25	45	9	18.9
A26	155	13	8.6
A27	580	9	1.6
A28	98	0	0.1

Segment Alternative	Total ROW Acres	Acreage of Segment Alternative ROW with a Slope of 6 Percent or Greater	Percent of Segment Alternative ROW with a Slope of 6 Percent or Greater
A29	94	4	4.2
A30	35	0	0.0
A31	23	0	0.0
A32	36	0	0.0
A33	129	11	8.7
A34	21	6	30.6
A35	18	0	0.0
A36	12	0	0.0
A37	144	1	0.4
A38	38	5	12.7

Prime Farmland

Impacts to soils designated as Prime Farmland, Prime Farmland if Drained, and Farmland of Statewide Importance are provided in Table 3.3-8.

Table 3.3-8. Farmland Soil Classifications for Route Alternative Right-of-Way

Farmland Classification	Route A				Route B				Route C			
	Acres in ROW	Percent of ROW	Temp Impacts (acres)	Permanent Impacts (acres)	Acres in ROW	Percent of ROW	Temp Impacts (acres)	Permanent Impacts (acres)	Acres in ROW	Percent of ROW	Temp Impacts (acres)	Permanent Impacts (acres)
Prime Farmland	1,281.2	28.4	169.4	0.9	1,722.9	35.2	224.3	1.1	1,609.1	35.3	212.3	1.1
Prime Farmland if Drained	532.3	11.8	70.4	0.4	837.2	17.1	109.0	0.5	515.1	11.3	67.9	0.3
Farmland of Statewide Importance	544.2	12.1	72.0	0.4	505.2	10.3	65.8	0.3	625.7	13.7	82.5	0.4
Not Prime Farmland	2,143.1	47.6	283.3	1.4	1,837.3	37.5	239.2	1.2	1,804.3	39.6	238.0	1.2
Total	**4,500.7**	**100.0**	**595.0**	**3.0**	**4,902.6**	**100.0**	**638.2**	**3.2**	**4,554.3**	**100.0**	**600.7**	**3.0**

Route A

Route A would impact the least amount of Prime Farmland of the three alternatives. Impacts to Farmland of Statewide Importance would be similar to the other route alternatives.

Route B

Route B would have the highest Prime Farmland and Prime Farmland if Drained impacts. This route would impact the least amount of Farmland of Statewide Importance.

Route C

Route C would impact a similar amount of Prime Farmland as Route B, but it would impact less areas considered Prime Farmland if Drained. This route would have the greatest impact on Farmland of Statewide importance.

Segment Alternatives

Table 3.3-9. Farmland Soil Classifications for Segment Alternative Right-of-Way

Segment Alternative	Prime Farmland				Prime Farmland if Drained				Farmland of Statewide Importance				Not Prime Farmland			
	Acres in ROW	Percent in ROW	Temporary Impacts (acres)	Permanent Impacts (acres)	Acres in ROW	Percent in ROW	Temporary Impacts (acres)	Permanent Impacts (acres)	Acres in ROW	Percent in ROW	Temporary Impacts (acres)	Permanent Impacts (acres)	Acres in ROW	Percent in ROW	Temporary Impacts (acres)	Permanent Impacts (acres)
A01	5.3	18.0	0.6	0.0	0.0	0.0	0.0	0.0	18.6	63.0	2.0	0.0	5.6	19.0	0.6	0.0
A02	9.2	5.8	1.0	0.0	0.0	0.0	0.0	0.0	101.4	63.9	10.9	0.1	48.2	30.3	5.2	0.0
A03	5.9	5.7	0.6	0.0	0.3	0.3	0.0	0.0	40.1	38.7	4.3	0.0	57.2	55.3	6.1	0.0
A04	7.8	16.7	0.8	0.0	0.0	0.0	0.0	0.0	17.7	37.8	1.9	0.0	21.3	45.5	2.3	0.0
A05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.3	100.0	4.1	0.0
A06	20.1	27.5	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	52.9	72.5	5.7	0.0
A07	4.1	1.7	0.4	0.0	0.6	0.2	0.1	0.0	0.0	0.0	0.0	0.0	232.8	98.0	25.0	0.1
A08	3.8	2.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	128.9	97.1	13.8	0.1
A09	14.9	85.5	1.6	0.0	0.3	1.9	0.0	0.0	0.0	0.0	0.0	0.0	2.2	12.6	0.2	0.0
A10	4.2	15.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.7	84.9	2.5	0.0
A11	2.5	13.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.6	86.3	1.7	0.0
A12	0.0	0.0	0.0	0.0	1.1	0.9	0.1	0.0	0.0	0.0	0.0	0.0	108.6	86.5	11.7	0.1
A13	5.7	5.2	0.6	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	103.2	94.5	11.1	0.1
A14	2.1	1.7	0.2	0.0	0.8	0.7	0.1	0.0	0.0	0.0	0.0	0.0	124.5	97.7	13.4	0.1
A15	29.1	23.4	3.1	0.0	2.6	2.1	0.3	0.0	0.0	0.0	0.0	0.0	91.1	73.4	9.8	0.0
A16	0.7	8.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.6	91.5	0.8	0.0
A17	0.0	0.0	0.0	0.0	1.0	13.5	0.1	0.0	0.0	0.0	0.0	0.0	6.4	86.5	0.7	0.0
A18	180.5	34.1	19.4	0.1	19.2	3.6	2.1	0.0	0.0	0.0	0.0	0.0	324.0	61.2	34.8	0.2
A19	91.3	83.5	9.8	0.0	4.7	4.3	0.5	0.0	8.9	8.1	1.0	0.0	4.6	4.2	0.5	0.0
A20	41.6	41.3	4.5	0.0	2.9	2.9	0.3	0.0	19.5	19.4	2.1	0.0	26.9	26.7	2.9	0.0
A21	52.9	40.5	5.7	0.0	7.6	5.8	0.8	0.0	14.4	11.1	1.5	0.0	54.5	41.8	5.8	0.0
A22	1.5	5.5	0.2	0.0	0.2	0.6	0.0	0.0	14.0	52.9	1.5	0.0	10.8	40.9	1.2	0.0
A23	85.4	31.3	9.2	0.0	12.7	4.7	1.4	0.0	55.6	20.4	6.0	0.0	118.9	43.6	12.8	0.1
A24	9.4	26.5	1.0	0.0	0.9	2.4	0.1	0.0	12.9	36.3	1.4	0.0	12.4	34.8	1.3	0.0

Segment Alternative	Prime Farmland				Prime Farmland if Drained				Farmland of Statewide Importance				Not Prime Farmland			
	Acres in ROW	Percent in ROW	Temporary Impacts (acres)	Permanent Impacts (acres)	Acres in ROW	Percent in ROW	Temporary Impacts (acres)	Permanent Impacts (acres)	Acres in ROW	Percent in ROW	Temporary Impacts (acres)	Permanent Impacts (acres)	Acres in ROW	Percent in ROW	Temporary Impacts (acres)	Permanent Impacts (acres)
A26	47.8	30.9	5.1	0.0	10.2	6.6	1.1	0.0	50.0	32.3	5.4	0.0	46.7	30.2	5.0	0.0
A27	249.4	43.0	26.8	0.1	171.7	29.6	18.4	0.1	93.7	16.1	10.1	0.0	65.5	11.3	7.0	0.0
A28	11.5	11.7	1.2	0.0	14.9	15.2	1.6	0.0	25.9	26.4	2.8	0.0	3.1	3.2	0.3	0.0
A29	6.8	7.2	0.7	0.0	13.7	14.5	1.5	0.0	11.5	12.2	1.2	0.0	16.8	17.9	1.8	0.0
A30	18.8	54.1	2.0	0.0	7.2	20.7	0.8	0.0	7.6	21.9	0.8	0.0	1.2	3.3	0.1	0.0
A31	11.1	32.1	1.2	0.0	22.6	65.2	2.4	0.0	0.0	0.0	0.0	0.0	0.9	2.7	0.1	0.0
A32	16.4	45.6	1.8	0.0	19.6	54.4	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
A33	45.4	35.1	4.9	0.0	12.1	9.4	1.3	0.0	17.9	13.9	1.9	0.0	53.7	41.6	5.8	0.0
A34	7.0	33.1	0.8	0.0	0.0	0.0	0.0	0.0	2.6	12.4	0.3	0.0	11.5	54.5	1.2	0.0
A35	8.9	49.8	1.0	0.0	8.9	50.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
A36	0.0	0.0	0.0	0.0	11.0	92.2	1.2	0.0	0.0	0.0	0.0	0.0	0.9	7.8	0.1	0.0
A37	48.2	33.5	5.2	0.0	46.4	32.2	5.0	0.0	14.7	10.2	1.6	0.0	34.9	24.2	3.7	0.0
A38	5.3	14.0	0.6	0.0	0.0	0.0	0.0	0.0	23.3	61.3	2.5	0.0	9.4	24.7	1.0	0.0

3.3.3 Mitigation

Route and Segment Alternatives

To the extent practicable, soil disturbance and excavation activities on steep slope would be avoided. Where disturbance and excavation cannot be avoided entirely, impacts would be minimized using Best Management Practices (BMPs). Sediment and erosion control plans would be developed that specify the types of BMPs necessary. Depending on the site, BMPs may include installation of silt fencing, straw bales, or ditch blocks and/or covering bare soils with mulch, plastic sheeting, or fiber rolls to protect drainage ways and streams from sediment runoff from exposed soils. Erosion control BMPs would be inspected during construction, especially during significant precipitation events. Soil compaction would be treated and restored through tillage operations, using a subsoiler.

All disturbed areas would be revegetated once construction is complete. Seed mixes would be specified based on site characteristics and in accordance with regulatory permits.

Potentially Erodible Soils

Slopes of 6 percent or greater tend to have a higher potential for erosion and would require BMPs if soils are graded or cleared.

Prime Farmland

Impacts to prime farmland would be minimized by adjusting final structure placement to avoid these resources to the extent practicable. Soils classified as prime farmland would receive the highest priority for avoidance. Further impacts to prime farmlands would be minimized by paralleling the proposed Project adjacent to existing ROW features and field lines. Minnkota would coordinate with the NRCS to determine if anticipated impacts require evaluation under the FPPA and, if so, would coordinate this review and possible mitigation measures. Unless specific permission is given by landowners, field crossings would not be oriented diagonally if this would disrupt normal farming operations.

3.4 Vegetation

3.4.1 Description of Resources

Land use/cover along each route are displayed on Figure 3.2-1 and shown in Table 3.4-1. Table 3.4-2 lists the land cover types by segment alternative, and Table 3.4-3 lists the land cover types by route ROW. Land cover data by segment alternative can be found in Table E-3 in Appendix E. GAP land cover data for North Dakota was used for this analysis (Strong et al).

Agricultural Vegetation

The general vegetative cover within the Study Area consists primarily of agricultural species used for grain and legume production such as wheat, corn, soybeans or sugar beets. Typically, areas used as cropland are established as monotypic communities. Pasture land is also common and is typically dominated by native or planted graminoid species. Many pastures are overgrazed and dominated by non-native grasses. Some locations retain characteristics of remnant prairie. Agricultural vegetative cover generally increases as the proposed Project moves east, with percent cover ranging from approximately 60 percent cropland in the west to nearly 90 percent cropland in the east.

Prairie, Woodland, and Wetland Vegetation

In the western sections of the Study Area, toward the Missouri River, prairie and wetland vegetation become more prevalent. Historically, North Dakota was mostly prairie land cover although much of the area has been modified for agricultural production. In the western portions of the Study Area, prairie cover is as high as 24 percent, decreasing to nearly 2 percent in the east. Typical species present in remnant prairies include bluestem (*Andropogon spp., Schizachyrium spp.*), needlegrass (*Achnatherum*), Indian grass (*Sorghastrum nutans*), and sideoats (*Bouteloua curtipendula*). Healthy prairie habitats can also include a variety of forbs such as prairie smoke (*Geum triflorum*), pasque flower (*Pulsatilla vulgaris*), and coneflower (*Echinacea spp., Ratibida spp.*).

Wetlands occur throughout the Study Area as the proposed Project traverses the Prairie Pothole Region of the upper Midwest. Wetlands cover up to 12 percent of the land near the center of the Study Area, but generally decrease in abundance in eastern portions of the Study Area due to increased cultivated crops. Wetlands are typically small, isolated depressions dominated by emergent vegetation, but also may be found along drainages, rivers, and streams. Common wetland vegetation includes reed canarygrass (*Phalaris arundinaceae*), prairie cordgrass (*Spartina pectinata*), and cattail (*Typha spp.*). Large wetland complexes are typically considered a constraint to transmission line development, as construction may require additional permitting, wetland specific BMPs, or structure placement which would cause permanent impacts. Furthermore, maintenance of new infrastructure and ROW could be more problematic in wet areas.

Wooded areas are not prevalent in North Dakota, making up a small percentage of vegetative cover within the routes (approximately 1.2 percent of each route). Currently, the most common wooded areas are shelterbelts around residences and buildings. Some rivers and streams crossed by the routes may have a wooded, riparian fringe. Species commonly found in these wooded areas include deciduous species such as green ash (*Fraxinus pennsylvanica*), aspen (*Populus tremuloides*), burr oak (*Quercus macrocarpa*) and eastern cottonwood (*Populus deltoides*).

Land cover classes that may conflict with the construction and operation of a new transmission line include developed areas, woodlands, water crossings, and large wetland complexes.

Table 3.4-1. GAP Land Cover Types within the Route Alternative

GAP Land Cover Category	Route A		Route B		Route C	
	Acres in Route	Percent of Route	Acres in Route	Percent of Route	Acres in Route	Percent of Route
Barren/Sparse Vegetation	49.2	0.2	36.2	0.1	37.2	0.1
Cropland	17073.1	57.0	20888.4	64.0	18363.1	60.5
Developed	99.2	0.3	135.5	0.4	165.7	0.5
Pasture	4989.2	16.6	4509.4	13.8	4754.4	15.7
Prairie	3,857.1	12.9	3,273.4	10.0	3,429.0	11.3
Shrubland	1,056.2	3.5	737.2	2.3	900.5	3.0
Wetland	2,441.1	8.2	2,733.3	8.4	2,347.3	7.8
Woodland	402.1	1.3	332.1	1.0	333.2	1.1
Total	**29,967.3**	**100.0**	**32,645.4**	**100.0**	**30,330.5**	**100.0**

Table 3.4-2. GAP Land Cover Types within the Segment Alternative

Segment Alternatives	Acres in Route									Percent of Route								
	Barren/sparse vegetation	Cropland	Developed	Pasture	Prairie	Shrubland	Wetland	Woodland	Total	Barren/sparse vegetation	Cropland	Developed	Pasture	Prairie	Shrubland	Wetland	Woodland	Total
A01	0.0	131.1	0.0	9.4	36.0	17.6	2.9	0.2	197.1	0.0	66.5	0.0	4.8	18.3	8.9	1.5	0.1	100
A02	4.8	303.8	1.4	201.6	399.5	131.6	11.3	4.6	1058.6	0.4	28.7	0.1	19.0	37.7	12.4	1.1	0.4	100
A03	7.0	81.7	7.8	150.4	255.6	70.9	62.1	54.2	689.7	1.0	11.8	1.1	21.8	37.1	10.3	9.0	7.9	100
A04	1.7	62.2	2.4	71.3	37.2	10.0	69.8	56.8	311.5	0.5	20.0	0.8	22.9	12.0	3.2	22.4	18.2	100
A05	2.7	50.9	0.0	81.2	105.9	8.0	6.4	0.0	255.1	1.0	20.0	0.0	31.8	41.5	3.1	2.5	0.0	100
A06	2.6	249.7	3.1	145.2	46.4	12.2	25.1	2.6	486.8	0.5	51.3	0.6	29.8	9.5	2.5	5.2	0.5	100
A07	9.6	490.4	0.8	304.4	511.4	59.4	203.4	3.7	1583.2	0.6	31.0	0.0	19.2	32.3	3.8	12.8	0.2	100
A08	8.5	293.7	0.1	235.7	209.8	34.6	99.3	1.7	883.4	1.0	33.2	0.0	26.7	23.7	3.9	11.2	0.2	100
A09	0.2	108.2	0.0	2.2	0.2	0.2	5.4	0.0	116.5	0.2	92.9	0.0	1.9	0.2	0.2	4.6	0.0	100
A10	0.4	101.4	2.4	19.9	22.6	3.2	35.4	0.3	185.8	0.2	54.6	1.3	10.7	12.2	1.7	19.1	0.2	100
A11	0.1	64.7	1.6	34.1	8.2	3.2	7.4	1.1	120.3	0.1	53.8	1.3	28.4	6.8	2.7	6.1	0.9	100
A12	7.6	250.8	7.3	162.8	204.8	56.6	139.4	6.5	835.8	0.9	30.0	0.9	19.5	24.5	6.8	16.7	0.8	100
A13	4.0	196.5	1.1	160.9	213.7	35.1	115.7	0.7	727.6	0.6	27.0	0.1	22.1	29.4	4.8	15.9	0.1	100
A14	0.2	123.9	5.9	242.2	297.4	42.6	134.5	2.0	848.8	0.0	14.6	0.7	28.5	35.0	5.0	15.9	0.2	100
A15	0.0	321.4	6.7	218.6	181.6	0.8	97.6	0.9	827.6	0.0	38.8	0.8	26.4	21.9	0.1	11.8	0.1	100
A16	1.3	28.8	0.0	11.8	1.7	1.4	10.1	0.0	55.1	2.4	52.3	0.0	21.4	3.1	2.5	18.3	0.0	100
A17	0.0	33.6	0.0	4.1	2.8	1.3	6.8	0.4	49.0	0.0	68.6	0.0	8.3	5.7	2.7	13.8	0.8	100
A18	2.2	1889.4	3.4	642.2	522.7	1.4	442.4	28.3	3532.1	0.1	53.5	0.1	18.2	14.8	0.0	12.5	0.8	100
A19	0.0	467.3	0.0	119.7	59.9	18.6	52.1	11.5	729.0	0.0	64.1	0.0	16.4	8.2	2.6	7.2	1.6	100
A20	0.0	300.7	0.0	121.2	45.3	89.5	96.2	16.3	669.2	0.0	44.9	0.0	18.1	6.8	13.4	14.4	2.4	100

Segment Alternatives	Acres in Route									Percent of Route								
	Barren/sparse vegetation	Cropland	Developed	Pasture	Prairie	Shrubland	Wetland	Woodland	Total	Barren/sparse vegetation	Cropland	Developed	Pasture	Prairie	Shrubland	Wetland	Woodland	Total
A21	0.0	366.3	2.3	191.3	100.2	95.2	97.3	17.1	869.6	0.0	42.1	0.3	22.0	11.5	10.9	11.2	2.0	100
A22	0.0	113.8	0.0	27.6	3.2	13.3	2.0	15.1	175.0	0.0	65.0	0.0	15.7	1.8	7.6	1.2	8.6	100
A23	0.0	966.1	13.3	316.5	155.3	167.0	157.8	38.0	1814.0	0.0	53.3	0.7	17.4	8.6	9.2	8.7	2.1	100
A24	0.0	199.8	0.0	10.7	0.9	3.6	19.7	2.8	237.4	0.0	84.1	0.0	4.5	0.4	1.5	8.3	1.2	100
A25	0.0	270.1	0.0	13.0	1.1	11.2	3.5	1.7	300.5	0.0	89.9	0.0	4.3	0.4	3.7	1.2	0.6	100
A26	0.0	828.9	0.8	73.5	53.0	33.6	27.3	16.0	1033.1	0.0	80.2	0.1	7.1	5.1	3.3	2.6	1.6	100
A27	0.0	3294.7	22.7	195.7	40.4	98.2	174.7	39.3	3865.7	0.0	85.2	0.6	5.1	1.0	2.5	4.5	1.0	100
A28	0.0	606.8	0.0	15.6	3.4	4.8	19.2	3.2	653.1	0.0	92.9	0.0	2.4	0.5	0.7	2.9	0.5	100
A29	0.0	471.2	1.2	50.3	12.1	11.4	71.4	7.6	625.3	0.0	75.4	0.2	8.1	1.9	1.8	11.4	1.2	100
A30	0.0	208.7	0.0	16.5	0.0	1.7	0.0	4.4	231.3	0.0	90.2	0.0	7.1	0.0	0.7	0.0	1.9	100
A31	0.0	150.3	0.0	1.1	0.0	0.0	0.0	0.0	151.4	0.0	99.3	0.0	0.7	0.0	0.0	0.0	0.0	100
A32	0.0	204.2	0.0	31.3	0.0	0.0	4.4	0.0	239.9	0.0	85.1	0.0	13.1	0.0	0.0	1.8	0.0	100
A33	0.0	560.3	22.5	129.6	22.0	62.9	40.5	20.9	858.9	0.0	65.2	2.6	15.1	2.6	7.3	4.7	2.4	100
A34	0.0	85.3	0.0	14.6	1.5	12.1	13.3	14.1	141.0	0.0	60.5	0.0	10.4	1.0	8.6	9.4	10.0	100
A35	0.0	115.5	0.0	2.8	0.0	0.0	0.0	0.2	118.6	0.0	97.5	0.0	2.4	0.0	0.0	0.0	0.2	100
A36	0.0	78.5	0.0	0.0	0.0	0.0	0.9	0.4	79.8	0.0	98.3	0.0	0.0	0.0	0.0	1.1	0.6	100
A37	0.0	672.7	2.3	198.5	47.4	5.6	10.2	24.4	961.0	0.0	70.0	0.2	20.7	4.9	0.6	1.1	2.5	100
A38	7.4	43.6	7.4	43.2	21.4	7.4	42.8	79.1	252.2	2.9	17.3	2.9	17.1	8.5	2.9	17.0	31.4	100

Table 3.4-3. Land Cover Data by Route Alternative Right-of-Way

GAP Land Cover Category	Route A				Route B				Route C			
	Acres in ROW	Percent of ROW	Temp Impacts (acres)	Conversion Impacts (acres)	Acres in ROW	Percent of ROW	Temp Impacts (acres)	Conversion Impacts (acres)	Acres in ROW	Percent of ROW	Temp Impacts (acres)	Conversion Impacts (acres)
Barren/Sparse Vegetation	7.8	0.2	1.0	<0.1	6.7	0.1	0.9	<0.1	5.9	0.1	0.8	<0.1
Cropland	2502.4	55.6	330.8	1.7	2958.1	60.4	385.1	1.9	2657.2	58.4	350.5	1.8
Developed	19.3	0.4	2.6	<0.1	26.8	0.5	3.5	<0.1	26.1	0.6	3.4	<0.1
Pasture	767.1	17.1	101.4	0.5	756.5	15.4	98.5	0.5	778.8	17.1	102.7	0.5
Prairie	610.1	13.6	80.7	0.4	547.8	11.2	71.3	0.4	541.1	11.9	71.4	0.4
Shrubland	172.8	3.8	22.8	0.1	129.6	2.6	16.9	0.1	145.5	3.8	19.2	0.1
Wetland	366.3	8.1	48.4	0.2	416.4	8.5	54.2	0.3	347.7	7.6	45.9	0.2
Woodland*	52.1	1.2	52.1	52.1	58.5	1.2	58.5	58.5	50.0	1.1	50.0	50.0
Total	**4,498.0**	**100.0**	**639.8**	**55.0**	**4,900.4**	**100.0**	**688.9**	**61.7**	**4,552.2**	**100.0**	**644.4**	**53.0**

Source: GAP data.
**These impacts would be considered a permanent vegetation conversion from woodland to shrubland or grassland.*

Impaired and Vulnerable Terrestrial Communities

North Dakota Parks and Recreation Department (NDPR) maintains the North Dakota Natural Heritage Inventory (NHI) as a spatial reference to protected and rare species occurrences or sensitive natural communities. The database includes data pertaining to flora and fauna species. While this inventory has not been completed throughout the entire Study Area, data is available for the vicinity of the Missouri River and Sheyenne River.

This database has assigned each occurrence a state conservation ranking, standards developed in part by NatureServe (NatureServe 2010). These rankings range between S1 for species or communities which are critically imperiled (less than 5 occurrences regionally) to S5 for species or communities considered secure (common species). Some communities are not assigned a rank, or are considered historical or extirpated (NatureServe 2009). These rankings are valuable to determine the extent of rare communities present in a given location. Rare communities present in the vicinity of the routes include areas of high quality prairie such as dry-mesic tallgrass prairies or needle-and-thread mixed grasses, high quality woodlands such as floodplain forests or burr oak upland woodlands and high quality shrublands and high quality wetlands. These communities likely harbor a greater diversity of plant species than the surrounding landscape. Impaired or vulnerable terrestrial communities are shown by route ROW on Table 3.4-4 and by segment alternative on Table E-4 in Appendix E.

Table 3.4-4. Impaired or Vulnerable Terrestrial Communities by Route Alternative Right-of-Way

State Conservation Ranking	Common Community Names	Route A	Route B	Route C
		Acres in ROW	Acres in ROW	Acres in ROW
S1	Dry Mesic Tallgrass Prairie	4.8	--	7.0
	Water Sedge Rich Fen	2.2	--	3.6
S2	Needle-and-thread Mixed Grass Prairie	9.0	9.0	13.4
	Needlegrass-wheatgrass Prairie	--	3.7	--
S2/S3	Saltgrass Saline Meadow	0.8	--	0.8
S3	Bur Oak Upland Woodland	2.2	2.1	3.9
	Cottonwood-Green Ash Floodplain Forest	11.4	13.8	7.3
	Green Ash Upland Woodland	1.6	1.6	--
S3/S4	Western Wheatgrass Prairie	9.0	9.0	13.4
S4	Buckbrush Shrubland	--	3.3	13.4
	Buffaloberry Shrubland	0.1	3.4	--
	Total	**41.1**	**45.9**	**62.8**

Source: North Dakota Natural Heritage Inventory

3.4.2 Impacts

Impacts to these resources were determined by estimating the number of structures which would fall into the vegetation classifications (GAP data).

Agriculture (see Table 3.4-3)

Route A

Land use along Route A is dominated by agricultural cropland, which totals 55.6 percent of the area within the ROW. This route would have the least permanent impact on agricultural vegetation, which would total 1.7 acres of impact. Temporary impacts would occur during construction and would affect 330.8 acres.

Route B

Land use along Route B is dominated by agricultural cropland, which totals 60.4 percent of the area within the ROW. This route would have the greatest impact on agricultural vegetation, which would total 1.9 acres of permanent impact. Temporary impacts would occur during construction and would affect 385.1 acres.

Route C

Land use along Route C is dominated by agricultural cropland, which totals 58.4 percent of the area within the ROW. This route would have moderate impact on agricultural vegetation which would total 1.8 acres of permanent impact. Temporary impacts would occur during construction and would affect 350.5 acres.

Prairie, Woodland, and Wetland Vegetation (see Table 3.4-3)

Route A

This route has the greatest coverage of prairie areas, 13.6 percent of the ROW, which is only slightly greater than prairie coverage on the other route alternatives. The most common type of prairie habitat along the route is dominated by a mixture of bluestem, needlegrass, and wheatgrass. Permanent impacts (0.4 acres) to prairie areas would be limited to structure and fiber optic regeneration footprints. Temporary impacts are estimated around 80.7 acres, and would be related to construction activities.

Approximately 8.1 percent of the ROW is considered wetland, although final permanent impacts to wetlands would be limited to 0.2 acre. In some areas, wetlands may share similar characteristics as prairie areas, but in many cases are degraded or dominated by non-native vegetation. Impacts to wetland areas would be similar to the other two route alternatives.

Woodland impacts would be similar to the other route alternatives. Approximately 52.1 acres of woodlands would be converted into grassland or scrublands. Woodlands that may be considered of higher biological integrity could include the cottonwood floodplains in the vicinity of the proposed Missouri River crossing. This route has is the smallest area of floodplain forests of each route alternative.

Route B

This route would have the least impact on prairie areas, which total 11.2 percent of the ROW. Permanent impacts (0.4 acres) to prairie areas would be limited to structure footprints. Temporary impacts are estimated to be just over 71 acres, and would be related to construction activities.

Areas classified as wetland in the GAP data make up for 8.5 percent of the ROW, although final impacts to wetlands would be limited to 0.3 acre. In some areas, wetlands may share similar characteristics as prairie areas, but in many cases are degraded or dominated by non-native vegetation. Impacts to wetland areas would be similar to each route alternative.

This route would impact the greatest amount of woodland vegetation. Approximately 58.5 acres of woodlands would be converted into grassland or scrublands. Woodlands than may be considered of higher biological integrity could include the cottonwood floodplains in the vicinity of the proposed Missouri River crossing. This route has the greatest area of floodplain forests of each route alternative.

Route C

This route would have moderate impact on prairie areas, which total approximately 11.9 percent of the ROW. Permanent impacts (0.4 acres) to prairie areas would be limited to structure footprints. Temporary impacts are estimated to be just over 71 acres, and would be related to construction activities.

Areas classified as wetland in the GAP data make up for approximately 7.6 percent of the ROW, although final impacts to wetlands would be limited to 0.2 acre. In some areas, wetlands may share similar characteristics as prairie areas, but in many cases are degraded or dominated by non-native vegetation. Impacts to wetland areas would be similar to each route alternative.

Woodland impacts would be similar to the other route alternatives. Approximately 50.0 acres of woodlands would be converted into grassland or scrublands. Woodlands that may be considered of higher biological integrity could include the cottonwood floodplains in the vicinity of the proposed Missouri River crossing. This route would impact less area of floodplain forest than Route B and more than Route A.

Impaired and Vulnerable Terrestrial Communities (see Table 3.4-4)

Table 3.4-4 above and Table E-4 in Appendix E contain the acreages of impaired and vulnerable terrestrial communities within each route and segment alternative ROW.

Route A

This route would impact 41.1 acres of an impaired or vulnerable terrestrial community; the least of any alternative. This route would affect 7.0 acres of S1 ranked communities, more than Route B and less than Route C.

The most common type of rare community along this route is cottonwood-green ash floodplain forests, which are present along 11.4 acres of the ROW. Known occurrences of this community along this route are adjacent to the Missouri River crossing. Western wheatgrass and needle-and-thread mixed grass prairies are the next most frequent type of community present along this ROW, 9.0 acres each. These communities are overlapping and present along the eastern bluffs of the Missouri River.

Route B

This route would affect 45.9 acres of impaired or vulnerable terrestrial communities, 4.8 acres more than Route A and 16.9 acres less acres than Route C. This route avoids communities assigned an S1 conservation ranking.

The most common type of rare community along this route is cottonwood-green ash floodplain forests. Known occurrences of this community along this route are adjacent to the Missouri River crossing. Western wheatgrass and needle-and-thread mixed grass prairies are the next most frequent type of community present along this ROW, 9.0 acres each. These communities are overlapping and present along the eastern bluffs of the Missouri River.

Route C

This route would affect the greatest area of impaired or vulnerable terrestrial communities of the three routes being considered, totaling 62.8 acres. This route would also impact the greatest area of communities assigned an S1 conservation ranking, totaling 10.6 acres.

The most common rare communities along this route are 13.4 acres each of needle-and-thread grass mixed prairies, western wheatgrass prairies, and buckbrush shrubland. These communities are overlapping and are located along the western bluffs of the Missouri River.

3.4.3 Mitigation

Agriculture

Mitigation of impacts to agricultural vegetation is addressed in Section 3.2.3. Minnkota would conduct a structure staking review with landowners, to the extent practical.

Prairie, Woodland, and Wetland Vegetation

Impacts to native vegetation would be minimized, when possible, by spanning habitats of higher quality. Where spanning is not feasible, impacts to native vegetation would be mitigated by re-establishing similar native species once construction is complete. Areas of non-native vegetation would be re-vegetated using native species appropriate for the local habitat, if approved by the landowner, to the extent practical.

Final impacts to wetland vegetation would likely be smaller than those identified in this section, as structure placement would be selected to avoid placement in these areas when possible. Mitigation, if required, would be completed in consultation with the U.S. Army Corps of Engineers (USACE) under Section 404 Permit requirements. Wetlands that do not require a Section 404 permit would be restored to preconstruction conditions, to the extent practicable.

Impacts to woodland vegetation would occur within the entire ROW where these habitats are present. Minnkota would mitigate impacts to woodland areas using a 2:1 replacement ratio (based on the number of trees removed), per PSC requirements. If feasible, the replacement areas would be located in the vicinity of the impacts. Where functional woodlands would be removed (such as shelter belts), mitigation would be designed to replace the intended utility of the impacted woodland.

Impaired and Vulnerable Terrestrial Communities

Impacts to impaired and vulnerable terrestrial communities would be minimized in a similar manner as discussed above; however, BMPs to minimize the spread of non-native species would be employed. In impaired and vulnerable terrestrial communities, BMPs may include but not limited to the following actions:

- Where soil would be disturbed, the topsoil would be excavated separately from subsoil and stored in separate stockpiles.
- Disturbed soils would not be transported to a different location on the proposed Project.
- The time which areas of disturbed soils are left bare would be minimized.
- Disturbed areas would be revegetated using a native seed mix consistent with native communities present near the area of disturbance.

3.5 Wildlife

3.5.1 Description of Resources

General Wildlife

In general, wildlife species present within the Study Area are typical of agricultural landscapes, pasture grasslands, and wetland habitat. Common mammals for these habitats include raccoon *(Procyon lotor)*, skunk *(Mephitis spp.)*, red fox *(Vulpes vulpes)*, rabbits *(Syvilagus spp.)*, bats (*Myotis spp*.), white-tailed deer *(Odocorleus virginianus)*, and coyote *(Canis latrans)*. The secondary ranges of pronghorn (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*) include the western part of the route alignments. Typical birds include songbirds; waterfowl; raptors; and game birds, such as pheasant *(Phasianus colchinus),* gray partridge (*Perdix perdix*), and sharp-tailed grouse (*Tympanuchus phasianellus*). In general, birds nest in shelterbelts and fencerow trees, and on the ground in the grasslands associated with prairie remnants, conservation land, lightly grazed pasture, and riparian corridors.

The Missouri and Sheyenne rivers, in particular, provide corridors for migration and foraging of wildlife as well as ample cover for small mammals, raptors, waterfowl, upland game birds, and other common wildlife along the routes. Additionally, the area described as the Northwestern Great Plains Ecoregion, which includes the route areas from western Wells County west to the Missouri River, includes relatively large tracts of grassland that provide native habitat for a variety of grassland species (USGS 2006).

Species of Concern in North Dakota

The NHI provides a system for identifying and prioritizing ecologically significant natural features in the state. Plant and animal species documented in the NHI have been assigned global and state ranks that describe the relatively rarity of each species. The North Dakota Natural Heritage Program has used these ranks to help develop a list of plant and animal species considered to be Species of Concern in North Dakota (Dirk 2006a, b). Species of Concern include those plant and animal species that have populations considered at risk in the state of North Dakota; but North Dakota Species of Concern do not necessarily receive legal protection under state and/or federal endangered species acts. Federally listed species are discussed in Section 3.6.

Table 3.5-1 provides the Species of Concern documented in the NHI within one mile of the route alternatives. Species of Concern in North Dakota typically have been assigned a natural heritage state rank of S1, S2, or S3, as outlined below:

- **S1 Critically Imperiled** – Critically imperiled in the state because of extreme rarity or because some factor of its biology makes it especially vulnerable to extirpation from the state. Typically 5 or fewer occurrences or very few remaining individuals (less than 1,000). [Critically endangered in state.]
- **S2 Imperiled** – Imperiled in the state because of rarity or because of other factors making it very vulnerable to extirpation from the state. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000). [Endangered in the state.]
- **S3 Vulnerable** – Vulnerable in the state either because of rarity, or because it is found only in a restricted range (even if abundant at some locations), or because of other

factors making it vulnerable to extirpation. Typically 21 to 100 occurrences or between 3,000 to 10,000 individuals. [Threatened in the state.] (NDNHI 2009)

Since areas within the routes have been studied to varying degrees of completeness, the species represented by the NHI data best serve as a snapshot of the potential presence of sensitive species, and do not necessarily represent a comprehensive list of all sensitive species located within the route alternatives. Hence, when assessing species records it is important to consider the similarity of habitats when interpreting the available data.

In general, most Species of Concern are associated with high quality rare or unique habitats and landscape features. In the route alternatives, most Species of Concern observations occur along the Missouri and Sheyenne rivers (Figure 3.6-1). Other species observances not associated with a major river are associated with unique habitats, such as remnant native prairie, riparian woodlands, wetland complexes, or rock outcroppings.

Additionally, Table 3.5-1 summarizes known raptor nests, owl nests, and sharp-tailed grouse leks near the route alternatives. North Dakota Game and Fish Department (NDGF) has recorded sharp-tailed grouse lek areas in Grand Forks County, in the vicinity of the English Coulee Retention Dam, and in Sheridan County near the Prophets Mountain area.

Table 3.5-2 summarizes sensitive species near the segment alternatives. On March 29 and 30, 2010, aerial surveys for raptor nests occurred within the route alternatives. The data from this survey are summarized in Table 3.5-3 and Table 3.5-4.

Table 3.5-1. NHI Sensitive Species Data within and Adjacent to Route Alternatives

Location	Species	Route		
		A	B	C
Within Route	NHI Species of Concern	0	0	0
	Raptor Nests*	0	0	0
	Burrowing Owl Nests	0	0	0
Within 1 mile of Route	NHI Species of Concern	7	4	9
	Raptor Nests*	0	2	1
	Burrowing Owl Nests	0	0	0
Within 2 miles of Route	Sharp-Tailed Grouse Leks (within 2 miles of centerline)	21	3	5

**Raptor nests include bald eagle and ferruginous hawk. Does not include data from March 2010 raptor surveys. See Table 3.5-3 for March 2010 data.*

Table 3.5-2. NHI Sensitive Species Data within and Adjacent to Segment Alternative

Segment Alternatives	Within Segment Alternative			Within 1 mile of Segment Alternative			Within 2 miles of Segment Alternative
	NHI Species of Concern	Raptor Nests*	Burrowing Owl Nests	NHI Species of Concern	Raptor Nests*	Burrowing Owl Nests	Grouse Leks (within 2 miles of centerline)
A04	0	0	0	2	0	0	0
A15	0	0	0	0	0	0	4
A16	0	0	0	0	0	0	1
A17	0	0	0	0	0	0	1
A18	0	0	0	0	0	1	1
A21	0	0	0	4	0	0	0
A23	0	0	0	0	1	0	0
A38	1	0	0	2	0	0	0

Table 3.5-3. March 2010 Raptor Nest Survey Results within and Adjacent to Route Alternative

Distance	Feature Type	Route		
		A	B	C
Within Route	Raptor Nest	10	10	12
	Raptor Observed	2	10	1
Within 1,000 feet of Route Limits*	Raptor Nest	6	4	3
	Raptor Observed	0	2	0

Source: Minnkota 2010b
**Does not include area within routes*

Table 3.5-4. March 2010 Raptor Nest Survey Results within and Adjacent to Segment Alternative

Segment Alternatives	Within Route		Within 1,000 feet of Route Limits*	
	Raptor Nest	Raptor Observed	Raptor Nest	Raptor Observed
A15	1	0	1	0
A22	1	0	0	0
A27	2	2	0	0

Source: Minnkota 2010b
**Does not include area within routes*

3.5.2 Impacts

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

result of the activity. The direct and indirect effects, as listed below, would likely be the same for each route and segment alternative.

Direct effects could include:

- Direct habitat modification and reduction associated with construction clearing or grading;
- Removal of raptor nests (excluding bald and golden eagle nests) during the breeding season;
- Introduction of sediment and fugitive dust through erosion and runoff during construction;
- Potential for displacement of ground nesting birds, such as sharp-tailed grouse, from lekking areas, particularly where Route A crosses near the Prophets Mountains in Sheridan County.
- Exposure to contaminants from fuels and chemicals that are used during construction and operation; and
- Injury or mortality associated with collisions with construction equipment and/or overhead transmission lines. Collisions are discussed in more detail below.

Raptors, waterfowl, and other bird species may be affected by the construction and placement of the transmission line and associated facilities. Avian collisions are a possibility after the completion of the transmission line. Waterfowl may be susceptible to transmission line collision, especially if the line is placed between agricultural fields that serve as feeding areas, or between wetlands and open water, which serve as resting areas. The transmission line shield wire is the part of the structure that is most likely to cause an avian collision. Additionally, the west half of the routes pass through the whooping crane migration corridor, which is discussed in Section 3.6.

Indirect effects could include:

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

3.5.3 Mitigation

Minnkota would use the following minimization measures to address avian and other wildlife issues associated with the transmission line:

- Consultation with the USFWS and RUS would continue to identify areas where both of the transmission line shield wires would be considered for marking in an alternating pattern. As noted in Section 3.6, both of the shield wires would be marked in an alternating pattern, as appropriate, to mitigate for sections of routes near suitable whooping crane habitat within the whooping crane migration corridor.

- The transmission line would be designed with consideration of the guidance found in Avian Power Line Interaction Committee's (APLIC) *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*.
- Preconstruction surveys for wetlands and woodlands in the vicinity of the transmission line and associated facilities would be completed to minimize impacts to wildlife habitat.
- To discourage active nesting within parts of the ROW expected to be temporarily or permanently disturbed by the proposed Project, tree removal, ground clearing, or mowing would occur in late fall or early spring to discourage tree and ground nesting.
- If the ROW is not cleared in early spring before the breeding season, a qualified biologist would survey the construction ROW for active ground nests and provide a construction buffer.
- In case of permanent jurisdictional wetland impacts, any unavoidable loss of jurisdictional wetland habitat would be replaced with functionally equivalent wetlands, as required by applicable permits.
- Appropriate erosion control measures would be installed and maintained to reduce sediment transport to adjacent wetlands, streams, and river channels.
- If impacted, per the PSC requirement, trees would be replaced at a 2:1 ratio, subject to landowner approval.
- Avoid refueling vehicles within 100 feet of a waterway's edge to minimize the potential for hazardous-materials spills reaching the waterway.
- Prompt restoration and re-vegetation of disturbed areas.
- Use native plant seed stock for re-vegetation.

3.6 Threatened and Endangered Species

3.6.1 Description of Resources

The Endangered Species Act (ESA) of 1973, as amended, provides for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend. Section 7 of the ESA requires federal agencies to insure that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of listed species, or to modify their critical habitat. The RUS is developing a Biological Assessment to support their efforts to meet their responsibilities under Section 7(a) of the ESA. Through review of the BA, the RUS would make a determination of whether the proposed Project would or would not affect a listed species or adversely modify critical habitat.

Federally threatened species are those species likely to become endangered within the foreseeable future throughout all or a significant portion of their range. Federally endangered species are those species already in danger of extinction throughout all, or a significant portion of, their range. Federal candidate species are those species being considered for listing as endangered or threatened, but for which a proposed regulation has not yet been published in the Federal Register. Designated critical habitat is a specific geographic area(s) that is essential for the conservation of a threatened or endangered species and that may require special management and protection. Table 3.6-1 summarizes federally designated species and critical habitat that may occur within the routes.

Table 3.6-1. Federally Listed Species and Critical Habitat by Counties that are Crossed by Route Alternative

Species	Type	County Occurrences	Preferred Habitat	Habitat Present in Route
Endangered				
Interior least tern (*Sterna antillarum*):	Bird	Burleigh, McLean, Oliver	Nests along midstream sandbars of the Missouri and Yellowstone rivers.	Yes, all routes at Missouri River
Whooping crane (*Grus americana*)	Bird	All	Migrates through North Dakota during spring and fall. Prefers to roost in wetlands and stock dams with good visibility (i.e. no or minimal woody debris within wetland or on wetland fringe).	Yes, all routes
Pallid sturgeon (*Scaphirhynchus albus*)	Fish	Burleigh, McLean, Oliver	Known only from the Missouri and Yellowstone rivers. No reproduction has been documented in 15 years.	Yes, Missouri River
Gray wolf (*Canis lupus*)	Mammal	McLean, Oliver	Occasional visitor in North Dakota. Most frequently observed in the Turtle Mountains area of northern North Dakota.	No, all routes are greater than 75 miles from Turtle Mountains
Black-footed ferret (*Mustela nigripes*)	Mammal	Oliver	Exclusively associated with prairie dog towns. No records of occurrence in recent years, although there is potential for reintroduction in the future.	No, large prairie dog towns capable of sustaining a ferret population are not present within the routes

Species	Type	County Occurrences	Preferred Habitat	Habitat Present in Route
Threatened				
Piping plover (*Charadrius melodus*)	Bird	Burleigh, Eddy, Foster, McLean, Oliver, Sheridan, Wells	Nests on midstream sandbars of the Missouri and Yellowstone rivers and along shorelines of saline wetlands.	Yes, all routes at Missouri River
Candidate				
Dakota skipper (*Hesperia dacotae*)	Insect	Eddy, McLean, Wells	Found in native prairie containing a high diversity of wildflowers and grasses. Habitat includes two prairie types: 1) low (wet) prairie dominated by bluestem grasses, wood lily, harebell, and smooth camas; 2) upland (dry) prairie on ridges and hillsides dominated by bluestem grasses, needlegrass, pale purple and upright coneflowers, and blanket flower.	Possible, all routes
Designated Critical Habitat				
Piping plover (*Charadrius melodus*)	Bird	Burleigh, Eddy, McLean, Oliver, Sheridan	Missouri River - Critical habitat includes sparsely vegetated channel sandbars, sand and gravel beaches on islands, temporary pools on sandbars and islands, and the interface with the river. Alkali Lakes and Wetlands – Critical Habitat includes: (1) shallow, seasonally to permanently flooded, mixosaline to hypersaline wetlands with sandy to gravelly, sparsely vegetated beaches, salt-encrusted mud flats, and/or gravelly salt flats; (2) springs and fens along edges of alkali lakes and wetlands; and (3) adjacent uplands 200 feet above the high water mark of the alkali lake or wetland	Yes, all routes at Missouri River crossing; No designated alkali lake and wetlands within routes
Delisted				
Bald eagle (*Haliaeetus leucocephalus*)	Bird	Possible in all counties crossed by routes	The bald eagle has been recently delisted from the ESA. However, the bald eagle is still protected by other federal laws including: the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, and the Lacey Act.	Possible, all routes; aerial surveys conducted on March 2010 documented one eagle nest in Eddy County about 700 feet south of Route A (Minnkota 2010b)

Table 3.6-2 summarizes the known occurrence of federally threatened and endangered species within the route alternatives and one mile of the route alternatives. Table E-5 in Appendix E summarizes the known occurrence of federally threatened and endangered species within the segment alternatives and one mile of the segment alternatives. All NDPR occurrences represent past observation of piping plover and interior least tern along the Missouri River. USFWS has

also indicated that these points along the Missouri River represent historic nesting sites of piping plover and interior least tern.

Confirmed whooping crane migration sitings are scattered throughout the west half of the route alternatives, from about the city of Carrington westward.

Table 3.6-2. Number of Federally Listed Species Occurrences within Route Alternative and One Mile of Route Alternative

Distance	Species Occurrences	Routes		
		A	B	C
Within Route	NDPRD T&E Occurrences	0	2	0
	Whooping Crane Sightings	0	0	0
	Total T&E Species Observations	0	2	0
Within 1 mile of Route	NDPRD T&E Occurrences	5	5	1
	Whooping Crane Sightings	4	2	1
	Total T&E Species Observations	9	7	2

Table 3.6-3 summarizes bald eagles that were observed with or near the routes during March 29-30, 2010, aerial surveys. No eagles were observed near the segment alternatives during surveys (Minnkota 2010b).

Table 3.6-3. Bald Eagle Nests and Observations Within and Adjacent to Route Alternative

Distance	Feature Type	Routes		
		A	B	C
Within Route	Bald Eagles (Soaring)	0	0	0
	Bald Eagles (Perched)	5	4	0
	Total Bald Eagles Observed	5	4	0
Within 1,000 feet of Route Limits (does not include route)	Bald Eagle Nest	1*	0	0
	Bald Eagle (Nesting)	2	0	0
	Bald Eagles (Soaring)	0	0	6
	Bald Eagles (Perched)	3	3	3
	Total Bald Eagles Observed	5	3	9

**Eagle nest located about 700 feet south of Route A in Eddy County*

An active bald eagle nest was observed about 700 feet south of Route A in Eddy County. Most of the bald eagle observations (17 of 21 bald eagles plus an active eagle nest) were observed near the central part of the routes, within Foster, Eddy, and Well counties. Additionally, two eagles were noted along the Missouri River and two eagles were observed in Grand Forks County (Minnkota 2010b).

3.6.2 Impacts

Due to the linear nature of the proposed Project, impacts to potential terrestrial species habitat would be limited to the area within the ROW. Long-term habitat impacts would occur at permanent structure and fiber optic station locations and where tree clearing is required; short-

term impacts could occur at the 30-foot-wide temporary access road. Existing, adjacent habitat would be left undisturbed.

Table 3.6-4 summarizes potential impacts to federally listed species and critical habitat. Species with potential impacts are discussed in more detail in this section.

Table 3.6-4. Potential Impacts to Federally Listed Species and Critical Habitat

Species	Type	Direct Impact Anticipated	Indirect Impact Anticipated	Comment
Endangered				
Interior least tern (*Sterna antillarum*):	Bird	No	Possible	Routes B and C: cross historic nesting sandbars Route A: crosses within about 1,000 feet of historic nesting sandbars
Whooping crane (*Grus americana*)	Bird	Possible	Possible	All routes: run perpendicular to the migration corridor and include potential whooping crane stopover habitat
Pallid sturgeon *(Scaphirhynchus albus*)	Fish	No	No	All routes: no impacts to the Missouri River are expected
Gray wolf (*Canis lupus*)	Mammal	No	No	All routes: Greater than 75 miles from Turtle Mountains, an area that is occasionally used by gray wolf
Black-footed ferret (*Mustela nigripes*)	Mammal	No	No	All routes: no known populations in North Dakota; routes do not cross any known potential habitat (prairie dog towns)
Threatened				
Piping plover (*Charadrius melodus*)	Bird	No	Possible	Routes B and C: cross historic nesting sandbars, Route A: crosses within about 1,000 feet of historic nesting sandbars
Candidate				
Dakota skipper (*Hesperia dacotae*)	Insect	No	Possible	All routes: do not cross any known sites; however, habitat loss may occur if native prairie is impacted
Designated Critical Habitat				
Piping plover (*Charadrius melodus*)	Bird	No	Possible	All routes: the Missouri River sandbars, which is designated critical habitat, would be spanned by the transmission line
Delisted				
Bald eagle (*Haliaeetus leucocephalus*)	Bird	No	No	All routes: no eagle nests would be impacted by the Project; transmission line would meet APLIC guidelines

Interior Least Tern

Routes B and C span sandbars on the Missouri River that are known to have historically been used as nesting grounds by interior least tern (Figure 3.6-1). Route A spans the Missouri River about 1,000 feet north of an historic nesting grounds sandbar. Aerial photography from 2009 indicates that sandbars are still present at these locations (detailed route maps – Appendix B).

A direct impact to the interior least tern could occur in the event of a collision with the transmission line. While typical flight height information is not readily available, it is documented that, when searching for prey, the interior least tern hovers about 3 to 33 feet above water, which is lower than the expected height of the transmission line (Thompson et al. 1997). As such, direct impacts due to collision with the transmission line would be unlikely.

Structure locations would be designed to avoid direct impacts to nesting habitat. Minnkota proposes to cross the Missouri River in one span; therefore, no structures would be placed within the Missouri River or its sandbars. In addition, Minnkota proposes to cross the Missouri River near existing transmission lines. The proposed Project would not cause a loss, fragmentation, or modification of sandbar habitat.

Another direct impact could occur in the event that the installation of a new transmission line causes displacement of local nesting populations. The timing of construction at the Missouri River would be restricted such that construction activities would not be allowed during the nesting season from May through August. Minnkota proposes to construct at the Missouri River after August. Structure locations would be designed to avoid direct impacts to nesting habitat.

The primary indirect effect would be the potential for complete avoidance by interior least tern of the nesting habitat located near the area of the proposed transmission line during construction. Loss of suitable nesting habitat (sandbars) is a concern regarding the interior least tern, due to the natural shifting of sandbars within the Missouri River as sandbars constantly erode and are created due to sediment deposition.

Whooping Crane

Potential direct effects to whooping cranes would include mortality associated with collisions and permanent loss of habitat. According to the USFWS, collisions with power lines are the greatest known source of mortality for fledged whooping cranes. Specifically, Stehn and Wassenich (2007) stated that shield wires are the wires most often struck by birds in flight. During preliminary discussions, USFWS commented that a new transmission line has the potential to affect whooping cranes during their annual spring and fall migration through North Dakota (Ellsworth, pers. comm.). The proposed Project crosses perpendicularly to the east half of the whooping crane migration corridor (Figure 3.6-1). The western terminus of the transmission line is located within the center (50th percentile band) of the whooping crane migration corridor. Migrating cranes are most vulnerable to collisions with structures in the early morning or late evening when light levels are diminished, as they fly at very low altitudes between roost and foraging sites, or when flying at low altitude when starting or ending a migration flight, especially when thermal currents are minimal.

The Study 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 stopover habitat for numerous migratory birds. Construction of utility lines and roads, and the increased urban and industrial developments with the associated human disturbance near the Study Area have also negatively affected whooping cranes and migration habitat. Short-term direct impacts could occur in the event that a whooping crane is displaced from available stopover habitat during proposed Project construction. Long-term direct impact could occur in the event that installation of a new transmission line causes displacement from local stopover habitat.

Stehn and Wassenich (2007) stated that whooping cranes responded to marked lines and tried to avoid the lines. Minnkota proposes to mark both of the new transmission line shield wires in an alternating pattern of the proposed Project within 1 mile of suitable habitat in the whooping crane migration corridor. Minnkota would work with the USFWS and RUS to identify marker device spacing.

The primary indirect effect would be the potential for complete avoidance by whooping cranes of the stopover habitat located near the area of the proposed Project. Loss of migration habitat is a growing concern. In addition, searching for suitable stopover habitat may cause increased energy expenditure, or increase the exposure to hazards as birds are required to fly low for longer distances. The potential exists for this disturbance to affect the physical condition of the birds, placing energy demands and stressors on individuals at a critical point in their life cycle (migration). The increased disturbance could also place the cranes at greater risk of exposure to other hazards encountered during migration such as structures, hunters, disease, and predation.

Piping Plover

Routes B and C span sandbars on the Missouri River that are known to have historically been used as nesting grounds by piping plover. Route A spans the Missouri River about 1,000 feet north of a historic nesting grounds sandbar. The route and segment alternatives that cross the Missouri River are located within the Missouri River critical habitat. Aerial photography from 2009 indicates that sandbars are still present at these locations. See Figure 3.6-1.

A direct impact to piping plover could occur in the event of a collision with the transmission line. While typical flight height information is not readily available, piping plovers do spend much of their time walking or running rather than flying, because their inconspicuous sand-colored plumage makes them more difficult to see on the ground than if they flew and exposed their bright white underbody (Elliott-Smith et al. 2004). As such, direct impacts due to collision with the transmission line would be unlikely.

Structure locations would be designed to avoid direct impacts to nesting habitat. Minnkota proposes to cross the Missouri River in one span; therefore, no structures would be placed within the Missouri River or its sandbars. In addition, Minnkota proposes to cross the Missouri River near existing transmission lines. The proposed Project would not cause a loss, fragmentation, or modification of sandbar habitat.

Another direct impact could occur in the event that the installation of a new transmission line causes displacement of local nesting populations. The timing of construction at the Missouri River would be restricted such that construction activities would not be allowed during the nesting season from mid-April through August. Minnkota proposes to construct at the Missouri River after August. Since piping plovers may use alkali wetland habitats for nesting, Minnkota proposes to conduct pre-construction surveys for active nesting piping plovers within the ROW. If active nesting areas are identified during the surveys, Minnkota proposes to maintain a 0.5-mile buffer of the active piping plover nesting areas that may be identified outside of the Missouri River and designated critical habitat. Structure locations would be designed to avoid direct impacts to nesting sandbar habitat.

The primary indirect effect is the potential for complete avoidance by piping plovers of the nesting habitat located near the area of the proposed transmission line during construction. Loss of suitable nesting habitat (sandbars) is a concern regarding the interior piping plover, due to the

natural shifting of sandbars within the Missouri River as sandbars constantly erode and are created due to sediment deposition.

Pallid Sturgeon

The proposed Project crosses the Missouri River, which is habitat for the pallid sturgeon. The proposed Project would span the Missouri River and not require installation of structures within the river channel. Additionally, Minnkota proposes to place structures about 100 feet away from the river's existing bank to account for river flows that have the potential to erode the river's bank. No direct impacts are anticipated to the pallid sturgeon due to construction or operation of the transmission line.

The proposed Project would utilize BMPs that would limit indirect impacts from sedimentation and erosion during construction, such as silt fence, straw bales, and revegetation. The proposed Project would not change water temperature of the river. Minnkota would not refuel vehicles within 100 feet of the river's edge to minimize the potential for hazardous-materials spills reaching the river. No indirect impacts are anticipated to the pallid sturgeon due to construction or operation of the transmission line.

Gray Wolf

The gray wolf may pass through the Study Area, but viable gray wolf habitat does not occur in the Study Area. It is unlikely that gray wolves would be present during construction and operation, with the possible exception of an occasional transient animal. If gray wolves entered the proposed Project during construction they could be struck by vehicles, but the chance of collisions is considered negligible, particularly since posted speed limits would be very low.

The proposed Project would not have indirect effects on the gray wolf. In general, the Study Area and North Dakota do not provide suitable habitat for establishment of a viable wolf population. Any wolves that have occurred or may occur in the Study Area are rare, dispersing individuals from a core population in Minnesota, well to the east of the Study Area.

Black-Footed Ferret

Potential direct effects to black-footed ferrets include: permanent loss of habitat, eradication of prairie dog towns (food source), and predation from raptors. Potential black-footed ferret reintroduction habitat could be found in portions of Oliver County. No records of occurrence within the Study Area have been documented in recent years and there are no reintroduced populations near the Study Area. Minnkota would not eradicate a prairie dog town that may be a potential food source for the black-footed ferret. In addition, Minnkota would design their structures per APLIC guidelines that would reduce the ability of raptors to perch on the structures. This may reduce the opportunities for raptors to perch on the structures to prey on the black-footed ferret, if a population was reintroduced to the Study Area. No direct or indirect impacts are anticipated due to construction or operation of the transmission line.

Candidate Species – Dakota Skipper

The direct effect to the Dakota skipper would be loss of habitat. Generally, the proposed Project impacts would be limited to localized permanent impacts due to structure installation or temporary impacts due to construction activities. Much of the proposed route and segment alternatives are disturbed lands. Areas that are disturbed during construction would be reseeded following construction.

An indirect effect would be the application of pesticides or herbicides for noxious weeds. Operations and maintenance crews would avoid broadcast applications of pesticides or herbicides within the immediate vicinity of any Dakota skipper present at time of application.

Piping Plover Critical Habitat

All route alternatives cross the Missouri River, which is designated critical habitat.

No direct impacts within critical habitat are expected as the transmission line would span the Missouri River, with structures being placed about 100 feet away (back) from the river edge.

The transmission line conductors would occupy a height of about 80 feet above the ground, which could be considered an indirect impact.

3.6.3 Mitigation

Minnkota would continue to work with the RUS to develop the Biological Assessment.

Mitigation and minimization measures are expected to include:

- Designing and siting the transmission line and structures according to APLIC guidelines for minimization of electrocution and collision.
- Marking both shield wires of the transmission line in an alternating pattern with visual marking devices within 1 mile of suitable habitat in the whooping crane migration corridor. Minnkota will work with the USFWS and RUS to identify marker device spacing.
- Avoiding Lake Williams National Wildlife Refuge, which is designated critical habitat for the piping plover.
- Constructing the Missouri River crossing after August, which is outside of the breeding and fledgling season for the interior least tern and for the piping plover. The USFWS reports that the breeding season for the interior least tern lasts from May through August. The USFWS states that the breeding season for the piping plover in North Dakota extends from mid-April through August.
- Conducting pre-construction surveys for active piping plover nesting areas within the ROW. If active nesting areas are identified, Minnkota proposes to maintain a 0.5-mile buffer of the active piping plover nesting areas that may be identified outside of the Missouri River and designated critical habitat.
- Avoiding placing structures within the Missouri River channel and on sandbars of the Missouri River where interior least tern and piping plover nesting could occur.
- Constructing the Missouri River crossing near existing transmission line crossing.
- Maintaining a distance of at least 330 feet from active eagle nests, or 660 feet if the activity would be visible from the nest. Raptor nest surveys were completed in March 2010.
- Avoiding direct impacts to wetlands, native prairie, wooded draws or other sensitive habitat areas whenever feasible.
- Conducting ground clearing in the fall and winter prior to the nesting season. If ground clearing is not completed in the fall or winter, ground surveys for nesting birds would take place prior to construction.

- Replacing trees at a 2:1 mitigation ratio, per the PSC requirement and subject to landowner approval.
- Avoid refueling vehicles within 100 feet of a waterway's edge to minimize the potential for hazardous-materials spills reaching the waterway.

3.7 Surface Water and Floodplain Resources

3.7.1 Description of Resources

There are many surface water resources (lakes, rivers, and streams) within or adjacent to the route alternatives (Figure 3.7-1). The Missouri River is the largest watercourse that is crossed by the route alternatives and is associated with large sandbars and wooded riparian habitat. In general, perennial watercourses are more frequent in the eastern half or the routes. Lakes are fairly evenly scattered throughout the vicinity of the route alternatives. Wetlands are discussed in Section 3.8.

Rivers and Streams

Four perennial rivers and one canal are crossed by the route alternatives. Most streams and creeks are mapped as intermittent in nature, with the exceptions of Kelly Creek, Baldhill Creek, Pickerel Lake Creek, and Spring Creek, which are perennial within at least one route alternative crossing. Table 3.7-1 and Table 3.7-2 summarize surface waters crossed by the route and segment alternatives.

While most of the streams and creeks crossed by the route alternatives are intermittent in nature, aerial photography indicates that some of these intermittent surface waters may support open water for extended periods of time.

Mapped FEMA Floodplains

For the proposed Project, the Federal Emergency Management Agency (FEMA) data is only available for the Missouri River. At the route crossings, all Missouri River floodplain crossings are mapped as Zone A 100-year floodplains. Approximate FEMA floodplain widths are as follows:

- Route A—1.0 mile
- Route B—0.6 mile
- Route C—0.5 mile
- Segment Alternative A03—0.4 mile
- Segment Alternative A04—1.0 mile
- Segment Alternative A38—0.8 mile

Table 3.7-1. Surface Waters Crossed by the Route Alternative – From West to East

Surface Water	Number of Crossings			Comment
	Route A	Route B	Route C	
Named Rivers and Canal				
Missouri River - perennial	1	1	1	Approximate river width at crossing— Route A: 2,400 feet ; Route B: 1,700 feet; Route C: 1,800 feet;
McClusky Canal	2	2	2	Crossed in Sheridan Co. and McLean Co.; canal typically maintains perennial flow at crossings; surface water is typically 150-foot-wide or less at crossings, upper banks at Sheridan crossing may be more than 300 feet wide

Surface Water	Number of Crossings			Comment
	Route A	Route B	Route C	
James River - perennial	1	1	1	Route A crosses in Eddy Co. and Routes B and C in Foster Co.; river width is 150 feet or less at crossings
Sheyenne River - perennial	1	1	1	All crossings in Griggs Co.; Routes A and C cross at same location, the river is highly sinuous at the Route A/C crossing, meandering across an approximately 1,800-foot-wide apparent floodplain; river is typically 100 feet wide or less at crossings
Maple River - intermittent	--	1	--	Route B: Crossing is near stream headwaters, channel less than 100 feet wide with 600-foot-wide floodplain
Goose River and branches - perennial	3	2	2	Route A: River not mapped as perennial at crossing, Little Goose and N Branch Goose River also crossed; Route B: Perennial broad meanders at crossing, also crosses S Branch; Route C: Perennial oxbow backwaters at crossing, N Branch also crossed
Named Streams and Creeks with Open Water				
Yanktonai Creek - intermittent	1	1	1	Narrow meandering surface water that is crossed by all routes in McLean Co. near US 83
Painted Woods Creek - intermittent	1	1	1	All crossing in McLean Co.; Route A and B cross at same location
Rocky Run - intermittent	3	--	2	Route A: Crosses in Eddy Co. downstream of Route C crossing; stream generally 50 feet wide except for crossing at Rosefield Slough, which is about 400 feet wide Route C: Crosses in Wells Co. near stream headwaters
Pipestem Creek - intermittent	--	4	--	Three crossings in Wells Co., near creek headwaters; one in Foster Co. where creek is about 50 feet wide with an apparent 800-foot-wide floodplain
Kelly Creek - perennial	--	Parallels for 2.5 miles	1	Route B: Creek meanders within route for about 2.5 miles in Foster Co. Route C: Upstream of Route B, stream shows braided pattern at this location, but little surface water
Baldhill Creek - perennial	--	1	--	Route B: Crossed in Griggs Co., tight meanders within approximately 1,000-foot-wide floodplain
Pickerel Lake Creek -perennial	1	--	1	Routes A and C cross at same location; creek narrow (approximately 20 feet) at Griggs Co. crossing location
Beaver Creek - intermittent	--	--	1	Route C: Crossing near creek headwaters in Grand Forks Co.
Spring Creek - perennial	--	--	--	Route C: Creek appears to be ditched at crossing in Grand Forks Co.
Cole Creek - intermittent	--	1	--	Route B: Narrow creek crossing in Grand Forks Co.; farmed up to edge of creek
Elm Coulee - intermittent	--	1	--	Route B: Narrow coulee crossing in Grand Forks Co.; farmed up to edge of creek
Wilson Creek - intermittent	--	Parallels for 0.5 mile	--	Route B: Parallel ditched part of creek in Grand Forks Co.; farmed up to edge of creek

Surface Water	Number of Crossings			Comment
	Route A	Route B	Route C	
English Coulee - intermittent	5	1	1	Route A:Crosses coulee three meanders within 2.5 miles; crosses two ditched sections within 1.0 mile, near prairie substation Route B/C: Crosses ditched segment near prairie substation

Table 3.7-2. Surface Waters Crossed by the Segment Alternative – From West to East

Surface Water	Number of Crossings											Comment
	A01	A04	A12	A13	A17	A21	A23	A33	A34	A37	A38	
Named Rivers and Canal												
Missouri River - perennial	1	--	--	--	--	--	--	--	--	--	1	A01: Crossing Width: 1,800 feet. A38 Crossing Width: 1800 feet
McClusky Canal	--	1	1	--	--	--	--	--	--	--	--	A04: Crossed in McLean Co. A12: Crossed in Sheridan Co.
Sheyenne River - perennial	--	--	--	--	1	--	--	1	1	--	--	A17: River is highly sinuous at crossing in Griggs Co.; floodplain is about 4,000 feet wide A33: Minimal trees at this crossing in Griggs County; Crossing Width approximately 100 feet A34: River is highly sinuous at crossing in Griggs County; Crossing With approximately 100 feet
Goose River and Branches - perennial	--	--	--	--	--	3	1	--	--	--	--	A21: Two crossings of N Branch Goose River; one crossing of Goose River A23:Crosses Goose Creek
Named Streams and Creeks with Open Water												
Rocky Run - intermittent	--	--	--	1	--	--	--	--	--	--	--	A13: Project centerline may avoid crossing feature
Pickerel Lake Creek -perennial	--	--	--	--	1	--	--	1	--	--	--	A17: Creek narrow (app. 20 feet); native grasslands adjacent to creek A33:
Beaver Creek - intermittent	--	--	--	--	--	1	--	--	--	--	--	A21: Creek narrow (20 feet); sinuous at crossing
English Coulee – Intermittent	--	--	--	--	--	--	--	--	--	1	--	A37: Creek narrow (less than 50 feet) at crossing

Lakes

While some "lakes" in North Dakota are, in a traditional sense, actually large wetlands, for the purpose of this EA, lakes were identified according to surface waters that have been named

"Lake." Table 3.7-3 and Table 3.7-4 summarize lakes crossed by the routes and segment alternatives.

Table 3.7-3. Named Lakes Crossed by the Route Alternative – From West to East

Surface Water	Number of Crossings			Comment
	Route A	Route B	Route C	
Yanktonai Lake	1	--	--	500-foot-wide crossing at west side of lake; lake is approximately 30 acres in McLean Co.
Lake Norway	1	--	1	Route A/C: Crosses north side of 115 acre lake in Griggs Co.; crossing width ranges from 800 feet to 1,400 feet at route

Table 3.7-4. Named Lakes Crossed by the Segment Alternative– From West to East

Surface Water	Number of Crossings		Comment
	A12	A15	
Mertz Slough	1	--	170 acre deep-water wetland in Sheridan Co; crossed by route but avoided by project centerline
Long Lake	--	1	100 acre lake in Griggs Co.; bottleneck in center of lake may be spannable without crossing open water

3.7.2 Impacts

Rivers, Streams and Lakes

No direct short-term or long-term impacts to watercourses and lakes are expected as part of the construction and operation of the transmission line and associated facilities. All rivers, streams, and lakes would be spanned by the transmission line, including the crossing at the Missouri River.

The Devils Lake basin, located in northeastern North Dakota, has experienced dramatic increases in lake water levels. The current water level has inundated much of the surrounding area, causing displacement of residents and impacting surface transportation. The Sheyenne River was the natural outlet to Devils Lake at one time. Currently, the capacity of the constructed Devils Lake outlet may have to be increased to control flooding effects within the basin; as a result, flows within the Sheyenne River may increase.

Applicable BMPs would be utilized to prevent indirect impacts due to runoff, erosion and sedimentation, or blockage of drainageways.

Perennial water sources would be used to obtain water for dust suppression and the concrete batch plant. Water withdrawal for construction purposes would not be taken from USFWS wetland easements.

Mapped FEMA Floodplains

Floodplains, including mapped FEMA floodplains, would be spanned by the transmission line wherever feasible. At the Missouri River crossing, the 100-year FEMA floodplains appear to be too wide to be completely spanned by the transmission line. Based on the expected width of the Missouri River floodplain crossing, floodplain impacts may be as follows, assuming a 1,000-foot span between transmission structures within the floodplain:

- Route A—3 structures (235.5 square feet of permanent impacts)

- Route B—2 structures (157 square feet of permanent impacts)
- Route C—1 structures (78.5 square feet of permanent impacts)
- Alternative A03—0 to 1 structures (78.5 square feet of permanent impacts)
- Alternative A04—3 structures (235.5 square feet of permanent impacts)
- Alternative A38—3 structures (235.5 square feet of permanent impacts)

3.7.3 Mitigation

Rivers, Streams and Lakes

The proposed Project would require a number of water resource permits, including coverage under the NPDES General Permit for Storm Water Discharges Associated with Construction Activities and associated Storm Water Pollution Prevention Plan (SWPPP), Permit to Cross North Dakota Sovereign Lands, Section 404 Clean Water Act Permit, and Section 10 Rivers and Harbor Act Permit. The placement of transmission line structures, land clearing that involves soil disturbance, or placement of construction mats may be considered a discharge of fill material that would require a permit from the USACE pursuant to Section 404 of the Clean Water Act. These permits would require Minnkota to develop and implement BMPs for sediment and erosion control during construction and operation of the proposed Project to protect topsoil and adjacent surface and groundwater resources, and to minimize soil erosion. Typical BMPs may include:

- Locate structures and disturbed areas away from rivers and lakes, where practicable;
- Contain stockpiled material, fuel, and chemicals, away from stream banks and lake shorelines;
- Install sediment and erosion control measures prior to construction, in accordance with sediment and erosion control plans and permits; maintain in good working order for the duration of construction;
- Use turbidity control methods prior to discharging wastewater from concrete batching or other construction operations to streams or other surface waters;
- Spread topsoil and seed in a timely manner;
- Avoid use of fertilizers, pesticides, or herbicides in or near waterbodies, including wetlands;
- Fuel construction vehicles outside of waterbodies, including wetlands, and use appropriate spill prevention and containment procedures; and
- Implement procedures to minimize and control inadvertent fluid returns during horizontal directional drilling operations, if they are used.

If the proposed Project structures cannot be sited such that impacts to jurisdictional water resources are avoided, compensatory mitigation under a USACE Section 404 may be required to replace the loss of aquatic resource functions in the watershed. Compensatory mitigation could include the restoration, establishment, enhancement, or preservation of wetlands or other aquatic resources to off-set proposed Project impacts.

Minnkota would work with the USACE to determine the 100-year flood stage of the Sheyenne River and place structures about 2 feet above the 100-year flood stage. This would accommodate

potential flood effects on the Sheyenne River due to proposed improvements to the outlet of Devils Lake.

Dust suppression measures would be conducted by the foundation contractor who would build and maintain the ROW during construction. Minnkota or the foundation contractor would apply for a permit from the State Water Commission for water appropriations related to construction purposes.

Mapped FEMA Floodplains

Minnkota would work with local planning and zoning commissions to obtain any applicable permits and approvals for potential impacts within the FEMA 100-year floodplain at the Missouri River crossing.

3.8 Wetlands

3.8.1 Description of Resources

The route alternatives span an area that is generally described as part of the prairie pothole region. The prairie pothole region is characterized by numerous shallow freshwater lakes and wetlands that pockmark the landscape. This region, which extends from Canada south to South Dakota and Minnesota, provides waterfowl habitat that is estimated to produce 50 to 75 percent of North American waterfowl in any given year (Witsch et al. 2000).

The ecology of these wetlands is dictated by seasonal wet-dry cycles. Snowmelt and spring rains serve as the primary water sources, resulting in many seasonal wetlands than hold surface water early in the growing season and then dry out as the summer progresses. While some of these wetlands can be quite large greater than 100 acres, the majority of pothole wetlands are less than 10 acres.

Some of these wetlands may have relatively high salinities that support plant communities that are tolerant of salty conditions. Saline wetlands, in some parts of North Dakota, also provide nesting habitat for the federally threatened piping plover.

Within the Study Area, wetlands tend to be most dense west of eastern Steele County, which forms the boundary of the Lake Agassiz Plain. In general, wetlands in the west half of the proposed Project (from Wells County west) have been less disturbed by agricultural practices and, thus, retain a more natural state.

Wetlands are identified as shallow water systems that provide unique functions and values to the surrounding landscape, such as water quality protection, wildlife habitat, and flood storage. Wetlands connected to Waters of the U.S. (i.e. not isolated basins) are protected under Section 404 of the Clean Water Act and are regulated by USACE and the U.S. Environmental Protection Agency (EPA). Wetlands within the routes may also be held in a USFWS wetland easement or grassland easement. The approximate locations and numbers USFWS easements within the route and segment alternatives are identified in Figure 3.2-3 and Table 3.2-2.

For this EA, general wetland locations were obtained from the National Wetland Inventory (NWI) (Figure 3.7-1). Wetlands are located throughout the routes; the various wetland types are shown in Table 3.8-1. Table 3.8-2 shows NWI wetlands within the segment alternatives. Table 3.8-3 outlines NWI wetlands within the route ROW. NWI data represent general locations and acreages of wetlands within the route alternatives. Since NWI data in North Dakota may not reflect the true size of wetlands, wetland size was also verified by the use of aerial photography that is dependent on the year the photograph was taken and the level of water in the wetland at that time. Therefore, in October 2010, Minnkota conducted an aerial photo review and field delineation of wetland features where access permitted. When a route centerline is selected, additional surveys for wetland resources would occur in the spring of 2011 after the snow melt.

Table 3.8-1. NWI Wetlands Identified within Route Alternative

Wetland Type	Route A		Route B		Route C	
	Acres	Percent	Acres	Percent	Acres	Percent
Freshwater Emergent Wetland	1,676.6	5.6	1857.5	5.7	1,665.9	5.5
Freshwater Forested/Shrub Wetland	20.5	0.1	21.5	0.1	23.6	0.1
Freshwater Pond	62.8	0.2	34.8	0.1	22.1	0.1
Lake	25.1	0.1	21.5	0.1	19.9	0.1
Riverine	70.7	0.2	67.8	0.2	55.4	0.2
Total	**1,855.7**	**6.2**	**2003.1**	**6.2**	**1,786.9**	**5.9**

Source: USFWS NWI.

Table 3.8-2. NWI Wetlands Identified within Segment Alternative

Segment Alternative		Freshwater Emergent Wetland	Freshwater Forested/Shrub Wetland	Freshwater Pond	Lake	Other	Riverine	Total
A01	Acres	0.4	0.0	1.4	0.0	0.0	0.0	**1.8**
	Percent	0.2	0.0	0.7	0.0	0.0	0.0	**0.9**
A02	Acres	2.5	0.0	0.9	0.0	0.0	0.0	**3.4**
	Percent	0.2	0.0	0.1	0.0	0.0	0.0	**0.3**
A03	Acres	7.5	0.0	1.2	0.0	0.0	39.5	**48.1**
	Percent	1.1	0.0	0.2	0.0	0.0	5.7	**7.0**
A04	Acres	7.4	6.5	0.2	0.0	0.0	55.3	**69.4**
	Percent	2.4	2.1	0.1	0.0	0.0	17.8	**22.3**
A05	Acres	4.3	0.0	0.0	0.0	0.0	0.0	**4.3**
	Percent	1.7	0.0	0.0	0.0	0.0	0.0	**1.7**
A06	Acres	9.1	0.0	0.2	0.0	2.6	0.0	**12.0**
	Percent	1.9	0.0	0.0	0.0	0.5	0.0	**2.5**
A07	Acres	119.7	0.1	0.6	32.4	0.0	0.0	**152.8**
	Percent	7.6	0.0	0.0	2.0	0.0	0.0	**9.7**
A08	Acres	88.0	0.0	0.0	0.0	0.0	0.0	**88.0**
	Percent	10.0	0.0	0.0	0.0	0.0	0.0	**10.0**
A09	Acres	4.1	0.0	0.0	0.0	0.0	0.0	**4.1**
	Percent	3.5	0.0	0.0	0.0	0.0	0.0	**3.5**
A10	Acres	34.8	0.0	0.0	0.0	0.0	0.0	**34.8**
	Percent	18.7	0.0	0.0	0.0	0.0	0.0	**18.7**
A11	Acres	6.1	0.4	0.0	0.0	0.0	0.0	**6.5**
	Percent	5.1	0.3	0.0	0.0	0.0	0.0	**5.4**
A12	Acres	103.7	0.0	0.3	0.0	0.0	0.0	**104.0**
	Percent	12.4	0.0	0.0	0.0	0.0	0.0	**12.4**
A13	Acres	92.9	0.0	0.2	0.0	0.0	0.0	**93.1**
	Percent	12.8	0.0	0.0	0.0	0.0	0.0	**12.8**
A14	Acres	117.1	0.0	0.7	0.0	0.0	0.0	**117.7**
	Percent	13.8	0.0	0.1	0.0	0.0	0.0	**13.9**
A15	Acres	78.1	0.0	0.8	0.0	0.0	0.0	**78.9**
	Percent	9.4	0.0	0.1	0.0	0.0	0.0	**9.5**
A16	Acres	4.5	0.0	0.0	0.0	0.0	0.0	**4.5**
	Percent	8.2	0.0	0.0	0.0	0.0	0.0	**8.2**

Segment Alternative		Freshwater Emergent Wetland	Freshwater Forested/Shrub Wetland	Freshwater Pond	Lake	Other	Riverine	Total
A17	Acres	6.4	0.0	0.0	0.0	0.0	0.0	**6.4**
	Percent	13.0	0.0	0.0	0.0	0.0	0.0	**13.0**
A18	Acres	355.4	0.0	0.6	0.0	0.0	2.4	**358.3**
	Percent	10.1	0.0	0.0	0.0	0.0	0.1	**10.1**
A19	Acres	35.6	2.4	0.1	0.0	0.0	0.0	**38.2**
	Percent	4.9	0.3	0.0	0.0	0.0	0.0	**5.2**
A20	Acres	68.9	0.0	0.1	0.0	0.0	0.0	**68.9**
	Percent	10.3	0.0	0.0	0.0	0.0	0.0	**10.3**
A21	Acres	66.1	0.0	4.7	9.1	0.0	0.0	**79.8**
	Percent	7.6	0.0	0.5	1.0	0.0	0.0	**9.2**
A22	Acres	2.5	0.0	0.0	0.0	0.0	0.0	**2.5**
	Percent	1.4	0.0	0.0	0.0	0.0	0.0	**1.4**
A23	Acres	90.1	0.0	6.0	0.0	0.0	6.4	**102.6**
	Percent	5.0	0.0	0.3	0.0	0.0	0.4	**5.7**
A24	Acres	18.5	0.0	0.0	0.0	0.0	0.0	**18.5**
	Percent	7.8	0.0	0.0	0.0	0.0	0.0	**7.8**
A25	Acres	1.2	0.0	0.0	0.0	0.0	0.0	**1.2**
	Percent	0.4	0.0	0.0	0.0	0.0	0.0	**0.4**
A26	Acres	14.6	0.0	0.0	0.0	0.0	0.0	**14.6**
	Percent	1.4	0.0	0.0	0.0	0.0	0.0	**1.4**
A27	Acres	87.7	0.4	0.6	0.0	0.0	0.0	**88.7**
	Percent	2.3	0.0	0.0	0.0	0.0	0.0	**2.3**
A28	Acres	15.2	1.3	0.0	0.0	0.0	0.0	**16.6**
	Percent	2.3	0.2	0.0	0.0	0.0	0.0	**2.5**
A29	Acres	55.3	0.0	0.2	0.0	0.0	0.0	**55.4**
	Percent	8.8	0.0	0.0	0.0	0.0	0.0	**8.9**
A30	Acres	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	Percent	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
A31	Acres	0.0	0.0	0.9	0.0	0.0	0.0	**0.0**
	Percent	0.0	0.0	0.1	0.0	0.0	0.0	**0.0**
A32	Acres	4.0	0.0	0.0	0.0	0.0	0.0	**4.0**
	Percent	1.7	0.0	0.0	0.0	0.0	0.0	**1.7**
A33	Acres	27.7	0,0	1.3	0,0	0.0	2.2	**31.2**
	Percent	3.2	0.0	0.2	0.0	0.0	0.3	**3.6**
A34	Acres	5.1	1.2	1.5	0.0	0,0	5.5	**13.3**
	Percent	3.6	0,9	1.1	0.0	0.0	3.9	**9.4**
A35	Acres	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	Percent	0.0	0.0	0.0	0.0	0.0	0.0	0.0
A36	Acres	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	Percent	0.0	0.0	0.0	0.0	0.0	0.0	0.0
A37	Acres	3.3	1.5	0.0	0.0	0.0	0.0	**4.8**
	Percent	0.3	0.2	0.0	0.0	0.0	0.0	0.5
A38	Acres	0.0	0.7	0.0	0.0	0.0	5.9	**6.6**
	Percent	0.0	1.8	0.0	0.0	0.0	15.5	17.3

Table 3.8-3. NWI Wetlands Identified within Route Alternative Right-of-Way

Wetland Type	Route A		Route B		Route C	
	Acres	Percent of ROW	Acres	Percent of ROW	Acres	Percent of ROW
Freshwater Emergent Wetland	255.1	5.7	272.3	5.6	236.2	5.2
Freshwater Forested/Shrub Wetland	3.5	0.1	2.7	0.1	3.7	0.1
Freshwater Pond	7.7	0.2	7.0	0.1	2.1	0.0
Lake	3.8	0.1	2.7	0.1	3.4	0.1
Riverine	9.4	0.2	9.2	0.2	7.9	0.2
Total	**279.5**	**6.2**	**293.9**	**6.0**	**253.3**	**5.6**

3.8.2 Impacts

Wetland impacts would be avoided or minimized through careful siting of the transmission line and associated facilities. Wetland basin locations on USFWS easements need to be identified, with the assistance of the USFWS, prior to construction. If construction activities are likely to impact wetlands regulated by USACE or the USFWS, Minnkota would notify the appropriate agency(s) and initiate the permit process.

Assuming that the transmission line would be centered within the route, all route alternatives would require permanent impacts to wetlands that are wider than the maximum transmission line span of about 1,000 feet. Additionally, segment alternatives A07 and A18 would likely result in permanent wetland impacts. Table 3.8-4 summarizes crossings greater than 1,000 feet for the routes. Table E-6 (Appendix E) summarizes crossings greater than 1,000 feet for the segment alternatives. As noted above, some of the NWI data may not accurately reflect the true wetland size. Wetland surveys would indicate actual wetland size. Wetlands within a 30-foot-wide construction ROW access road would also be temporarily impacted during construction. See Table 3.8-5 for a summary of the estimated permanent impacts for route alternatives. See Table E-6 (Appendix E) for a summary of the estimated permanent and temporary impacts by segment alternative.

Table 3.8-4. Route Alternative Crossings of NWI Wetlands Greater than 1,000 Feet

Estimated NWI Wetland Crossing Distance	Route A		Route B		Route C	
	Number of Crossings	Number of Structures	Number of Crossings	Number of Structures	Number of Crossings	Number of Structures
1,000-2,000 Feet	4	4	7	7	2	2
2,000-3,000 Feet	1	2	1	2	6	8
3,000-4,000 Feet	0	0	1	3	0	0
Total	**5**	**6**	**9**	**12**	**8**	**10**

Table 3.8-5. Estimated NWI Wetland Impacts within Route Alternative Right-of-Way

Description	Routes		
	A	B	C
Estimated Permanent Wetland Impacts			
Estimated number of structures in NWI wetland	6	12	10
Estimated Acreage of Permanent Impacts (square feet)	0.01 (471)	0.02 (942)	0.02 (785)

3.8.3 Mitigation

Permanent impacts to wetlands would be avoided to the extent practicable through refinement of Project design. The majority of the wetlands that may be permanently impacted by the proposed Project appear to be isolated basins that likely do not fall under USACE jurisdiction. Surveys for USACE jurisdictional wetlands would be completed prior to construction. Permanent impacts to jurisdictional wetlands and waters would be mitigated according to the USACE regulatory requirements, as applicable. Permanent impacts to wetlands under USFWS easements would be avoided if feasible.

Minnkota would use BMPs during construction and operation of the transmission line and associated facilities to protect topsoil and adjacent wetland resources and to minimize soil erosion. Practices may include containing excavated material, protecting exposed soil, stabilizing restored material, and revegetating disturbed areas with native species.

3.9 Geologic and Groundwater Resources

This section describes the geologic and groundwater resources that are crossed by the route and segment alternatives, the potential impacts of the routes and segment alternatives on those resources, and potential mitigation measures to reduce or eliminate those potential impacts.

3.9.1 Description of Resources

This section describes the geologic and groundwater resources present within the Study Area. The Study Area is defined as the 1,000-foot-wide routes proposed for Routes A, B, and C, and the segment alternatives. Descriptions of the surficial and bedrock geology were obtained from digital GIS-based files obtained from the North Dakota Geological Survey, except as noted.

Geology

Most of the Study Area is underlain by Quaternary-age glacial sediments deposited by glacial ice originating from the Keewatin Ice Sheet. Glacial till of the Coleharbor Group is the dominant type of surficial sediment. Bluemle (2006) describes the till as an unsorted, unbedded mixture of boulders, gravel, and sand in a matrix of silt and clay, yellowish-brown to olive-gray in color. Smaller pockets of cross-bedded sand, also part of the Coleharbor Group, exist near some streams. The most extensive (approximately 10 miles) of these is near Baldhill Creek in Griggs County. Coleharbor Group thickness averages 100 feet in the Study Area. Recent-age sediments, in the form of river-deposited clay, silt, and sand, and windblown sand, underlie most of the remainder of the Study Area. The only part of the Study Area where glacial and post-glacial sediments are absent is in the Sheyenne River valley, where the Pierre Formation (bedrock) has been exposed through erosion effects of the river and its tributaries.

Bedrock in the eastern two-thirds of the Study Area is primarily shale formed in offshore marine environments during the Cretaceous Period. The Pierre, Niobrara, and Belle Fourche formations are the major shale units present, and they range in thickness from 75 to 700 feet. Bedrock in the western third of the Study Area is composed of sandstone and lignite of the Tertiary and Cretaceous periods, which is generally 400 to 650 feet thick.

Groundwater

Groundwater resources in the Study Area exist in both surficial (unconsolidated) and bedrock aquifers. Major surficial aquifers are composed of river alluvium, such as along the Missouri River, and glacial outwash. These types of aquifers tend to be long and narrow in shape, and are not widespread in the Study Area. The Spiritwood Aquifer is a significant sand and gravel aquifer that trends north-to-south and intersects the Study Area in Griggs County. This aquifer is composed of sand and gravel that was deposited in a pre-existing bedrock valley, and is overlain by till in many areas. The depth to groundwater varies widely across the Study Area, and ranges from near the ground surface adjacent to streams, to more than 100 feet in topographically high areas underlain by thick till sequences.

3.9.2 Impacts

The overall impact of the proposed Project on environmental and economic viability of geologic and groundwater resources would be negligible. Impacts would be limited to the displacement of surficial sediments, bedrock, and groundwater during construction of structure foundations. The borings for structural foundations would be drilled into the ground, and may extend 40 to 100 feet below ground surface depending on soil conditions and structure type. Boring diameter is expected to be 7 to 10 feet. Given these values, the maximum volume of displaced soil and

groundwater would be about 7,854 cubic feet (291 cubic yards) at a structure location. Construction spoils, including soil cuttings and boring stabilization fluids, would be disposed of off site. Topsoil would be left on site, if desired by the landowner. Groundwater from dewatering would be discharged on-site into an approved BMPs structure.

The storage and use of fuels, greases, and other chemicals during construction has the potential to impact geologic materials and groundwater. In addition, there is potential for construction activities to encounter previously contaminated soil.

3.9.3 Mitigation

Impacts to geologic and groundwater sources may be avoided and/or mitigated by the following:

- The depth and diameter of structure foundations would be minimized during the design phase.
- In the event that previously contaminated soils are discovered during construction, the contractor would stop work immediately, contact the appropriate state agency, and consult with the agency with respect to an acceptable plan of action.
- A SWPPP would be produced that includes procedures for proper storage and disposal of all hazardous and non-hazardous wastes generated during the construction process.
- Controlled staging areas would be used for refueling, for hazardous material loading and unloading operations, and to provide adequate spill cleanup materials and equipment. In the event that a spill did occur and cause damage to soil productivity, Minnkota could restore the productivity of the ROW. Spill impacts, if any, would be mitigated in compliance with applicable federal, state, and local cleanup standards.

3.10 Cultural Resources and Historic Properties

Federal legislation and executive orders require consideration of the cultural and historical environment by federal agencies. In particular, the National Historic Preservation Act of 1966, as amended ((NHPA)(16 U.S.C. § 470 et seq.)), requires federal agencies to take into account the effect their actions may have on historic properties and consult on those effects with interested parties prior to carrying out such actions. The Advisory Council on Historic Preservation has developed regulations to guide agencies in implementing the requirements of Section 106 of the NHPA, (36 CFR Part 800) NEPA also requires that federal agencies assess their actions' effects on the human environment, which includes the natural and the physical (e.g., buildings) environment, and the relationships of people to that environment.

All federal agencies whose actions may constitute an undertaking (such as providing permits or funding for a project) have responsibilities under the NHPA, however, the lead federal agency for NHPA compliance on this proposed Project is the RUS. RUS is coordinating compliance between the Section 106 procedures and the steps taken to meet NEPA requirements. As such, studies and analyses conducted to comply with NEPA, including this EA, would be used and expanded as appropriate by RUS to meet the requirements of Section 106. Pursuant to 36 CFR § 800.2(d)(3), as part of its NEPA and Section 106 coordination, RUS has used its NEPA procedures to meet its requirements for public involvement under 36 CFR Part 800.

Consultation

The alternatives addressed by the EA cross a large area of North Dakota that was originally inhabited by several Native American tribal groups. The modern day descendants of those original inhabitants are currently spread out over a large area, including other states, such as Minnesota, Wyoming, Nebraska, and South Dakota. As the tribes retain concerns and interests in much of the Study Area, Minnkota began to elicit information from tribal governments and Tribal Historic Preservation Offices (THPOs) early in the project planning process. The efforts of Minnkota and RUS to consult with the interested tribes are outlined in Section 5.3 of this document.

3.10.1 Description of Resources

Although there is no one accepted definition, the federal government generally considers "cultural resources" to refer to historic, aesthetic, and cultural aspects of the human environment. These can include natural and built resources, and the relationship that people have to those resources. Those cultural resources that meet specific evaluation criteria developed by the National Park Service (NPS) may qualify for listing in the National Register of Historic Places (NRHP). Those cultural resources listed on or eligible for listing on the NRHP are designated "historic properties" under the NHPA. Historic properties can include archaeological and historical resources as well as traditional resources and use areas identified as having special meaning for specific communities. Archaeological and historic resources are those places that represent the visible or otherwise tangible record of human occupation. These resources vary in size, shape, condition, and importance, among other considerations; some are clearly evident on the landscape, while others are buried or only visible to knowledgeable people. For the purpose of this EA, archaeological resources are typically underground or at the surface, while historic resources include standing structures such as bridges and buildings.

Pursuant to 36 CFR § 800.16(d), the area of potential effects (APE) is defined as the area within which Minnkota's proposal has the potential to either directly or indirectly affect historic

properties that may be present. Currently, the APE includes a 1000-foot corridor of the proposed routes and segments for each build alternative under consideration in this EA for archaeological resources. However, the APE also must address visual effects. Given the height of the proposed structures, this proposed Project could alter a historic property's integrity by diminishing its setting or feeling. Accordingly, the APE is 2 miles from the build alternative centerline, but would be adjusted and refined as RUS learns more about the historic properties that might be present and the proposed Project's specific effects on them.

Minnkota and its consultant reviewed available records of identified cultural resources, including but not limited to those provided by the North Dakota State Historic Preservation Office (SHPO), to avoid them to the greatest extent possible, taking into consideration other natural resources and existing conditions. Minnkota recognizes that the list of known resources is limited to those identified though surveys in specific locations, often tied to urban and rural development and infrastructure. Resources are typically categorized by type with an indication of relative importance, more exactly whether or not these resources are significant. The database information provided by SHPO, however, did not include specific information or details on the type of property listed, and was useful mainly in identifying site location. The standard significance is one applied by federal agencies for compliance with federal regulations, typically Section 106 of the NHPA (as amended), and is useful when determining sites to avoid. Where sites have not been evaluated for significance (and therefore for determination of eligibility for listing on the NRHP) and may be physically impacted by the proposed Project, Minnkota would follow steps outlined in a Programmatic Agreement (PA) to determine eligibility and mitigation of adverse effects.

The following section presents the results of a search of available background information for the route and segment alternatives. Physical avoidance of resources was a consideration in locating route and segment alternatives for the proposed Project. Any historic property that cannot be avoided would be treated according to stipulations outlined in a Programmatic Agreement between RUS, SHPO, and other interested parties.

As mentioned above, the available background information illustrates the limited extent of previous archaeological site inventories. Archaeological inventories of the route and segment alternatives are being conducted, so it is not possible to quantify the entirety of the potential archaeological impacts and use that information during the route selection process. Archaeologists often develop predictive models based on a number of factors, including but not limited to areas immediately adjacent to permanent water sources. According to this commonly used modeling factor, these environments have a higher probability to contain pre-contact archaeological sites because of the possible variety and abundance of potable water and flora and fauna resources. This water-based factor has been referenced during coordination among state agencies and the SHPO for this proposed Project. Other areas having potential for spiritual or archaeological sites were brought up during consultation meetings and include areas of higher elevation adjacent to water sources, as well as lower terraces along waterways and drainages.

Therefore, Minnkota and its consultant reviewed the location of route and segment alternatives relative to known aquatic environments. The GAP analysis shows that Route C would impact fewer acres of aquatic environments than Routes A and Route B. One would expect, supposing that pre-contact archaeological sites are more common near permanent water sources, that fewer such sites would be impacted by the construction and operation of Route C.

Minnkota and its consultant are conducting field surveys and associated activities where access is permitted in the APE. Physical avoidance of resources would be preferred, but should a historic property be identified and not avoided, Minnkota and RUS would work with state agencies and the SHPO to resolve questions of significance and mitigation if necessary, as outlined in the PA.

Ongoing Resource Identification

Minnkota is committed to identifying and avoiding impacts to additional resources that may be within the route that have not yet been recorded. In anticipation of route selection, a pedestrian survey of the preferred route in selected areas with good surface visibility began in October 2010. These areas included pastures, fallow fields, and cultivated fields. During the pedestrian survey, field crews noted when proposed testing locations were not accessible because of unharvested crops and noted areas recommended for additional testing. Subsurface testing of selected areas began after the pedestrian survey in late October 2010.

When a route centerline is selected, additional survey for architectural resources as well as archaeological resources will occur. Architectural resource survey and inventory can occur during the winter months, but additional archaeological survey is dependent on weather conditions. It is presumed that the archaeological survey would be completed after winter snows have melted and frost is out of the ground during the spring of 2011.

3.10.2 Archaeological Impacts

Minnkota and its consultant reviewed records sent from the SHPO to identify known archaeological resources within one mile of the centerline of the route and segment alternatives. The literature review also included reports of previously surveyed areas relevant to the Study Area and Government Land Office maps. Results were requested for parts of Oliver, Burleigh, McLean, Sheridan, Wells, Eddy, Foster, Griggs, Steele, Grand Forks, and Traill counties. Section-specific discussions of archaeological sites within one mile of the centerline of the route and segment alternatives are provided below. The resources are grouped into seven categories to aid in assessment. These are Mound sites (sites with or without burials or additional features), Stone Features (sites containing circles, cairns, effigies or other stone alignments), Isolated Finds (single or very few chipped or ground stone flakes, tools, or broken tools), Cultural Material Scatter (chipped stone, animal bone, tools, or ceramics, either historic or prehistoric), Habitation (prehistoric earthlodges, hearths, caches, depressions), Multicomponent (containing both prehistoric and historic habitation materials or features), Unknown (not enough information on site form to categorize the site), and Historic Districts.

In addition to the resources listed below, the Spirit Lake Nation Reservation in Benson County is located approximately 20 miles north of the Study Area and the Knife River Indian Villages National Historic Site is located south of Washburn on the west end of the Study Area. These resources would not be impacted during construction or operation of the proposed Project.

Since the actual ROW would be narrower than the route and segment alternatives studied, Minnkota anticipates that all direct impacts to archaeological resources could be avoided by spanning or shifting the transmission line ROW.

Route A

Fifty-four archaeological resources were previously recorded within 1 mile of the Route A centerline. There are no sites within 1 mile of the Route A centerline that are listed on or recorded as eligible for listing on the NRHP, and no historic districts; however, none of the 54

sites have been formally evaluated for listing. Within 1 mile of Route A there are 9 mound sites, 5 stone feature sites, 15 isolated finds, 23 cultural material scatters, 0 habitation sites, 2 unknown sites, and 0 multicomponent sites. Table F-1 in Appendix F provides additional site detail.

No previously recorded archaeological resources within 1 mile of Route A centerline would be directly impacted by construction or operation of the proposed Project.

Route B

Fifty-two archaeological resources were previously recorded within 1 mile of the Route B centerline. There is one site listed as eligible or recommended eligible for the NRHP and there are no historic districts; however, none of the 52 sites have been formally evaluated for listing. Within one mile of Route B there are 0 mound sites, 6 stone feature sites, 15 isolated finds, 28 cultural material scatters, 1 possible habitation site, 0 multicomponent sites, and 1 unknown site. There is also 1 site that may be a historic school site. Table F-2 in Appendix F provides additional site detail.

No previously recorded archaeological resources within 1 mile of Route B centerline would be directly impacted by construction or operation of the proposed Project.

Route C

Seventy-eight archaeological resources were previously recorded within 1 mile of the Route C centerline. One site is eligible for listing on the NRHP and one Historic District (Cross Ranch Archaeological District). The other 77 sites that have not been evaluated for listing on the NRHP include 7 mound sites, 27 stone feature sites, 14 isolated finds, 23 cultural material scatters, 3 habitation sites, 2 unknown sites, and 1 multicomponent site. It should be noted that the Cross Ranch Archaeological District contains numerous individual sites, many eligible for the NRHP, from all categories, but is listed here in Table F-3 as one site for tabulation purposes. Table F-3 in Appendix F provides additional site detail.

No previously recorded archaeological resources within 1 mile of Route C centerline would be directly impacted by construction or operation of the proposed Project.

Segment Alternatives

Thirty-six archaeological resources were previously recorded within 1 mile of the segment alternatives (Table F-4 of Appendix F). No archaeological resources were located within 1 mile of Segment Alternatives A01, A06, A09, A10, A11, A13, A14, A15, A16, A17, A19, A22, A24, A25, A27, A28, A29, A30, A32, A33, A35, and A36. Two of the sites are either eligible or recommended eligible for listing on the NRHP. The remaining sites have not been evaluated. There are 4 mound sites, 5 stone feature sites, 1 isolated find, 23 cultural material scatters, 1 habitation site, 2 unknown sites, and 0 multicomponent sites.

3.10.3 Architectural Impacts

Minnkota and its consultant reviewed records sent from the SHPO to identify known historical structures within 1 mile of the centerline of the route and segment alternatives. The literature review also searched for reports of previously surveyed areas relevant to the Study Area. Results were requested for Oliver, Burleigh, McLean, Sheridan, Wells, Eddy, Foster, Griggs, Steele, Grand Forks, and Traill counties. More information on the sites that lie within one mile of the route and segment alternatives is provided below. To help summarize the results of the SHPO records review, sites were grouped into categories as follows: Civic Buildings (post office, school, townhall), Farmstead Features (farmstead, house, ranch, elevator, windmill, dump,

depression, foundation, corral, fence, barn), Cemetery (cemetery and burial), Bridge, Church, Trail, Railroad (track and facility), Town Site, Camp Site (camp and expedition), District, and Miscellaneous (steamboat, Sheyenne River, unknown).

Route A

Fifty-six historic structures were previously recorded within 1 mile of the Route A centerline. Four sites are listed or recommended eligible for listing on the NRHP. The remaining 52 sites have not been evaluated for listing on the NRHP. There are 8 civic buildings, 26 farmstead features, 2 cemeteries, 8 bridges, 4 churches, 0 trails, 2 railroad, 3 town Site, 0 camp sites, 0 districts, and 3 miscellaneous. Table F-5 in Appendix F provides additional site details.

No previously recorded historic architectural site within 1 mile of Route A centerline would be directly impacted by construction or operation of the proposed Project. This proposed Project could indirectly alter a historic property's integrity by diminishing its setting or feeling if the APE is expanded beyond 1 mile, and if additional survey identifies new historic properties.

Route B

Fifty-one historic structures were previously recorded within 1 mile of the Route B centerline. Four sites are listed or recommended eligible for listing and 1 site is eligible as part of a district on the NRHP. The other 46 sites have not been evaluated for listing on the NRHP. There are 8 civic buildings, 12 farmstead features, 3 cemeteries, 2 bridges, 9 churches, 0 trails, 2 railroad, 5 town sites, 4 camp sites, 1 district, and 5 miscellaneous. Table F-6 in Appendix F provides additional site details.

No previously recorded historic architectural site within 1 mile of Route B centerline would be directly impacted by construction or operation of the proposed Project. This proposed Project could indirectly alter a historic property's integrity by diminishing its setting or feeling if the APE is expanded beyond 1 mile, and if additional survey identifies new historic properties.

Route C

Forty-six historic architectural sites were previously recorded within 1 mile of the Route C centerline. One site is listed or recommended eligible for listing and 1 site is eligible as part of a district on the NRHP. The other 44 sites have not been evaluated for listing on the NRHP. There are 12 civic buildings, 11 farmstead features, 1 cemetery, 2 bridges, 10 churches, 0 trails, 2 railroads, 6 town sites, 0 camp sites, 0 districts, and 2 miscellaneous. Table F-7 in Appendix F provides additional site details.

No previously recorded historic architectural site within 1 mile of Route C centerline would be directly impacted by construction or operation of the proposed Project. This proposed Project could indirectly alter a historic property's integrity by diminishing its setting or feeling if the APE is expanded beyond one mile, and if additional survey identifies new historic properties.

Segment Alternatives

Sixty-seven historic architectural sites previously recorded by the SHPO are within one mile of the segment alternatives. No architectural properties were located within one mile of Segment Alternatives A01, A05 A10, A13, A14, A16, A17, A19, A20, A22, A24, A25, A29, A30, A32, A33, A34, A35, and A36. Two sites are eligible for listing on the NRHP. The other 65 sites have not been evaluated for listing on the NRHP. There are 11 civic buildings, 32 farmstead features, 0 cemeteries, 4 bridges, 10 churches, 1 trail, 3 railroads, 2 town sites, 1 camp site, 0 districts, and 3 miscellaneous. Table F-8 in Appendix F provides additional site details. Though no

architectural property would be directly impacted by the proposed Project, this proposed Project could indirectly alter a historic property's integrity by diminishing its setting or feeling if the APE is expanded beyond one mile, and if additional survey identifies new historic properties.

3.10.4 Mitigation

Construction activities for the route and segment alternatives would occur in areas with previously identified archaeological and historic resources that have not been evaluated for listing on the NRHP. Minnkota would adhere to stipulations concerning historic property discovery outlined in a PA, which includes a survey methodology to document the existing conditions within the proposed Project, identify the extent of resources within these areas, and if applicable, provide recommendations regarding NRHP eligibility prior to construction. During the proposed Project engineering phase, Minnkota would strive to avoid eligible historic properties or mitigate impacts by consulting with the parties in accordance with the PA to identify and implement appropriate responses to the effects. Such mitigative responses could include the items listed below.

- Preservation in place;
- Site stabilization;
- Protection from erosion;
- Documentation of existing conditions and any disturbance;
- Interpretation or data recovery if necessary as appropriate;
- Protection from looting/vandalism;
- Revegetating to counteract wind erosion;
- Fencing off sensitive areas during construction;
- Trees cut at ground level with stumps left in place;
- Informing construction crews on how to recognize resources and laws protecting resources; and
- Providing cultural sensitivity training to construction crews.

Minnkota would integrate a training, monitoring, and discovery plan into construction bid documents should previously unknown cultural resources or human remains be inadvertently encountered during construction along the route. The plan would outline the framework for handling such discoveries in an efficient and legally compliant manner. The plan may include the following topics: construction monitoring by a professional archaeologist at specific locations along the Study Area, procedures for identification and protection of resources in the field, contact information for parties to address a discovery, and procedures for avoidance and associated tasks in the event of work stoppage in a construction area.

3.11 Visual Resources

3.11.1 Description of Resources

This section details the visual characteristics and visual resources of the route and segment alternatives along with the potential visual impacts and mitigation measures at various locations along the potential routes. The discussion of visual quality and aesthetics is based on a qualitative review of the existing landscape environment surrounding the Study Area. Visual and aesthetic resources within the Study Area were identified through discussions with state and local agency officials, review of comprehensive land use plans, and other local and regional plans, comments received from participating citizens at open houses, and through a review of aerial photography and field observation. Generally, visual and aesthetic resources within the Study Area include historic residential or commercial structures, parklands, open space areas, water features, scenic overlooks, and densely forested areas.

Determining the relative scenic value or visual importance of an area is a complex process involving both the philosophical and/or psychological response to what may be perceived as beautiful by the individual. Generally, landscapes that incorporate a balanced mixture of diversity and harmony have the greatest potential for high scenic value and may be considered important to persons living in or traveling through a region. Viewer response is based on the sensitivity and exposure of the viewer to a particular viewshed. Sensitivity relates to the magnitude of the viewer's concern for the viewshed, while exposure is the function of the type, distance, perspective, and duration of the view.

The landscape topography crossed by the route and the segment alternatives is a mixture of agriculture, farmsteads, fallow fields, large open vistas, and gently rolling hillside topography. The proposed Project is primarily located in sparsely populated rural areas of North Dakota, where the landscape is mostly flat to rolling agricultural lands that can be classified as rural open space. The settlements in much of the Study Area are rural residences and farm buildings (inhabited and uninhabited) scattered along rural county roads. These structures are focal points in the open space character of the landscape crossed by the potential routes. A number of farmsteads date back the late 19th and 20th centuries, along with more modern farm buildings and residences that represent the different eras of North Dakota farm architecture. Scattered areas of forest and tree cover occur throughout the Study Area, primarily in areas considered unsuitable for farming, or planted as protection from the wind and sun around rural residences or farmsteads.

Residences are located adjacent to roads where the proposed routes would be located and many residents have surrounded their homes with a mix of deciduous and coniferous trees that serve as natural windbreaks, shade, and enhanced privacy for homes. Cottonwood trees are commonly found within the Study Area and landowners have expressed the desire to have them untouched as they add to the visual landscape of their land. Minnkota intends to work with landowners in the Study Area to minimize the impact of the transmission line to the surrounding landscape and limit the removal of trees. As the proposed transmission line extends from west to east towards Grand Forks, the number of rural residences gradually increases, thereby increasing the potential for visual impacts to homes near the transmission line. Additionally, the transmission lines would be visible to travelers along the roads the three proposed route alternatives follow.

There are areas of high scenic integrity and significance at points along the routes, as identified by the public and agency officials during public open houses and agency coordination meetings. Specifically, these areas include river and open water features, historic structures, tree stands,

public recreation areas, and scenic byways (State Highways 1804 and 1806). More information on these scenic areas can be found in Recreational Resources (Section 3.15).

Land parcels along the proposed route alternatives considered to contain outstanding natural features and warrant protection or management have been placed into state and federal conservation easement programs or fee trust lands such as WMA's or wildlife habitat areas under the jurisdiction of the USFWS. The proposed routes would follow existing field lines, field breaks, highways, county, and township roads in an effort to utilize existing corridors.

NDPR reviewed the Project proposal and commented that the proposed route alternatives are near properties containing significant natural, historic, and scenic resources. Properties include Cross Ranch State Park and the Cross Ranch Nature Preserve in Oliver County, which are located within proximity to the proposed Project and could affect the state park viewshed (Figure 3.16-1).

In addition to the naturally occurring landscape features and the scenic byway, historic structures are located at various points along the routes. Data from SHPO and the NRHP were obtained to identify historic structures along the routes. These structures serve many functions, such as cultural resources and tourist destinations. Specific information about the location of archaeological sites and historic facilities can be found in Section 3.10.

3.11.2 Impacts

The new transmission line would create a new visual element within the vicinity of the proposed Project. The visual impact of the transmission line could affect landowners who live along or near the roads that the route and segment alternatives intend to follow or community residents who travel along these roads regularly. As the proposed Project extends from west to east towards Grand Forks, the number of rural residences gradually increases, thereby increasing the potential for visual impacts to homes near the transmission line. The natural landscape is often characterized as rolling and mostly flat terrain used for agriculture purposes. Depending on a viewer's physical location, the terrain conditions, and natural landscape features such as tree cover, the transmission structures could be visible for distances between 1.5 and 2 miles. A viewer's degree of discernable detail decreases as physical distance from an object increases. Beyond 2 miles in physical distance, the outline of structures most likely would not be seen. The transmission line wiring is unlikely to be seen clearly beyond distances of one-half to three-quarters mile. Minnkota has created visual simulations of the proposed Project for the following crossings: Missouri River crossing, State Highway 1804 crossing, State Highway 1806 crossing, Sheyenne River crossing, typical section road, and a typical field line (Appendix G). These simulations help characterize the visual impact of the proposed Project.

3.11.3 Mitigation

In an effort to minimize the visual effects of the transmission line in visually sensitive areas, a route would parallel field and section lines or would be located in areas where compatible land uses have been identified by the public and agencies. The route and segment alternatives generally follow existing transportation corridors or quarter-section field lines. The proposed structures would be between 130- and 150-feet-tall, typically located just outside the public road ROW. Many of these roads currently do not share a ROW with a transmission line, with the exception of power distribution lines serving rural residences and farmsteads.

Several areas the transmission line crosses may be considered visually sensitive, specifically the crossing points of the Missouri River, Sheyenne River, James River, Goose River, McClusky

Canal, and various creeks throughout the Study Area (Figure 3.7-1). As part of the routing process, care has been taken to avoid the placement of structures in ecologically sensitive areas, typically identified by the public as areas of scenic significance, and additional care would be taken to avoid visual impacts to the greatest extent practicable. Minnkota intends to work with landowners in the route and segment alternatives to minimize the impact of the transmission line to the surrounding landscape and limit the removal of trees.

Although the transmission line would be a contrast to surrounding land uses, Minnkota would continue to work with landowners and public agencies to identify concerns related to the transmission line and aesthetics. In general, mitigation includes enhancing positive effects as well as minimizing or eliminating negative effects. Potential mitigative measures include the following:

- Where feasible, the location of pole structures, ROWs, and other disturbed areas would be determined by considering input from landowners or land management agencies to minimize visual impacts.
- Structure types (design) would be uniform to the extent practical. The Project proposes to use self-weathering single pole steel structures, single circuited, ranging in height between 130 and 150 feet. The height of the structure may be reduced, as feasible, to minimize impacts within the areas of high scenic importance. The self-weathering structure would turn a brownish color to help blend with the landscape.
- Structures would be placed at the maximum feasible distance from scenic highway, waterway, and trail crossings, within the limits of structure design.
- Care shall be taken to preserve the natural landscape; construction and operation shall be conducted to prevent any unnecessary destruction, scarring or defacing of the natural surroundings in the vicinity of the work.
- To the greatest extent possible, waterways would be crossed in the same location as existing disturbances, such as utility lines or roads. This is especially important for the crossing points of the Missouri River, Sheyenne River, James River, McClusky Canal, and Goose River.
- The new transmission line would parallel existing ROWs and field lines to the extent practicable to minimize visual impacts to farmlands or open spaces.

3.12 Noise

3.12.1 Description of Resources

Noise is defined as unwanted sound. Noise may include a variety of sounds of different intensities across the entire frequency spectrum. Noise is measured in units of decibels (dB) on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight." The A-weighted decibel (dBA) scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA. A noise level change of 3 dBA is barely perceptible to average human hearing. A 5 dBA change in noise level, however, is clearly noticeable. A 10 dBA change in noise levels is perceived as a doubling or halving of noise loudness, while a 20 dBA change is considered a dramatic change in loudness.

Cumulative noise increases occur on a logarithmic scale. If a noise source is doubled, there is a 3 dBA increase in noise, which is barely discernible to the human ear. For cumulative increases resulting from sources of different magnitudes, the rule of thumb is that if there is a difference of greater than 10 dBA between noise sources, there would be no additive effect (*i.e.*, only the louder source would be heard and the quieter source would not contribute to noise levels). Table 3.12-1 below provides noise levels associated with common, everyday sources and places the magnitude of noise levels discussed here in context.

Table 3.12-1. Noise Levels Associated with Common Sources

Sound Pressure Level (dBA)	Noise Source
140	Jet Engine (at 25 meters)
130	Jet Aircraft (at 100 meters)
120	Concert
110	Pneumatic chipper (powered by compressed air or hydraulics)
100	Jointer/planer
90	Chainsaw
80	Heavy truck traffic
70	Business office
60	Conversational speech
50	Library
40	Bedroom
30	Secluded woods
20	Whisper

Source: A Guide to Noise Control in Minnesota, MPCA (revised, 1999)

Transmission lines produce noise under certain conditions. The level of noise depends on conductor conditions, voltage level, and weather conditions. Generally, activity-related noise levels during the operation and maintenance of transmission lines are minimal and would not be noticeable above ambient noise levels outside of the ROW.

In foggy, damp, or rainy weather, transmission lines can create a crackling sound due to the small amount of electricity ionizing the moist air near the conductors. During heavy rain the background noise level of the rain is usually greater than the noise from the transmission line. As

a result, people do not normally hear noise from a transmission line during heavy rain. During light rain, dense fog, snow and other times when there is moisture in the air, transmission lines would produce audible noise approximately equal to household background levels.

Neither the PSC nor the North Dakota Department of Health regulates noise with measureable standards. There has been recent comment on proposed noise level targets prepared by the North Dakota Legislative Council for the Energy Development and Transmission Committee. This EA references 50 dB at the property line for noise sensitive land uses such as residences. As there is no weighting to this metric, Minnkota assumes that this is an un-weighted metric to account for predominant low frequency noise.

A 345 kV transmission line was evaluated using the Bonneville Power Administration CFI8X model for audible noise from transmission lines. Where possible, the model was executed as a worst-case scenario benchmark, to ensure that noise was not under-predicted. Table 3.12-2 presents the L_5 and L_{50} noise levels predicted for a 345 kV transmission line. Using the L_5 and L_{50} for demonstrating comparison to the sources in Table 3.12-1 is conservative because the noise level exceeded 5 and 50 percent of the time within an hour would be more than noise levels experienced as a long-term duration over 24 hours.

Table 3.12-2. Calculated Audible Noise for the Operation of Proposed Single Circuit Transmission Line Designs (Receptor 5 Feet Above Ground)

Structure Type	Noise L_5 (Edge of ROW, Estimated Ambient + dBA increase)	Noise L_{50} (Edge of ROW, dBA)
Steel Structure 345 kV Single Circuit	54.1	45.8

3.12.2 Impacts

Transmission Line

The proposed route and segment alternatives proceed through generally low density residential and farmland areas. Potentially up to one residence may be located adjacent to the ROW on Route Alternative A and two residences may be located adjacent to the ROW on Route Alternative B. Each of the proposed route and segment alternatives passes within 1,500 feet of some residences, but no closer than 150 feet. Since residences would be at least 150 feet away from the proposed Project, it is anticipated that coronal noise, the electrical breakdown of air into charged particles caused by the electrical filed at the surface of conductors, from the transmission line would be far enough away so as to not be heard above the ambient noise produced by wind and other natural phenomena. Short-term impact would be noise generated during operation of construction equipment and worker presences.

The proposed Project would not have significant noise effects for the surrounding area and would not exceed 50 dB at those times when noise sensitivity is at its highest. Noise produced by the proposed transmission line route alternatives would not exceed the North Dakota Legislative Council for the Energy Development and Transmission Committee recommended level of 50 dB at the property line. Therefore, predicted noise levels associated with the transmission line are typically much lower than the ambient noise in the Study Area and would not increase the existing background noise levels in the Study Area.

Noise associated with the operation of the proposed Project is not predicted to impact any of the residences outside of the ROW.

Substation

The loudest noise levels associated with substation operation are when the cooling fans and oil pumps are in operation. Both of the substations proposed for transmission and equipment upgrades are located on Minnkota property.

Noise levels around substations are not anticipated to increase.

3.12.3 Mitigation

Construction activities would generate noise that is short-term and intermittent. Noise impacts associated with construction would be mitigated by limiting the hours of work to daytime hours. Heavy equipment used in construction would be equipped with sound attenuation devices, such as mufflers, to minimize the daytime noise levels. The primary mitigation measure for reducing transmission line noise would be to route the transmission line away from sensitive noise receptors, to the extent possible.

3.13 Human Health and Safety

This section discusses the potential human health and safety impacts of the construction and operation of the proposed Project. Human health and safety includes potential issues ranging from the flow of energy along the line to the proximity of the proposed Project to public services such as airports and hospitals. The majority of the information in this section was obtained from federal and state agencies, including the National Institute of Environmental Health Sciences (NIEHS), EPA, and World Health Organization (WHO).

3.13.1 Description of Resources

Electric Fields

The electric field from a transmission line can join with a conductive object, such as a vehicle or a metal fence, which is in proximity to the transmission line. This would induce a voltage on the object, the magnitude of which is dependent on many factors, including the weather; object shape, size, orientation, and capacitance; object to ground resistance; and object location along the ROW. If these objects are insulated or semi-insulated from the ground and a person touches them, a small current would pass through the person's body to the ground. This might be accompanied by a spark discharge and mild shock, similar to what can occur when a person walks across a carpet and touches a grounded object or another person.

The main concern with induced voltage on an object is the current flow through the person to ground if a person were to touch the object. The best method to avoid these discharges is not to park equipment directly under the transmission line. Another option would be to drop a chain that is attached to the equipment onto the ground (or lower the equipment head to the ground on a combine) prior to dismounting if parked near a transmission line and pulling the chain (or head) up after getting into the equipment. It is important to note that use of a chain attached to farm machinery to eliminate spark discharges is not necessary for safety reasons and therefore should only be considered if the discharge is considered annoying to the operator and the vehicle must be parked under the transmission line.

To ensure that any discharge does not reach unsafe levels, the NESC requires that any discharge be less than 5 milliamperes (ma). Minnkota would assure that any fixed object, such as a fence or other large permanent conductive object close to or parallel to the transmission line, would be grounded so any discharge would be less than the 5 ma NESC limit.

Magnetic Fields

Current passing through any conductive material, including a wire, produces a magnetic field in the area around that material. The magnetic field associated with a HVTL is strongest at the conductor and decreases rapidly with increasing distance from the conductor.

Electric and Magnetic Field Research

The question of whether exposure to power-frequency (60 Hertz (Hz)) magnetic fields can cause biological responses or even health effects has been the subject of considerable research in the past three decades. The most recent and exhaustive reviews of the health effects from power-frequency fields conclude that the evidence of health risk is weak. The NIEHS issued its final report, *NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields*, on June 15, 1999, following six years of intensive research. NIEHS concluded that there is little scientific evidence correlating extra low frequency electric and magnetic field (EMF) exposure with health risk.

There are no set federal guidelines for EMF. Published guidelines include, the International Commission on Non-Ionizing Radiation Protection has established a continuous electric field exposure limit of 4.2 kV/meter for members of the general public and the American Council of Governmental Industrial Hygienists has set a Threshold Limit Value for occupational exposure to electric fields at 25 kV/meter for an electric field.

While the general consensus is that electric fields pose no human risk, the question of whether exposure to magnetic fields can cause biological responses or health effects continues to be debated.

Implantable Medical Devices

Implantable medical devices for example pacemakers, defibrillators, neurostimulators, and insulin pumps may experience interference from strong EMF. The function of these devices is vital and should not be impaired. The majority of research has been conducted on the interference to pacemakers from EMF. In 2004, the Electric Power Research Institute (EPRI) report, *Electromagnetic Interference With Implanted Medical Devices,* stated that implantable medical devices may be more susceptible to interference from electric fields than to magnetic fields.

Effects may occur to a person with an implantable medical device and are usually temporary and resume normal function once the person is removed from the source of electric fields. Research has shown the following potential effects occur to pacemakers exposed to electric fields:

- Rate increasing;
- Erratic pacing ;
- Switching to asynchronous pacing or fixed-rate pacing;
- Single beat inhibition (i.e. a single beat is missed by the pacemaker);
- Total inhibition.

Older unipolar pacemaker designs are more susceptible to electric field interference. Research completed by Toivonen et al. (1991) indicated that the earliest evidence of interference was in electric fields ranging from 1.2 to 1.7 kV/meter. For older style unipolar designs, the electric field for some proposed structure types does exceed levels that Toivonen et al. indicated may produce interference. However, a recent paper (Scholten et al. 2005) concludes that the risk of interference inhibition of unipolar cardiac pacemakers from high voltage power lines in everyday life is small. In the unlikely event a pacemaker is impacted, the effect is typically a temporary asynchronous pacing (commonly referred to as reversion mode or fixed rate pacing). The pacemaker returns to its normal operation when the person moves away from the source of the interference.

Stray Voltage

"Stray voltage" is a condition that can occur on the electric service entrances to structures from distribution lines—not transmission lines. More precisely, stray voltage exists between the neutral wire of the service entrance and grounded objects in buildings such as barns and milking parlors.

Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences. However, transmission lines can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line. Appropriate measures

would be taken to prevent stray voltage problems when the transmission line parallels distribution lines.

Public Services

Public services generally refer to services provided by government entities to its citizens. Public services are often those services that are used to benefit public health and safety, such as education and emergency services (fire, ambulance, and police). Public services are concentrated within the municipalities within the Study Area. There are eight municipalities within one mile of the Routes A, B, and C and segment alternatives (Table 3.13-1).

Table 3.13-1. Municipalities within Vicinity of Route and Segment Alternatives

Municipalities	Route A	Route B	Route C	SA 21	SA 27	SA 28
Within ROW	-	-	Sharon	None	None	None
Within Route	-	-	Sharon	None	None	None
Within 1 mile of Route	Aneta, Grand Forks, Northwood	Goodrich, Grand Forks, Thompson	Binford, Goodrich, Grand Forks, Sharon	Binford	Hatton	Aneta

Visible and marked existing utilities within the Study Area have been identified. There are existing fiber optics, pipelines, transmission lines, rural water lines, and associated facilities within the Study Area. Existing utilities are identified on the detailed route maps in Appendix B and on Figure 3.2-2.

Transmission lines can present an important safety concern to airports and aircraft. The placement of transmission line structures or the stringing of transmission lines between structures could severely impact the safe operation of an airport or hinder the maneuverability of aircraft. If close enough, the presence of a steel transmission line structure or wiring could interfere with the operation of air navigation or weather systems. Transmission line wiring can also present a significant risk to pilots. It is important to note that the physical dimensions of airport runways determine the class size of aircraft capable of landing at an airport. Furthermore, the aircraft design and propulsion system are determinants in an aircraft's ability to land at a given facility. For example, jet aircraft are heavier, typically require a greater runway length for takeoff and landing, and require more glide slope clearance distance compared to propeller-driven aircraft. Both of these factors are important in relation to tall structures such as transmission lines because they determine the takeoff and landing glide slopes necessary for safe flight operation, which in turn determine the setback distance of tall structures such as transmission line structures.

The FAA has established guidelines to determine the appropriate setback distance for tall structures, including transmission lines, from public use airports and heliports. Federal Aviation Regulation (FAR) Part 77 establishes standards and notice requirements for reporting airspace obstructions for objects currently impacting or that could impact navigable airspace around aviation facilities. FAR Part 77 defines a series of imaginary surface zones surrounding airports that specify height restrictions for structures based on slope ratios. These imaginary surfaces include the primary surface, horizontal surface, conical surface, approach surface, precision instrument approach surface, and the transitional surface. According to FAR Part 77, "an object will be considered an obstruction to a public airport (excluding seaplane bases and heliports) if it is of greater height" than any of the aforementioned imaginary surfaces. Each of these imaginary

surfaces have corresponding slopes, based in part on the airport's use designation, flight volumes, and plane size capabilities. All surfaces are measured at the mean sea-level elevation of the airport.

Furthermore, certain objects such as steel pole transmission line structures have the potential to conflict with the operation of airport navigational aids and weather observation station facilities. Specifically, these facilities include radar facilities used for aircraft navigation. These facilities may require similar routing regulations as airports and airstrips.

One public airport (McClusky Municipal Airport) and three private airstrips are located within one mile of the routes and segment alternatives. The Grand Forks Airport has planned improvements for the existing airport layout because of a forecasted increase in aircraft operations. According to the July 2006 Land Use Compatibility Plan for Grand Forks International Airport, the future plan includes the construction of two additional runways. In additional to these future updates, Grand Forks Airport intends to make additional upgrades, including extending current main runway and existing crosswind runway. There is also a radar facility used for aircraft navigation located just over a mile from Segment Alternative A27.

Air Quality

Corona consists of the breakdown or ionization of air within a few centimeters of transmission line conductors and hardware. Usually some imperfection such as a sharp edge, a protrusion on hardware, a scratch on the conductor, or water is necessary to cause corona. Corona can produce ozone and oxides of nitrogen in the air surrounding the conductor. Ozone also forms in the lower atmosphere from lightning discharges and from reactions between solar ultraviolet radiation and air pollutants, such as hydrocarbons from auto emissions. The natural production rate of ozone is directly proportional to temperature and sunlight and inversely proportional to humidity. Thus, humidity or moisture, the same factor that increases corona discharges from transmission lines, inhibits the production of ozone. Ozone is a very reactive form of oxygen molecules and combines readily with other elements and compounds in the atmosphere. Because of its reactivity, ozone is relatively short-lived.

The federal government has regulations regarding permissible ambient air concentrations of ozone and oxides of nitrogen. The state has incorporated these federal ambient air quality standards into its air quality rules. The ambient air quality standard for ozone is 0.075 ppm based upon a three-year average of the annual fourth-highest daily maximum 8-hour average (40 CFR §50.15) concentration. Humid conditions and rain may cause transmission line insulators to release static electricity, converting oxygen to ozone.

3.13.2 Impacts

Direct and indirect effects resulting from the proposed Project would be similar for Routes A, B, and C and all segment alternatives.

Electric Fields

According to the NIEHS, "A person standing directly under a high-voltage transmission line may feel a mild shock when touching something that conducts electricity. These sensations are caused by the strong electric fields from the high-voltage electricity in the lines. They occur only at close range because the electric fields rapidly become weaker as the distance from the line increases. Electric fields may be shielded and further weakened by buildings, trees, and other objects that conduct electricity."

Insulated electric fences used in livestock operations can pick up an induced charge from transmission lines. Usually, the induced charge will drain off when the charger unit is connected to the fence. When the charger is disconnected either during maintenance or when the fence is being built, minor shocks may result.

Magnetic Fields

Peak magnetic field levels can vary considerably depending upon the amount of current carried by the line. According to the NIEHS, "Alternating magnetic fields produced by AC electricity can induce the flow of weak electric currents in the body. However, such currents are estimated to be smaller than the measured electric currents produced naturally by the brain, nerves, and heath" (NIEHS 1999).

Electric and Magnetic Field

EMF would be strongest directly under the transmission line and decrease with increasing distance from the transmission line towards the ROW edge. Minnkota conducted an EMF study for the proposed Project. A summary of the EMF study that outlines calculation parameters is included in Appendix H. Based upon the capacity of the proposed Project design, calculated EMF values would not exceed about 3.6 kV/meter under maximum operating conditions at any location near the ground level underneath or in the vicinity of the proposed transmission line. During normal loading conditions, EMF values have been calculated to be approximately 0.98 kV/meter at the edge of the ROW. There are no anticipated EMF impacts expected as a result of the construction or operation of the proposed routes or segment alternatives.

Implantable Medical Devices

At levels associated with high-voltage transmission lines, a transmission line within the routes or segment alternatives would not have regular, temporary interference with implantable medical devices at levels associated with high-voltage transmission lines.

Stray Voltage

Appropriate measures would be taken to prevent stray voltage problems when the transmission line parallels distribution lines. There are no anticipated stray voltage impacts expected as a result of the construction or operation of the proposed routes or segment alternatives.

Public Services

Many of public services within the Study Area are located within municipality boundaries, but rural water, fiber optic, transmission lines, and distribution lines are located outside of the municipality boundaries. Several of these municipalities have medical centers, hospitals, fire stations, police stations, and schools. There would be no direct or indirect effects to these public services with this proposed Project.

Potential impacts to public services, mainly emergency services, would be related to construction activities that may disrupt roadways and access. Generally, construction activities would be staged such that public roads would not be closed for any substantial period. Emergency access for local residents, should they need emergency services, would be provided by halting construction and relocating equipment so emergency vehicles could access the residence. Once construction is complete, the transmission line would span all roads and therefore would not impede emergency services.

A transmission line within Routes A, B, C, or the segment alternatives is not anticipated to have any long-term negative direct or indirect effects to public services.

The proposed Project would have a positive effect on public services by providing improved reliability and capacity to meet the growing demands for electrical service within the Study Area. The added transmission would reduce the risk of brownouts (leading to potential blackouts) by providing baseload power to the Minnkota service area.

Aside from certain electrical impacts that are being addressed and mitigated through existing processes with neighboring utilities, Minnkota does not anticipate direct or indirect impacts to existing utilities from this proposed Project.

Due to the distance of each airport from the proposed Routes A, B, C, and segment alternatives, the placement of the proposed Project structures within the Routes A, B, and C and segment alternatives would not create obstacles or hazards for air traffic related to the nearby airports. If the FAA determines impacts once a route is selected, Minnkota would file the required notice with FAA pursuant to the requirements set forth by FAR Part 77, Subsection 13.

Air Quality

No impacts to air quality due to the operation of the transmission line are anticipated. Calculations done for a 345 kV project showed that the maximum one-hour concentration during foul weather (worst case) would be 0.0007 ppm. This is well below both federal and state standards.

Most calculations for the production and concentration of ozone assume high humidity or rain, with no reduction in the amount of ozone due to oxidation or air movement. These calculations would therefore overestimate the amount of ozone that is produced and concentrated at ground level. Studies designed to monitor the production of ozone under transmission lines have generally been unable to detect any increase due to the transmission line facility.

Temporary air quality impacts caused by construction-vehicle emissions and fugitive dust from ROW clearing and construction are expected to occur. Exhaust emissions from diesel equipment may vary during construction, but would be minimal and temporary. The magnitude of these emissions is influenced heavily by weather conditions and the specific construction activity taking place.

3.13.3 Mitigation

The NESC provides standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials, and ROW widths. In addition, the United States Occupational Safety and Health Administration (OSHA) regulates worker safety in both construction and industrial settings and has developed and enforces regulations that are designed to protect workers from potential accidents. Minnkota would require OSHA-compliant safety procedures that would be followed during and after installation of the transmission line, including clear signage during all construction activities.

Impacts from electric fields could be minimized by grounding metal buildings, fences, or other larger permanent conductive objects in proximity or parallel to the line to prevent excessive discharges. Vehicles, which may be parked under or adjacent to transmission lines, generally are grounded adequately through their tires. In some instances, such as vehicles with unusually old tires or those parked on dry rocks, plastic, or other surfaces that insulate them from the ground,

the vehicle can be grounded by attaching a grounding strap to the vehicle that is long enough to touch the ground.

Minimizing the length of transmission line parallel to or collocated (through the use of structures that allow under-building of distribution lines) with distribution or local service conductors would minimize the potential for a transmission line to contribute to stray voltage. However, collocating or paralleling existing distribution or local serving electric lines may be advantageous for minimizing other potential effects from the proposed Project.

Potential shocks from insulated electric fences used in livestock operations can be prevented by shorting out one or more of the fence insulators to ground with a wire when the charger is disconnected or installing an electric filter to ground charges induced from a power line, while still allowing the charger to be effective.

Proper safeguards would be implemented for construction and operation of the facility. The proposed Project would be designed according to local, state, and NESC standards regarding ground clearance, crossing utilities clearance, building clearance, strength of materials and ROW widths. Construction crews and/or contract crews would comply with local, state, and NESC standards regarding facility installation and standard construction practices. Minnkota would establish industry safety procedures that would be followed during and after installation of the transmission line, including clear signage during all construction activities.

The proposed Project would be equipped with protective devices (breakers and relays located where transmission lines connect to substations) to safeguard the public in the event of an accident, or if the structure or conductor falls to the ground. The protective equipment would de-energize the transmission line should such an event occur. In addition, the substation facilities would be properly fenced and accessible only by authorized personnel.

Minnkota would ensure that all safety requirements are met during the construction and operation of the proposed Project. Additionally, when crossing roads or railroads during stringing operations, guard structures would be utilized to eliminate traffic delays and provide safeguards for the public. With the proper safeguards and protective measures implemented as described above, no additional mitigation should be needed.

Minnkota would continue to work with the Grand Fork International Airport and the FAA and does not anticipate any impacts to airspace and glide slope intercept for public airports along the route and segment alternatives; thus, it is not anticipated that any mitigation will be necessary.

BMPs would be used to control fugitive dust during construction including operating vehicles at reduced speeds and use of water and dust abatement methods. Dust suppression would be completed by the foundation contractor who would build and maintain the ROW during construction. Minnkota or the foundation contractor would apply for a permit from the State Water Commission for water appropriations related to construction purposes.

3.14 Socioeconomics and Environmental Justice

3.14.1 Description of Resources

Executive Order 12898, which requires federal actions to address potential environmental justice impacts to minority and low-income populations, was signed by President Clinton on February 11, 1994. The responsible official must consider an action's potential for demographic, geographic, economic, and human health risk factors when conducting and documenting a NEPA related analysis. The directives from this order are addressed in this analysis of the impacts of the route and segment alternatives. The analysis identifies whether the proposed Project could have disproportionate impacts to minority and low income populations just from potentially being sited in areas where those populations predominately reside.

This section describes the primary social and economic characteristics of the Study Area and along the route and segment alternatives under consideration. Socioeconomic factors analyzed include population, income, household, employment, household income, and poverty. U.S. Census data used for the evaluation are summarized at different geographic levels: national, state, country, census tracks, block groups, and block. Census block level data were used to most accurately portray the existing population conditions in proximity to the Study Area. Due to the predominately rural nature of the Study Area, with the notable exception of Grand Forks County, the size of the Census block groups increase as the population decreases. In some cases, persons living outside of the route and segment alternatives would also be included in the analysis. Therefore, the results may not actually display the existing conditions as they pertain to the residents living in proximity to the route and the segment alternatives. As a result, it is difficult to ascertain specific social or economic characteristics of the population living along the route and segment alternatives. However, based on the data available, general social and economic characteristics may be inferred from Census block data.

The route and segment alternatives include portions of 12 counties in North Dakota and several farm-based communities. The largest cities located near the route and segment alternatives include Grand Forks (population 49,321), Carrington (population 2,268), Cooperstown (population 1,053), and Northwood (population 959). According to the U.S. Census Bureau, the racial characteristics within the Study Area are primarily white, with small American Indian populations. The Spirit Lake Nation lands, which is the nearest minority population, are located approximately 10 miles north of New Rockford, North Dakota (See Figure 3.2-2). No route or segment alternatives cross the Spirit Lake Nation lands, which are located in the northern portion of Eddy County. There is limited potential to impact minority or disadvantaged populations with the construction and operation of a new transmission line within the Study Area.

To consider population characteristics, a Region of Comparison (ROC) is established to understand the dynamics of the population living in proximity to the proposed transmission line route and segment alternatives. The ROC established for the proposed Project comprises the selected counties the transmission line would cross. Additionally, towns and cities the route and segment alternatives would travel around or through were also included in part of this analysis.

Shifts in population have occurred throughout the Study Area; populations continue to grow around the Grand Forks region, while many communities in the western portion of the Study Area have continued to lose population. The trend in decreasing rural populations is not exclusive to the Study Area. The changing dynamics in most rural areas, including the age of population and the ability to find work in more urban areas, has contributed to the decrease in

rural populations. The migration of young people away from rural areas has resulted in an increase in the average age of local residents. Furthermore, as area residents have aged, the desire to move to regional centers where better healthcare options are available has resulted in reduced rural populations and larger farming operations, or the loss of agricultural production. In turn, the migration of the population away from rural areas has had economic implications for rural communities. Employment in social services, particularly health care and elder care occupations has significantly increased over the past decade. Per capita and median household incomes are typically lower in rural western counties when compared to Grand Forks County.

Social Characteristics

Population characteristics considered relevant to the social setting of the Study Area include the total population, estimated population, per capita income, and poverty status. Western North Dakota communities have gradually experienced reductions in total population. Additionally, per capita incomes rise significantly as the transmission line moves from west to east, a function of several factors including (but not limited to) higher cost of living, higher paying jobs, and higher property values. Finally, poverty levels are generally higher in the western Study Area when compared to the eastern Study Area.

Economic Characteristics

There are both similarities and differences between the economic characteristics of the western Study Area compared to the Grand Forks region. As identified in Section 0, the prevailing land use within the Study Area is agricultural, primarily planted crops. Many of the counties in the route and segment alternatives identify agricultural practices as a foundation of both the social and economic fabric of the county. Significant efforts by county and local officials to preserve and protect agricultural lands have been made. Aggregate mining for sand or gravel are also important economic activities in rural areas and in several instances, this type of extractive land use contributes directly to county and local road projects or other developments. Minnkota's Milton R. Young Station and the lignite mining operations at the nearby Center Mine, owned and operated by BNI Coal Ltd., are important regional sources of employment in the western Study Area.

As the proposed route alternatives move from west to east, the employment base of counties closest to Grand Forks diversifies. The larger population base of the Grand Forks region leads to both greater demand and needs for a range of services and products. Economic commonalities between the employment bases of the two regions are apparent. Management, professional, and other related occupations are leading industries in all counties, and employment in sales and service is also very strong. Table 3.14-1 lists the top four employment industries within Study Area counties.

Table 3.14-1. Top Occupations for Counties within the Study Area

County	Industry	Percent of Workforce
Burleigh	Management/Professional	36.5
	Sales and Office	28.8
	Service Occupations	16.0
	Production/Transportation	9.1
Eddy	Management/Professional	39.1
	Agriculture	19.1

County	Industry	Percent of Workforce
	Service Occupations	17.9
	Sales and Office	16.5
Foster	Management/Professional	35.6
	Sales and Office	21.2
	Service Occupations	14.9
	Agriculture	13.5
Grand Forks	Management/Professional	32.2
	Sales and Office	25.4
	Service Occupations	20.1
	Production/Transportation	11.1
Griggs	Management/Professional	35.1
	Sales and Office	20.4
	Service Occupations	16.7
	Agriculture	16.0
McLean	Management/Professional	31.8
	Sales and Office	22.1
	Service Occupations	16.5
	Construction	15.8
Mercer	Management/Professional	27.2
	Sales and Office	19.2
	Construction	17.1
	Service Occupations	17.9
Nelson	Management/Professional	36.7
	Sales and Office	20.5
	Agriculture	16.2
	Service Occupations	14.8
Oliver	Management/Professional	35.2
	Agriculture	23.7
	Sales and Office	15.8
	Service Occupations	12.8
Sheridan	Management/Professional	43.0
	Agriculture	35.0
	Sales and Office	18.7
	Service Occupations	12.9
Steele	Management/Professional	38.8
	Agriculture	24.5
	Sales and Office	19.5
	Service Occupations	11.8
Traill	Management/Professional	30.3

County	Industry	Percent of Workforce
	Agriculture	22.3
	Sales and Office	18.0
	Transportation	15.7
Wells	Management/Professional	33.6
	Sales and Office	21.4
	Service Occupations	18.2
	Agriculture	17.1

Sources: U.S. Census Bureau, Census 2000 Summary File 3, 2010.

Population by Race and Ethnicity

The Study Area is composed of a variety of racial and ethnic groups. Race is defined as a self-identification data item based on an individual's perception of his or her racial identity. Respondents to the 2000 Census selected the race(s) with which they most closely identified themselves. Ethnicity is defined as a classification of a population that share common characteristics such as religion, cultural traditions, language, tribal heritage, or national origin. All counties within the Study Area have a population with a 95 percent or higher population of White/Caucasian. The remaining populations in all of the counties include Black/African American, American Indian, Hawaiian, some other race alone, or two or more races (Table 3.14-2).

Table 3.14-2. Population by Race and Ethnicity for Counties within the Study Area

County	Burleigh	Eddy	Foster	Grand Forks	Griggs	McLean	Nelson	Oliver	Sheridan	Steele	Traill	Wells
Total	69,416	2,757	3,759	66,109	2,754	9,311	3,715	2,065	1,710	2,258	8,477	5,102
White/ Caucasian	66,043	2,691	3,717	61,530	2,739	8,586	3,661	2,019	1,700	2,226	8,276	5,036
Black/ African American	204	0	6	867	0	3	2	0	0	1	14	22
American Indian	2,079	37	0	1,612	8	589	24	28	5	21	76	35
Asian	279	2	10	632	3	7	13	4	0	0	16	3
Native Hawaiian	0	0	0	30	0	0	0	0	0	0	0	0
Some other race alone	266	7	8	415	0	8	0	0	0	2	69	0
Two or more races	545	20	18	1,023	4	118	15	14	5	8	26	6

Sources: U.S. Census Bureau, Census 2000 Summary File 3, 2010.

3.14.2 Impacts

In general, increasing the transmission output capability and reliability would benefit the region on a long term basis. The proposed Project is not expected to have negative long term economic impacts. Indirectly, the increased capability and reliability of the electric system to supply energy to commercial and industrial users may contribute to the economic growth of communities and counties along the route and to future generation of renewable energy development. In addition, Minnkota would pay a transmission line tax to the state that gets allocated to the county; therefore, a positive economic gain would result to the county. Short-term positive economic gains would result from activities associated with construction. Local businesses would likely see an increase in revenues from construction of the proposed Project. The number of workers hired from within and outside of the Study Area may result in positive economic gains in the form of increased wages and spending, lodging, meals, and other consumer goods and services. It is estimated that 200 to 250 workers would be employed during construction. It is not anticipated that the proposed Project would create new permanent jobs, but it would create temporary construction jobs that would provide a one-time influx of income to the area.

The proposed Project is not anticipated to result in an economic or social hardship to minority or low-income populations.

Construction activities would provide a seasonal influx of additional dollars into the communities during the construction phase. Long-term beneficial impacts from the proposed Project include increased local tax base resulting from the incremental increases in revenues from transmission lines taxes. Within the State of North Dakota, utilities pay a transmission line tax to the state. The state divides and allocates that money to the counties where transmission lines are located.

One concern of residents living near existing or proposed transmission lines is how proximity to the line could affect the value of their property. The potential change to property value that might be experienced has been studied in the past. Research on this issue does not identify a clear cause and effect relationship between the two variables. Instead, the presence of a transmission line becomes one of several factors that interact to affect the value of a particular property. The impacts on residential property values do not appear to be significantly different within various land use types (i.e., agricultural versus suburban or urban) – or at least any difference is too subtle for current research to detect. Therefore, property value impacts appear to be similar for all route or segment alternatives evaluated in this EA.

As part of the federal scoping process for the proposed Project, questions and concerns about property values were raised. In general three primary concerns regarding the potential impact of a nearby transmission line on property value were voiced:

- Concern of possible health effects from electric or magnetic fields (EMF): While no conclusive evidence of the effects of EMF on health exists, it is recognized that people's concerns about this issue can influence their decisions related to purchase of property.
- The potential noise and visual unattractiveness of the transmission line: The visual profile of transmission line structures and wires may decrease the perceived aesthetic quality of property. The transmission facility would not generate noise above the existing noise levels.

- Potential interference with farming operations or foreclosure of present or future land uses within the transmission line ROW: On properties that are farmed, installation of a transmission line can remove land from production and farming practices may have to be adjusted based upon pole locations. The proposed Project may also be perceived as reducing the potential for development of the land for another use.
- Location of a transmission line on their property may result in a lower rental fee for the property. Generally, it has been found that a new transmission line may result in a decline in property value immediately following the construction. However, this effect diminishes after a few years. A property's value is influenced more by location to a school or job, the size of the house, and neighborhood quality, rather than the presence of transmission lines.

  When the route for the transmission line is chosen, a landowner whose property is affected by the ROW would be asked by Minnkota for an easement. Easements allow Minnkota to locate a transmission line on the property and enter for maintenance when needed. In return the landowner is compensated and receives payment based on the fair market value of the property. The landowner keeps ownership of the land but they are restricted to certain activities so they do not compromise the safety and efficiency of the transmission line.

Under the No Action Alternative there would be an economic impact due to poor voltage stability caused by leaving about 225 MW stranded at Young 2. The poor voltage stability would cause rolling brown-outs and could limit potential to develop renewable energy.

3.14.3 Mitigation

Construction of the proposed Project would result in short-term positive economic impacts for communities within the Study Area. In general, increasing transmission capacity and reliability would be an economic benefit to the surrounding communities and businesses. For these reasons, the proposed Project is not expected to have negative economic impacts on local and regional economies. As such, no mitigation measures are proposed to address socioeconomic impacts.

The proposed Project is not anticipated to impact minority or low-income populations; therefore, no mitigation measures are planned.

The payments of taxes to the state, then allocated to the counties in which the transmission line and associated infrastructure are located, are not anticipated to generate negative impacts. For this reason, no mitigation measures are needed.

Easement payments to landowners are required to compensate landowners for loss of use of the utility easement on their property (this would include a landowner's leased property). In addition, Minnkota would communicate with landowners regarding the placement of structures.

The No Action Alternative would not meet the Purpose and Need of the proposed Project. Based on this EA, if the proposed Project is not constructed it may cause other facilities to be built.

3.15 Recreational Resources

3.15.1 Description of Resources

Many recreational resources exist within the Study Area, including trails, rivers, lakes, federal lands, and state lands. This section describes the primary recreation resources of the Study Area and along the routes and segment descriptions under consideration. Recreational resources are identified to understand the potential effects that the proposed Project may have on the resources. Minnkota focused on recreational resources within the proposed routes and segment alternatives. However, some resources are identified in the Study Area that may have viewshed impacts from the proposed Project.

Outdoor recreational opportunities along the three routes and segment alternatives include riding all-terrain vehicles (ATVs) and snowmobiles, hiking, boating, fishing, camping, swimming, hunting, and nature observation. Recreational resource and land management data were gathered from state and federal agencies. Detailed route maps in Appendix B and Figure 3.15-1 identify the locations of recreation resources within the vicinity of the proposed routes and segment alternatives. Figure 3.15-1 displays the location of managed recreation lands in the vicinity of the proposed routes and segment alternatives. The detailed route maps in Appendix B show the recreation point locations, such as golf courses, picnic areas, local parks, and boat landings.

State-Managed Lands

NDGF's WMAs and NDPR's state parks, nature preserves, and recreation areas play a large role in North Dakota's outdoor recreation system. There are no state parks, nature preserves, and recreation areas located within the routes or segment alternatives. No WMAs are located within the routes. The Wilbur Boldt WMA is located within Segment Alternative A02.

Two NDPR managed lands (Cross Ranch State Park and Cross Ranch State Nature Preserve) within 1 mile of the routes and no NDPR managed lands within the segment alternatives (Table 3.15-1). Five WMAs located within one mile of the routes and segment alternatives.

Table 3.15-1. State Managed Lands within one mile of the Route and Segment Alternatives

Route or Segment Alternative	Resource Agency	Name
C	NDPR	Cross Ranch State Park
C	NDPR	Cross Ranch State Nature Preserve
A, B, Segment Alternatives A01 & A02	NDGF	Wilbur Boldt WMA
A	NDGF	Wells County WMA
C	NDGF	Robert L. Morgan WMA
C	NDGF	Smith Grove WMA
Segment Alternative A27	NDGF	Golden Lake WMA

Federal Managed Lands

USFWS manages WPAs, Wildlife Development Areas (WDAs), and National Wildlife Refuges (NWRs). The Bureau of Reclamation manages the Chain of Lakes Recreation Area/McClusky Canal through Sheridan, Burleigh, and McLean counties. The East Park Lake, West Park Lake,

Heckers Lake, and New Johns Lake are four in-line lakes on the McClusky Canal that make up the Chain of Lakes Recreation Area.

These federally managed lands provide habitat for a variety of waterfowl, shorebirds, grassland birds, plants, insects, and wildlife as well as provide opportunities for public access and wildlife dependent recreation such as hunting, wildlife watching, photography, camping, boating, fishing, and ATV/snowmobile riding (see Figure 3.15-1).

As discussed in the Land Use section (Section 3.2), the USFWS holds easements on private lands for the protection of wetland and grasslands resources. The purpose of wetland easements and grassland easements is to protect wetland areas and adjacent grassland buffers for the reproduction and growth of waterfowl species. The USFWS allows some hunting on these easements.

Five WPAs, three WDAs, one NWR, and one Bureau of Reclamation-managed land are located within the routes and segment alternatives. Table 3.15-2 outlines the federal lands located within the routes and segment alternatives.

Table 3.15-2. Federal Managed Lands within the Route and Segment Alternatives

Route or Segment Alternative	Resource Agency	Name
A	USFWS	Hoornaert WPA
A	USFWS	Topp WPA
A, B, C	USFWS	Gaub WPA
B, C	USFWS	Moldenhauer WPA
B	USFWS	Chasely WPA
A, B	USFWS	East Park Lake WDA
Segment Alternatives A07 & A12	USFWS	Koening WDA
Segment Alternative A07	USFWS	Lost Lake WDA
Segment Alternative A07	USFWS	Lost Lake NWR
A, B, C, Segment Alternatives A07 & A08	Bureau of Recreation	Chain of Lakes Recreation Area/McClusky Canal

There are 27 WPAs, two NWRs, and one Bureau of Reclamation-managed land located within 1 mile of the routes and segment alternatives. Table 3.15-3 displays the federal lands located within one-mile of the routes and segment alternatives.

Table 3.15-3. Federal Managed Lands within one mile of the Route and Segment Alternatives

Route or Segment Alternative	Resource Agency	Name
Segment Alternative A07	USFWS	Lost Lake NWR
C	USFWS	Sibley Lake NWR
A	USFWS	Bauers WPA
A	USFWS	Delfs WPA
A, B, C,	USFWS	East Park Lake WPA

Route or Segment Alternative	Resource Agency	Name
Segment Alternatives A05 & A06		
A	USFWS	Ehni WPA
A	USFWS	Faul WPA
A, B, C, Segment Alternative A08	USFWS	Gaub WPA
A	USFWS	Indian Hills WPA
A Segment Alternative A12	USFWS	Kindschi WPA
A	USFWS	Schindler WPA
A Segment Alternative A14	USFWS	Topp WPA
B	USFWS	Chasley WPA
B, C	USFWS	Fritchie WPA
B, C	USFWS	Goodrich WPA
B	USFWS	Heeren WPA
B, C	USFWS	Lasher WPA
B, C	USFWS	Moldenhauer WPA
B, C	USFWS	Radtke WPA
B, C	USFWS	Thorson WPA
B, C	USFWS	Weckerly WPA
C	USFWS	Koenig WPA
Segment Alternative A04	USFWS	Hecker's Lake WPA
Segment Alternative A12	USFWS	Crystal Lake WPA
Segment Alternative A13	USFWS	Monk WPA
Segment Alternative A14	USFWS	Midgley WPA
Segment Alternative A14	USFWS	Swan Lake WPA
Segment Alternative A21	USFWS	Erickson WPA
Segment Alternative A21	USFWS	Fritz WPA
A, B,C, Segment Alternatives A07, A08, A09, A10, A11, A12, A13, A14	Bureau of Recreation	Chain of Lakes Recreation Area/McClusky Canal

North Country National Scenic Trail

The NPS administers the North Country National Scenic Trail (trail) that crosses seven states (New York, Pennsylvania, Ohio, Michigan, Wisconsin, Minnesota, and North Dakota). NPS explains that the trail is a collection of certified and proposed segments. Within North Dakota from Valley City, the trail follows the Sheyenne River to the Garrison Diversion then to the McClusky and New Rockford canals. Most of the certified segments occur on public lands, i.e. USFWS, Bureau of Reclamation, and USFS. The NPS is reviewing segments on the western portion of the trail in order to connect with the Lewis and Clark National Historic Trail and the

Knife River Indian Village National Historic Site (an NPS property). A portion of the trail runs parallel to the McClusky Canal and Chain of Lakes Recreation Area. Recreational opportunities include hiking and camping (See Figure 3.15-1).

In addition, the NPS administers the Lewis and Clark National Historic Trail that crosses 11 states. The NPS attempts to preserve the remnants of the historic route of 1804-1806 Corps of Discovery Expedition and to provide a comprehensive interpretation of its history, including the American Indian perspective, to allow for better visitor understanding and appreciation of its significance. Recreational opportunities include canoeing the Missouri River and driving State Highways 1804 and 1806 (See Figure 3.15-1). Table 3.15-4 outlines the trails crossed by the routes and segment alternatives.

Table 3.15-4. Trails crossed by the Route and Segment Alternatives

Route or Segment Alternative	Trail Name	Associated Resource Land	County
A, B, C Segment Alternatives A07, A08	North Country National Scenic Trail	Chain of Lakes Recreation Area	McLean County
A, B, C Segment Alternatives A18	North Country National Scenic Trail	McClusky Canal	Sheridan County
A, B, C Segment Alternatives A23, A33 & A34	North Country National Scenic Trail	McClusky Canal	Griggs County
A, B, C Segment Alternatives A03. A04 & A38	Lewis and Clark National Historic Trail	Missouri River and State Highways 1804 and 1806	Burleigh & Oliver County

National Heritage Area

A National Heritage Area is "a place designated by Congress where natural, cultural, historic, and recreational resources combine to form a cohesive, nationally distinctive landscape arising from patterns of human activity shaped by geography." The Northern Plains Heritage Foundation received funding from Congress through the NPS to undertake a study to identify and evaluate a range of alternatives for managing, preserving, and interpreting the assemblage of nationally important historic sites, structures, stories, legends, and landscapes existing within the free flowing segment of the Missouri River in central North Dakota. The Northern Plains National Heritage Area includes: "The proposed east/west boundary of the study area encompasses a distance of ten miles across or approximately five miles from the banks of the free flowing segment the Missouri River. The north/south boundary encompasses an approximate eighty mile distance from the Huff Mandan Village south of Mandan to the Big Hidatsa Village north of Stanton ND."

Automobile Tours

No designated state or federal scenic byways or backways are located within the Study Area. The Sakakawea Scenic Byway near Washburn is located north of the Study Area along State Highway 200A from Washburn to Stanton. State Highways 1804 and 1806 are a part of the Lewis and Clark National Historic Trail. State Highways 1804 and 1806 are located on the east and west sides of the Missouri River, respectively, and would be crossed by Routes A, B, C and Segment Alternatives A03 and A04.

Other Recreational Resources

No additional recreational resources, such as boat landings, golf courses, and playgrounds/ball fields, were located within the routes or segment alternatives. Table 3.15-5 outlines the resources located within 1 mile of the routes and segment alternatives.

Table 3.15-5. Recreation Areas within one mile of the Route and Segment Alternatives

Route or Segment Alternative	Recreational Resources
A	Boat landing and camp site, Legacy Grove Camp, Fort Trotter Trail, Golf Ground or Country Club
B	Boat landing and camp site, Legacy Grove Camp, Playground/Ball Field
C	Playground/Ball Field
Segment Alternatives A03	Legacy Grove Camp
Segment Alternatives A04	Legacy Grove Camp
Segment Alternatives A14	Box T Ranch Bible and Saddle Camp
Segment Alternatives A21	Playground/Ball Field
Segment Alternative A38	Legacy Grove Camp

PLOTS is a voluntary program offered to landowners by the NDGF, which provides landowners with monetary compensation for allowing public access to their land for fishing or hunting. Table 3.15-6 illustrates the number and acreage of PLOTS lands within the routes and segment alternatives.

Table 3.15-6. PLOTS within the Route and Segment Alternatives

Route or Segment Alternative	Number of PLOTS Lands	Total Acreage
A	15	518
B	4	122
C	10	326
Segment Alternative A05	1	64
Segment Alternative A08	1	47
Segment Alternative A12	4	116
Segment Alternative A13	1	31
Segment Alternative A14	2	96
Segment Alternative A18	7	224
Segment Alternative A19	2	37
Segment Alternative A23	1	18

TNC owns two properties within the Study Area: Cross Ranch Preserve and Davis Ranch Preserve. The Cross Ranch Preserve is divided into 3 units. The southern unit located within Route C is defined as uplands that are covered by mixed-grass prairie. The Davis Ranch Preserve is large prairie landscape in the Missouri Coteau consisting of high quality northern mixed-grass prairie with fresh, alkaline, ephemeral, and permanent wetlands. No routes or segment

alternatives are located within the Davis Ranch Preserve. Wildlife observation is allowed on TNC-owned lands.

3.15.2 Impacts

Direct impacts to recreational resources would be minimized to the extent feasible. Direct effects involve altering or physically changing recreation resources, conflicting with recreation area goals, or affecting accessibility to areas. Indirect effects are visual impacts to the scenic quality and natural appearance of the landscape as viewed from the recreational use area by a recreational user. The proposed Project would span recreational resources to minimize impacts, such as rivers and lakes. In general, recreational impacts would be visual in nature and limited to individuals using public or private property in the corridor for hiking, hunting, fishing, or nature observation.

The transmission line would likely be visible from all recreational resources located within and adjacent to the routes and segment alternatives and would have the potential to be visible from all recreation resources within approximately 1 mile of the routes and segment alternatives depending on the surrounding topography.

No state managed lands would be impacted by the routes. The Wilbur Boldt WMA is located within Segment Alternative A02, but if this alternative is selected the final ROW may be able to avoid this WMA since the segment alternative just crosses the north side of the WMA. If the WMA is not avoidable the potential impacts are listed in Table 3.15-7.

Table 3.15-7. State Lands within the Segment Alternative Right-of-Way

Segment Alternative ROW	Resource Agency	Name	Acreage Along ROW	Length of Crossing	Number of Structures	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Segment Alternative A02	NDGF	Wilbur Boldt WMA	0.40	100	0	0.04	0.0

Although five WPAs, three WDAs, one NWR, and one Bureau of Reclamation managed lands are located within the routes and segment alternatives. The ROW is anticipated to avoid most federally-managed lands, because the ROW may have space within the 1,000-foot-wide route or segment alternative to avoid the managed lands, even though the boundaries of the routes and segment alternatives may overlap with the boundary of the managed land. Table 3.15-8 provides a list of those ROWs that may impact federal lands if avoidance is not feasible. Route A may impact the Hoornaert WPA. The routes and segment alternatives are anticipated to span the Chain of Lakes Recreation Area.

Table 3.15-8. Federal Lands within the Route and Segment Alternatives Right-of-Way

Route or Segment Alternative ROW	Resource Agency	Name	Acreage Along ROW	Length of Crossing (ft)	Number of Structures	Temporary Impacts (Acres)	Permanent Impacts (Acres)
A	USFWS	Hoornaert WPA	8.86	2,635	3	1.17	0.006
Segment Alternative A07	USFWS	Koening WDA	3.27	947	1	0.35	0.002
Segment Alternative A07	USFWS	Lost Lake WDA	1.09	1,315	1	0.117	0.001
Segment Alternative A07	USFWS	Lost Lake NWR	6.45	7,920	8	0.693	0.003
Segment Alternative A12	USFWS	Koening WDA	0.16	994	1	0.017	0.000
A, B, C, Segment Alternatives A07 & A08	Bureau of Recreation	Chain of Lakes Recreation Area/ McClusky Canal			0	0	0

No impacts to other recreation resources, such as golf courses, parks, and camps are anticipated.

The transmission line would span three trails. No structures would be placed directly in the trails and the trails would not need to be relocated or closed. Individuals using these trails would continue to have access to the trails. However, during construction there may be short periods of disruption with construction workers in the area.

The proposed Project would span the Northern Plains National Heritage Area. No structures would be placed within the Missouri River or block trail access. Individuals using the river and trails would continue to have access to the resources. However, during construction there may be short periods of disruption with construction in the area.

No impacts to TNC lands are anticipated.

Table 3.15-9 illustrates the number and acreage of PLOTS lands that may be impacted by the routes and segment alternatives. Individuals using these properties would have access under the transmission line to the property; the proposed Project would not impact the recreational opportunities on PLOTS lands.

Table 3.15-9. PLOTS within the Route and Segment Alternative Right-of-Way

Route orSegment Alternative ROW	Number of PLOTS Lands	Total Acreage
A	10	71
B	4	19
C	6	29
Segment Alternative A05	1	9
Segment Alternative A08	1	9
Segment Alternative A12	1	9
Segment Alternative A13	1	4
Segment Alternative A14	2	15
Segment Alternative A18	4	26
Segment Alternative A19	2	9
Segment Alternative A23	1	1

3.15.3 Mitigation

The proposed Project would span existing trails, State Highways 1804 and 1806, and the Chain of Lakes Recreation Area/McClusky Canal. Since it is not anticipated that any recreational resources would be removed from service by implementation of the proposed Project, no adjacent land would need to be converted or dedicated to recreational use or wildlife management. Secondary recreational uses of proposed Project property may be allowable depending on security requirements. No other mitigation is anticipated to be necessary.

If Route A ROW crosses the Hoornaert WPA, Minnkota will work with the USFWS to apply for the appropriate permits and to minimize impacts.

Minnkota would work with the state and federal agencies to reduce visual impacts to these resources. As discussed in Section 3.11, the transmission line would be designed to minimize impacts to aesthetics.

3.16 Cumulative Impacts

In addition to analyzing the individual impacts of a project, the federal environmental review process requires consideration of the cumulative environmental impact of multiple projects within an area. In conformance with National Environmental Policy Act (NEPA) requirements, this section discusses the cumulative significance of past, present, and reasonably anticipated future projects on the environment along the Center to Grand Forks proposed routes and segment alternatives.

3.16.1 Regulatory Requirements

The Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of NEPA defines cumulative impacts as:

The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7).

Cumulative impacts are considered direct effects, which are "caused by the action and occur at the same time and place" (40 CFR 1508.8).

The CEQ regulations also require a discussion of cumulative actions and connected actions in the scope of the environmental review. These terms are defined as follows:

Cumulative actions are those "which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same [environmental review]" (40 CFR 1508.25 (a) (1)).

Connected actions are those that are closely related. "Actions are connected if they: (i) automatically trigger other actions which many require environmental review; (ii) cannot or would not proceed unless other actions are taken previously or simultaneously; or (iii) are interdependent parts of the larger action and depend on that larger action for their justification" (40 CFR 1508.25 (a) (1)).

Indirect effects, also termed secondary effects, are "caused by the action and are later in time or father removed in distance, but are sill reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to inducted changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems' (40 CFR 1508.8).

3.16.2 Analytical Approach

This cumulative impacts review was developed in consultation with the federal and state agencies responsible for the various environmental resources within the routes and segment alternatives, and is limited to those resources the agencies identified as being of concern and potentially requiring mitigation. This type of screening ensures that the analysis focuses on critical resources. The cumulative impacts analysis is based on existing conditions of the critical environmental resources in each of the routes and segment alternatives.

This analysis uses an approach developed through graduate research (Shoemaker, 1994 and 2004) and in dialogue with federal agencies such as the EPA, Federal Highway Administration (FHWA), USACE, and the Bureau of Land Management. It is a nationally accepted methodology on large infrastructure projects and consists of the following steps:

- Establish valued environmental components;
- Establish temporal and spatial study boundaries;
- Identify past, present, and reasonably foreseeable activities both direct and indirect; and
- Analyze cumulative impacts through use of a matrix format (CEQ 1997).

3.16.3 Valued Environmental Components

Valued environmental components (VECs) are those components of the environment for which there is regulatory or public concern. VECs include the social, cultural, technical, economic, and natural components of the environment. This section follows two principles identified by CEQ when considering VECs: (1) focus only on the effects and resources within the context of the proposed action; and (2) present a concise list of issues that have relevance to the anticipated effects of the proposed action or eventual decision. Based on this guidance, the resources examined in previous subsections of Section 3.0 were reviewed to determine which constituted VECs that may be affected by cumulative actions. The factors used to decide which resources to review are listed below.

- Land Use – Further consideration as the routes have the potential to impact agricultural activities.
- Soils –No further consideration as Minnkota would use approved and proven mitigation measures to minimize the potential for soil erosion.
- Vegetation – Further consideration as the routes have the potential to impact agricultural activities and removal of prairie vegetation.
- Wildlife – Further consideration due to potential for bird strikes, habitat change, and habitat fragmentation.
- Threatened and Endangered Species – Further consideration to address any regional activities that may affect special status species habitat potentially impacted by the proposed Project.
- Water Resources – No further consideration as Minnkota would use approved and proven mitigation measures to minimize the potential for sedimentation.
- Wetlands – No further consideration as Minnkota would use approved and proven mitigation measures to minimize the potential for additional losses and habitat conversion of waters of the United States.
- Geology and Groundwater – No further consideration as Minnkota would use approved and proven mitigation measures to minimize the potential for groundwater impacts.
- Archaeological and Historic Resources – No further consideration as the routes are not expected to impact known cultural resources and values. Minnkota would conduct a cultural resource survey prior to construction and adjust the proposed Project's ROW alignment to avoid impacting any discovered cultural resource sites.
- Visual Resources – Further consideration of the potential to affect the viewshed.
- Noise – No further consideration as the routes are not expected to exceed state noise standards.

- Electric and Magnetic Fields – No further consideration as the routes would be constructed following "prudent avoidance" guidance.
- Public Services – No further consideration, as the routes would not restrict the public from any public service.
- Radio, TV, and Cell Phone – No further consideration as transmission lines rarely result in any impacts, and in the rare case that there are, the impacts can be readily mitigated by tightening loose hardware or upgrading receiving antennas.
- Economic Factors – No further consideration as all proposed routes would positively affect economic conditions by improving the reliability of the local transmission system and reducing the potential for brown-outs.
- Human Settlement – Further consideration because although no involuntary residential displacement is anticipated, the proposed Project may have an indirect effect on property values.
- Recreation and Tourism – Further consideration as some of the routes and segment alternatives may have indirect visual impacts upon trail users. Further consideration may occur depending on proximity to other projects.

3.16.4 Temporal and Spatial Boundaries

The temporal boundary is the design life of the proposed Project facilities. Spatial boundaries are based on the Study Area, which includes all land within the routes and segment alternatives under consideration for the proposed Project.

3.16.5 Past, Present, and Reasonably Foreseeable Activities

Regulations and case law provide direction as to what constitutes a reasonably foreseeable action that should be included in a cumulative impacts review. Reasonably foreseeable actions include activities that are not speculative and that constitute an independent utility or function. In addition, a reasonably foreseeable project should be planned and funded (Canter and Rumrill, 1997).

Additional development induced by the proposed Project is considered an indirect impact for purposes of a cumulative impacts analysis. The development of a wind generation facility in response to the proposed Project increasing the transmission outlet for such generation would only merit specific analysis if it is reasonably foreseeable. At this point, no specific wind generation facilities induced by this proposed Project have been identified as reasonably foreseeable. The following tables provide a summary of the activities identified within the Study Area that may contribute to direct or indirect cumulative impacts. Table 3.16-1 lists past, present, and reasonably foreseeable transmission line projects. Table 3.16-2 lists past, present, and reasonably foreseeable pipeline projects. Table 3.16-3 lists past, present, and reasonably foreseeable wind energy projects.

Table 3.16-1. Past, Present, and Reasonably Foreseeable Transmission Line Projects

State	Project	Description
Minnesota	Fargo to St. Cloud 345 kV Transmission Project/ Great River Energy	Clay, Douglas, Grant, Ottertail, Pope, Stearns, Stevens, Todd, Traverse, and Wilkin counties
Minnesota	Noble Flat Hill 230 kV HVTL/ Noble Flat Hill Windpark I, LLC	Clay County
North Dakota	230kV Transmission Line/ FPL Energy Burleigh County Wind, LLC	Burleigh County
North Dakota	230kV Transmission Line/ FPL Energy Oliver Wind, LLC	Oliver County
North Dakota	230 kV Transmission Line/ M-Power, LLC	Barnes/Steele County
North Dakota	230 kV Transmission Line / Allete, Inc.	Oliver County
North Dakota	Luverne 230 kV Transmission Line/Otter Tail Corporation	Barnes/Steele Counties
North Dakota	230 kV Transmission Line/Allete, Inc.	Morton/Oliver Counties
North Dakota	102 MW Baldwin Wind Energy Center/Baldwin Wind, LLC	Burleigh County
North Dakota	230 kV Transmission Line/ NextEra Energy Resources, LLC	Oliver & Morton Counties
North Dakota	230 kV Electric Transmission Line/Otter Tail Power Company	Sargent County
North Dakota	Pillsbury-Fargo 230 kV Transmission Line/Minnkota Power Coop., Inc.	N/A
North Dakota	Fargo-Monticello MN 345 KV CapX Transmission Line/ Northern States Power Company	N/A
North Dakota	230 kV Transmission Line/ Tatanka Wind Power, LLC	Dickey - McIntosh Counties

Table 3.16-2. Past, Present, and Reasonably Foreseeable Pipeline Projects

State	Project	Description
Minnesota	Enbridge Pipeline Southern Lights Project/Enbridge Pipelines, LLC	108 mile, 20 inch pipeline in Kittson, Marshall, Pennington, Red Lake, Polk, and Clearwater Counties
Minnesota	Lakehead Pipeline Terrace Expansion/Lakehead Pipeline	68.6 miles, 36 inch crude oil pipeline in Kittson, Marshall, Pennington, Red Lake, and Polk Counties
Minnesota	Lakehead Pipeline Company Clearwater/Lakehead Pipeline	107 miles, 20 inch crude oil pipeline in Kittson, Marshal, Pennington, Red Lake, Polk, and Clearwater Counties
North Dakota	Antelope Valley Station Water Pipeline/ Basin Electric Power Coop Inc.	Mercer County
North Dakota	Crude Oil Pump Stations/ Enbridge Pipelines (North Dakota) LLC	Mountrail, McHenry, Ramsey, and Grand Forks Counties
North Dakota	30-Inch Crude Oil Pipeline/ TransCanada Keystone Pipeline, LP	Cavalier/Sargent Counties
North Dakota	6-Inch Crude Oil Pipeline/ Plains All American Pipeline, LP	Dunn/Stark Counties

Table 3.16-3. Past, Present, and Reasonably Foreseeable Wind Energy Projects

State	Project Name/Applicant	Description
Minnesota	Bitter Root Wind Farm Project/Buffalo Ridge Power Partners, LLC	138 MW project in Lincoln/Yellow Medicine Counties
Minnesota	West Stevens Wind/West Stevens Wind	20 MW project in Stevens County
Minnesota	Grant County Wind/Grant County Wind, LLC	20 MW project in Grant County
Minnesota	Lakeswind Wind Power Plant/Project Resources Corporation	60 MW project in Becker, Clay, Ottertail Counties
Minnesota	Noble Flat Hill Windpark I/Noble Flat Hill Windpark I, LLC	201 MW project in Clay County
Minnesota	Bear Creek Wind Project	47.5 MW project in Ottertail/Todd Counties
North Dakota	Rugby Wind Farm/Pierce County PPM Energy, Inc.	N/A
North Dakota	Wind Farm/Cavalier County Langdon Wind, LLC	N/A
North Dakota	Wind Farm/Logan County Just Wind-Wind Farm Development	N/A
North Dakota	Wind Farm Expansion/Cavalier County Langdon Wind, LLC	N/A
North Dakota	Electric Generation Wind M-Power, LLC	Griggs/Steele County
North Dakota	1000 MW Wind Farm/NextEra Energy Resources, LLC	Oliver County
North Dakota	150 MW Border Winds Energy Project/Sequoia Energy US Inc.	N/A
North Dakota	125 MW Wind Energy Conversion Facility/Allete, Inc.	Oliver County
North Dakota	Emmons County Wind Farm Project/Just Wind, LLC	Emmons County
North Dakota	175 MW Wind Farm/ Rough Rider Wind I, LLC	Dickey County
North Dakota	Bison I Wind Project/Allete, Inc.	Morton/Oliver Counties
North Dakota	Ashley Wind Power-Power Project CPV/Ashley Renewable Energy Company, LLC	N/A
North Dakota	Luverne Wind North Field/Ottertail Power	Griggs/Steele Counties
North Dakota	Luverne Wind South Field/Ashtabula Wind II, LLC	Griggs/Steele Counties
North Dakota	102 MW Baldwin Wind Energy Center/FPL Energy, LLC	Burleigh County
North Dakota	102 MW Baldwin Wind Energy Center/NextEra Energy Resources LLC	Burleigh County

3.16.6 Analysis Matrix

The assessment of potential impacts is possible through the use of an interaction matrix based on the identified relevant activities. An interaction matrix not only lists activities and environmental effects, but also incorporates an association between cause and effect using evaluation criteria (CEQ).

Table 3.16-4 below identifies the potential cumulative impacts for the VECs identified above. As previously noted, cumulative impacts result from spatial (geographic) and temporal (time) crowding of environmental impacts. Many researchers and practitioners have used observations or environmental change theory to categorize how impacts build up and lead to different types of cause-and-effect pathways. Table 3.16-5 lists cause-and-effect pathway criteria that reflect common categories cited in CEQ's Considering Cumulative Effects under the National

Environmental Policy Act. The pathway criteria in Table 3.16-5 are used to evaluate potential interactions of activities in Table 3.16-4 leading to potential cumulative impacts.

Table 3.16-4. Interaction Matrix

Resource	Project Impact	Past, Present, and Reasonably Foreseeable Projects	Cumulative Interaction/ Pathway	Mitigation
Land Use	Removal of land from agricultural production	Transmission Lines, Pipelines, and Wind Energy Facilities	Fragmentation and compounding effects	Span croplands to extent practicable; follow section or half-section boundaries to the extent practicable; allow agricultural production under lines and adjacent to structures.
Soils	Removal of prime farmland,erosion	Transmission Lines, Pipelines, and Wind Energy Facilities	Compounding effects and Indirect effects	Span croplands to extent practicable; follow section or half-section boundaries to the extent practicable; allow agricultural production under lines and adjacent to structures. Implement standard best management practices
Flora	Removal of grassland/prairie vegetation	Transmission Lines, Pipelines, and Wind Energy Facilities	Fragmentation and compounding effects	Revegetate with native species
Fauna	Displacement, avian collisions, habitat change, habitat fragmentation	Transmission Lines, Pipelines, and Wind Energy Facilities	Fragmentation and compounding effects	Marking of the shield wires and construction timing
Threatened and Endangered Species	Displacement, mortality, habitat change, habitat fragmentation	Transmission Lines, Pipelines, and Wind Energy Facilities	Fragmentation and compounding effects	Coordinate with regulatory agencies and implement project-specific conservation measures
Visual Resources	Introduce pole structures	Transmission Lines, Pipelines, and Wind Energy Facilities	Fragmentation and compounding effects	Parallel with existing linear features and field breaks and focus similar activities in one area.
Human Settlement	Displacement and lower property values	Transmission Lines, Pipelines, and Wind Energy Facilities	Compounding effects	Comply with federal relocation requirements, provide compensation to impacted landowners

Resource	Project Impact	Past, Present, and Reasonably Foreseeable Projects	Cumulative Interaction/ Pathway	Mitigation
Recreation and Tourism	WPA impacts, trail crossings and visual impacts	Transmission Lines, Pipelines, and Wind Energy Facilities	Compounding effects	Comply with federal regulations regarding permits if change a WPA use. Minimize crossings of recreational trails, consider trail location when identifying structure locations
Water Resources/ Wetlands	Sedimentation, turbidity, runoff, and wetland fill and wetland type conversion	Transmission Lines, Pipelines, and Wind Energy Facilities	Fragmentation and compounding effects	Comply with state and federal regulations, develop wetland mitigation plan; maintain existing hydrologic characteristics

Table 3.16-5. Cumulative Interaction Criteria

Pathway Criteria	Main Characteristics	Example
Time crowding	Frequent and repetitive effects on an environmental system	Forest harvesting rates exceeding regrowth
Time lags	Delayed effects	Exposure to carcinogens
Space crowding	High spatial density of effects on an environmental system	Pollution discharges into streams from nonpoint sources
Cross-boundary	Effects that occur away from the source	Acidic precipitation
Fragmentation	Change in landscape pattern	Fragmentation of natural habitat
Compounding effects	Effects arising from multiple sources or pathways	Synergism among pesticides
Indirect effects	Secondary effects	Commercial development following highway construction
Triggers and thresholds	Fundamental change in system behavior or structure	Global climate change

3.17 Summary of Impacts

Table 3.17-1 summarizes the resources that may be impacted as a result of construction of the proposed Project and the appropriate mitigation. The segment alternative impacts and mitigation are not summarized, but would be similar to that provided for the overall routes.

Table 3.17-1. Summary of Route Impacts and Mitigation

Resource	Impact	Mitigation
Land Use	Route A: Approximately 3.0 acres of land would be permanently impacted due to the construction of the transmission line (2.2 acres of agricultural land). The existing land use is primarily agriculture and would remain in agriculture use since the land under or adjacent to the line can still be used by the landowner. Route B: Approximately 3.2 acres of land would be permanently impacted due to the construction of the generation outlet (2.4 acres of agricultural land). Route C: Approximately 3.0 acres of land would be permanently impacted due to the construction of the generation outlet (2.3 acres of agricultural land). Impacts to USFWS easements may occur within the routes. Short-term impacts to residents and local business owners in the Study Area primarily would be related to disruption caused by temporary construction activities, such as noise. Long-term impacts may include displacement of residences or businesses due to location within the proposed Project ROW. Potential voluntary displacement of up to two homes may occur near the ROW within the routes, depending on final ROW location.	Minnkota would work with landowners and regulatory agencies to minimize impacts of the proposed Project. To minimize impacts to land owners, Minnkota has agreed to the following mitigation measures: The exact location of structure sites, the ROW, and other disturbed areas would be determined with landowners' input. The minimum area necessary would be disturbed. Construction activities would be limited to the ROW, unless access permission is obtained from the landowner(s). Landowner compensation would be established by individual easements.
Soils	Route A: A total of approximately 3.0 acres of land would be permanently impacted by the transmission line construction. Approximately 593.8 acres of temporary impacts are anticipated. Route B: A total of approximately 3.2 acres of land would be permanently impacted by the transmission line construction. Approximately 637.0 acres of temporary impacts are anticipated. Route C: A total of approximately 3.0 acres of land would be permanently impacted by the transmission line construction. Approximately 599.6 acres of temporary impacts are anticipated.	BMPs for erosion and sediment control would be utilized to minimize wind and water erosion along the route. Only land needed for the transmission line structures would be permanently impacted. Temporarily disturbed areas that are not cultivated would be revegetated.

Resource	Impact	Mitigation
Vegetation	Route A: A total of approximately 3.0 acres of land would be permanently impacted by the transmission line construction and 52 acres of woodland would be converted to shrubland or grassland. Approximately 639.8 acres of temporary impacts are anticipated. Route B: A total of approximately 3.2 acres of land would be permanently impacted by the transmission line construction and 58.5 acres of woodland would be converted to shrubland or grassland. Approximately 688.9 acres of temporary impacts are anticipated. Route C: A total of approximately 3.0 acres of land would be permanently impacted by the transmission line construction and about 50 acres would be converted to shrubland or grassland. Approximately 644.4 acres of temporary impacts are anticipated.	Minnkota would work with the USFWS to minimize impacts on easements and federal-managed lands. Minnkota would avoid existing trees and shrubs as practicable. Minnkota would use BMPs during construction and operation to minimize impacts. Impacts to individual trees or shrubs would be replaced at a ratio of 2:1. Temporarily disturbed areas would be reseeded
Wildlife	Impacts to wildlife populations are expected to be minimal. Potential avian and bat collisions may occur, but are anticipated to be relatively small.	A variety of mitigation measures would be implemented, as discussed in Section 3.5. Some examples of wildlife mitigation measures include continued consultation with RUS and USFWS, design transmission line following APLIC standards, preconstruction wetland and woodland surveys, and implementation of erosion control measures.
Threatened and Endangered Species	Impacts to rare and unique natural resources are not anticipated.	Wetland surveys would be completed for wetlands prior to construction to ensure that transmission structures can span the wetlands. Minnkota has committed to marking of both shield wires in an alternating pattern in select areas, designed the line and structures per APLIC guidelines, and construction timing.
Surface Water and Floodplain Resources	No impacts are anticipated to rivers, streams, drainageways, or floodplain resources.	To minimize impacts during construction an NPDES permit and SWPPP would be prepared and submitted to the North Dakota Department of Health. Minnkota would span all rivers and streams to the extent practicable. No structures would be placed within a regulatory floodway.
Wetlands	No impacts are anticipated.	Minnkota would mitigate impacts according to USACE requirements. All additional wetlands would be avoided to the extent practicable.
Geologic and Groundwater Resources	No impacts to geologic and groundwater resources are anticipated.	No mitigation measures are necessary.
Cultural Resources	No impacts to previously identified cultural resources are anticipated.	Minnkota has completed a Class I Cultural Resources Inventory for the macro-corridors. Minnkota would conduct surveys prior to construction.
Visual	The transmission line would be evident to individuals traveling on adjacent roads as well as residences and landowners that live in close proximity to the transmission line and substations.	The routes minimize the number of residences potentially impacted by the line. Minnkota attempted to site the routes along field lines away from residences.

Resource	Impact	Mitigation
Noise	The closest occupied structure to the Center Substation is about 5,380 feet away; the closest occupied structure to the Prairie Substation is about 2,880 feet away. No impacts to noise sensitive land uses are anticipated.	No mitigation measures are proposed.
Human Health and Safety	No impacts are anticipated.	Minnkota would follow "prudent avoidance" methods to minimize EMF exposure and any potential impacts to human health. Minnkota would conduct an EMF study. If proper safeguards are implemented, no additional mitigation is required.
Public Services	No impacts are anticipated.	The transmission line would be constructed according to the configuration identified by Minnkota to mitigate any potential impacts. Impacts to existing public services would be avoided to the extent practicable.
Socioeconomics and Environmental Justice	Socioeconomic impacts are primarily positive due to increased expenditures during construction and the long term benefits of an increased tax base of the county due to transmission line tax. A nominal amount of land would be permanently removed from production due to the construction of the proposed Project. The proposed Project is not anticipated to result in an economic or social hardship to minority or low-income populations. A concern of residents living near existing or proposed transmission lines is how proximity to the line could affect the value of their property.	The proposed Project is not expected to have negative economic impacts on local and regional economies. As such, no mitigation measures are proposed to address the socioeconomic impacts. The payments of taxes to the state, then allocated to the counties in which the transmission line and associated infrastructure are located are not anticipated to generate negative impacts. For this reason, no mitigation measures are needed. Easement payments to landowners are required to compensate landowners for loss of use of the utility easement on their property (this would include a landowner's leased property). Minnkota would communicate with landowners regarding the placement of structures.
Recreational Resources	Impacts to recreational resources are primarily visual, and limited to individuals using the resources. Potentially one WPA may be impacted by Route A. The Chain of Lakes Recreation Area may be impacted by the three routes. The routes would span three trails. PLOTS parcels and USFWS easements would be impacted.	Minnkota would route the transmission line along field breaks and section lines to avoid state and federal managed lands. Visual impacts would be minimized by placement of structures away from these features to the extent possible. Access to trails, PLOTS, and USFWS easements would be maintained and recreational activity may continue.

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4.0 Preferred Route Selection

The deciding factors in selecting Route A as the preferred route are listed below. Table 4.0-1 shows a comparison of routes A, B, and C.

- Route A would affect three more residences than Route B, but nine fewer residences than Route C. Placement of the 150-foot-wide ROW within the 1,000-foot-wide route would reduce impacts to homes or be able to avoid homes within the route.
- Route A would be the shortest in length, thereby reducing affects, environmental features, and cost.
- Route A would have the fewest number of poles in cropped lands, lessening the impact to farmers.
- All three routes affect about the same number of federal and state managed lands.
- Route A would cross the Missouri River about 1.25 miles north of the existing high-voltage direct current transmission line, which would reduce the visual affect of a new river crossing to river users. Route A would reduce the affect to birds and threatened and endangered species along the river by having a river crossing near an existing crossing point.
- Route A would reduce visual impacts to residents and travelers along state highways by not routing the Project within state highway rights-of-way.
- Route A has the fewest number of large water body crossings.
- Route A best addresses public, agency, and tribal input and concerns raised at the meetings by minimizing impacts to landowners, agricultural practices, crossing the Missouri River at an existing crossing point, and environmental features.

Route A has about 33 segment alternatives for routing options based upon discussions with landowners. As Minnkota negotiates easements and enters the state permitting process there could be variations with the final route alignment. However, the final alignment would be located within the macro-corridors.

Table 4.0-1. Route Alternative Comparison Table

		Route[1]		
		A	**B**	**C**
Resource	**Total Length (mile)**	247.4	269.6	250.4
	Length (feet)	1,306,386	1,423,274	1,322,101
	Total ROW[2] Acres	4,498.0	4,900.4	4,552.2
	Number of Structures	1,309	1,425	1,324
Impact Acres	**Acres of Temporary Impact**	593.8	637.0	599.6
	Acres of Permanent Impact	3.0	3.2	3.0
	Acres of Woodland Conversion[3]	52	59	50
Collocating (miles)	Transmission Line (includes transmission line following highway)	8.2	2.6	10.1
	Highway	12.3	15.6	4.1
	Other Road	43.6	46.2	73.7
	Total Existing Corridor	64.1	64.4	87.8
Homes (count)	0-75 feet from route centerline	1	0	2
	75-150 feet from route centerline	1	2	0
	150-300 feet from route centerline	3	2	8
	300-500 feet from route centerline	6	4	10
	Total Homes in 1,000-foot-wide route	11	8	20
	0-100 feet beyond the route	10	2	10
	100-500 feet beyond the route	22	24	19
	Homes per Mile (within route)	0.04	0.03	0.08
Wetlands	Count of NWI Wetland Crossings greater than 1000 feet	5	9	8
	Acres of NWI Wetland in ROW	280	294	253
	Percent NWI Wetland in ROW	6.2	6.0	5.6
Land Cover	Percent Cropland within ROW	56	60	58
	Percent Pasture within ROW	17	15	17
	Percent Prairie within ROW	14	11	12
	Percent Shrubland within ROW	4	3	4
	Percent Woodland within ROW	1	1	1
Resource Areas	Total Resources Areas within ROW	2	1	1
	Total Resources Areas within 1 Mile of Route Centerline	14	14	18
Cultural	Cultural Sites within Route	17	14	19
	Cultural Sites within 1 Mile of Route	110	103	124
	Center Pivot Irrigation within 0.5 Mile of Route Centerline	7	7	4
	Communication Tower within Route	1	0	1
	Airports within 1 Mile of Route Centerline	0	3	2

[1]. Route = 1,000-feet-wide
[2]. ROW = 150-feet-wide
[3]These impacts would be considered a permanent vegetation conversion.

5.0 Public and Agency Coordination

Minnkota pursued a public outreach effort that provided opportunities for landowner and other stakeholders to be involved in the routing process. Minnkota engaged landowners, interested members of the public, federal, and state agencies, and local government units. This section discusses outreach efforts in general. Refer to Appendix I for meeting notes and mailings

Initial meetings with federal and state permitting authorities started in April 2009. Meetings with the counties were held in April and May 2009. Minnkota began hosting a series of public open house meetings in the Study Area to discuss the proposed Project and identify potential issues and concerns in May 2009.

5.1 Public Participation

Minnkota engaged the public from the initial stages of proposed Project development and continued public involvement throughout each stage of the Project by using a variety of outreach tools. Minnkota voluntarily hosted three rounds of public open house meetings within the proposed Project area. Table 5.1-1, below, identifies the Project phase, meeting dates, meeting locations, meeting materials and number of attendees for each round of meetings. Minnkota hosted pre-scoping and post-scoping public open house meetings, while the RUS hosted the Scoping meetings held in November 2009. Detailed information from the 2009 public participation for this proposed Project is located in the Scoping Decision/Report prepared by RUS and published February 2010.

In order to notify landowners of each round of public open house meetings, Minnkota used the following type of mail and media outreach:

- Direct mail notice to landowners with property within the proposed Project area.
- Press release to television stations and radio stations within the proposed Project area.
- Newspaper advertisements in the local newspapers within the proposed Project area.

Table 5.1-1. Public Open House Meetings

Project Phase	Meeting Dates	Meeting Locations	Meeting Materials	Total Attendees
Pre-Scoping (Hosted by Minnkota)	May 6-7, 12-14, 2009	Washburn, Wing, Carrington, Cooperstown, Grand Forks	Informational boards, meeting handout, project video, aerial maps of potential project corridors	161
Pre-Scoping (Hosted by Minnkota)	August 20, 2009	Center	Informational boards, meeting handout, project video, aerial maps of potential project corridors	53
Scoping (Hosted by RUS)	November 16 - 19, 2009	Grand Forks, Cooperstown, Carrington, McClusky, Wilton, Center	Informational boards, meeting handouts/resource factsheets, aerials maps of macro-corridors	187
Post-Scoping (Hosted by Minnkota)	April 12-15, 2010	Grand Forks, Finley, Carrington, McClusky, Wilton, Center	Information boards, meeting handout/resource factsheets, mapping station, aerial maps of proposed routes, 30 minute presentation	503

In addition to public open house meetings, Minnkota used a project-specific Web site and project-specific information line to reach interested members of the public. Minnkota hosted a Web site at www.minnkotacgf.com. The Web site content varied by the Project phase, but always provided the following information:

- Home Page – General Project information, announcements, maps, and video;
- Project Page – Detailed Project information;
- Contact Us Page – Project manager contact information and links to log a comment or be added to the project mailing list;
- Resource Page – Glossary of terms, public meeting materials, factsheets, and RUS documents;
- FAQ Page – List of frequently asked questions and answers.

Minnkota established a toll-free project information line (800-473-5679). The toll-free project information line provided an opportunity for the public to receive general Project information, to sign-up for the mailing list, and leave a comment. The toll-free project information line launched on April 13, 2009, was modified with each phase of the proposed Project to include updated Project information along with the public open house meeting times, dates, and locations.

Minnkota collected comments from the public to identify concerns about the proposed Project or routing suggestions within the proposed Project area. The public could log a comment in one of the following manners:

1. Through the Web site;
2. Leave a comment on the toll-free project information line;
3. Email, mail or phone a comment to Minnkota;
4. Fill out a comment form during open house meetings;
5. Voice a comment to a Project team member at the open house meeting.

In order to streamline the tracking, integration, and response to comments received from the public, Minnkota developed a comment management protocol. All comments were addressed in one of the four ways: (1) a return phone call, (2) an email, (3) a mailing with letter and resources information, (4) or discussed internally and added to the Project database.

Minnkota will continue to notify the public of Project milestones through Project completion.

5.2 Federal, State, and Local Agency Consultation

In April 2009, Minnkota sent letters to initiate correspondence with federal agencies, state agencies, and county commissioners within the proposed Project Study Area. Table 5-2-1 provides information of all agency mailings for the proposed Project.

Table 5.2-1. Agency Mailings

Agency Type	Purpose	From	Mailing Date
Federal and state agencies	Project introduction	Minnkota	4/27/2009
County Commissioners	Project introduction	Minnkota	4/22/2009
Federal and state agencies	River crossing site visit	RUS	9/16/2009
Federal and state agencies	AES and MCS review and invitation to Scoping Meeting	RUS	11/2/2009
USFWS	Letter to initiate Section 7 Consultation	RUS	6/4/2010

Minnkota held meetings with federal, state, and local agencies to provide general Project information and provide updates as the Project progressed. Table 5.2-2 provides a list of agency consultation meetings from April 2009 to May 2010.

Minnkota initiated agency meetings in April and May 2009. At these meetings, Minnkota provided a PowerPoint presentation with general Project introduction materials including the proposed Project background, need, Study Area, permits required, and approval process. Minnkota provided an opportunity for the agencies to identify and discuss any specific concerns related to the proposed Project.

In September 2009, a meeting was held for federal and state agencies to review the proposed river crossing routes. Minnkota provided two pontoon boats to review crossings along the Missouri River. In addition to the Missouri River, the agencies reviewed potential crossings at the Sheyenne River. Minnkota and RUS received comments from the agencies during these site reviews to assist in the determination of crossing options with minimal impacts.

The USACE hosts bi-weekly interagency meetings in Bismarck, North Dakota for other federal and state agencies. Minnkota attended two meetings (April 30, 2009, and April 15, 2010) to provide a status update of the Project to the state and federal agencies in attendance.

As necessary or requested by agencies, Minnkota will continue to meet with federal, state, and local agencies regarding the proposed Project.

On April 21, 2010, the RUS hosted a meeting with the USFWS to initiate the Section 7 Consultation process. Discussions included the Section 7 Consultation schedule, biological assessment, and federally listed species. On June 4, 2010, the RUS mailed a letter to the USFWS North Dakota Ecological Services Field Office of their intended approach to consultation under Section 7(a) of the ESA.

Table 5.2-2. Agency Meetings

Agency	Meeting Date
North Dakota PSC Meeting	4/13/2009
McLean County Commissioners	4/20/2009
Eddy County Commissioners	4/21/2009
Foster County Commissioners	4/21/2009
Grand Forks County Commissioners	4/21/2009
Traill County Commissioners	4/21/2009

Agency	Meeting Date
Nelson County Commissioners	4/29/2009
Burleigh County Commissioners	4/29/2009
North Dakota Inter-Agency Meeting (NDGFD, USACE, BOR, USFWS, FHWA, NRCS, NDDOT, ND Office of State Engineer)	4/30/2009
Griggs County Commissioners	5/5/2009
Kidder County Commissioners	5/5/2009
Sheridan County Commissioners	5/5/2009
Steele County Commissioners	5/5/2009
Wells County Commissioners	5/5/2009
Oliver County Commissioners	5/7/2009
Federal and State Agency Boat Tour – NDGF, USACE, SWC, NDPRD	9/23/2009
USFWS	9/24/2009
Agency Scoping Meeting (BOR, ND P&R, ND SWC, USACE, USFWS, ND SHPO, FHWA)	11/19/2009
North Dakota Inter-Agency Meeting (ND SHPO, USFWS, NDDOT, USACE, FHWA, ND SWC, FAA)	4/15/2010
USFWS – Section 7 Consultation	4/21/2010

5.3 Tribal Consultation

RUS is required under Section 106 of the National Historic Preservation Act, 16 U.S.C. §§ 470f, and it's implementing regulations, 36 C.F.R. §§ 800.3-800.7, to enter into consultation with agencies and other parties, including Native American tribes, that may have an interest in the effects to historic properties by the proposed Project. RUS is coordinating consultation with tribal representatives and governments.

RUS invited the tribes listed in Table 5.3-1 to participate in preliminary consultation and Section 106 Consultation for the proposed Project. To initiate consultation, RUS sent a letter on September 10, 2009 providing general information on the proposed Project. In addition, this letter invited tribal representatives to field meetings in September 2009 at the Missouri and Sheyenne rivers. Both river crossings have a high potential for cultural resources, and Native American tribes are being consulted during the preparation of a PA.

Table 5.3-1. Initial Project Tribal Contact

Nation	Nation
Assiniboine & Sioux Tribes of the Fort Peck Reservation	Oglala Sioux
Bois Forte Ojibwe	Red Lake Band of Chippewa
Crow Creek Sioux	Rosebud Sioux
Flandreau Santee Sioux	Santee Sioux
Fond du Lac Band of Lake Superior Chippewa	Cheyenne River Sioux
Grand Portage Band of Ojibwe	Sisseton Wahpeton Oyate
Leech Lake Band of Ojibwe	Spirit Lake Tribe
Lower Brule Sioux	Standing Rock Sioux
Lower Sioux Community	Three Affiliated Tribes
Mille Lacs Band of Ojibwe	Turtle Mountain Band of Chippewa
Minnesota Chippewa Tribe	Upper Sioux Community
Northern Cheyenne nations	White Earth Band of Ojibwe

No tribal invites participated in the Scoping Meetings or attended the September 2009 river meetings. Following these meetings, Minnkota contacted each tribe directly to determine its interest in the proposed Project. This effort identified other tribes that may have an interest in consulting. These additional tribes were contacted and are included in the list in Table 5.3-2. RUS received letters and oral communication from several tribal governments that have expressed interest to participate in the Section 106 process for this Project. RUS will continue to consult with the tribal governments as listed in Table 5.3-2. A representative of the Wahpekute, a non-Federally recognized tribe was also consulted.

Table 5.3-2. Tribal Consultation List

Nation	Date Mailed	Response	Consultation Status
Leech Lake Band of Ojibwe Indians	5/8/2009	5/14/2009 - Letter	Declined participation
Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation	5/8/2009	12/15/09 - Phone	Consulting party
Bois Forte Band of Chippewa Indians	5/8/2009	6/10/2009 – Letter	Declined participation
Cheyenne River Sioux Tribe of the Cheyenne River Reservation	5/8/2009	12/01/09 – Phone	Consulting party
Crow Tribe (Apsaalooke Nation)	5/8/2009	No response to date	Consulting party
Crow Creek Sioux Tribe of the Crow Creek Reservation	5/8/2009	No Response to Date	Consulting party
Flandreau Santee Sioux Tribe	5/8/2009	12/03/09 – Phone	Declined participation
Fond du Lac Band of Lake Superior Chippewa	5/8/2009	No response to date	Consulting party
Grand Portage Band of lake Superior Chippewa	5/8/2009	09/21/09 – email	Consulting party
Lower Brule Sioux Tribe of the Lower Brule Reservation	5/8/2009	3/22/109 – phone	Consulting party

Nation	Date Mailed	Response	Consultation Status
Lower Sioux Indian Community	5/8/2009	No response to date	Consulting party
Minnesota Chippewa Tribe	5/8/2009	No response to date	Individual bands consulted
Mille Lacs Band of Ojibwe Indians	5/8/2009	5/15/2009 – Letter	Consulting party
Oglala Sioux Tribe of the Pine Ridge Reservation	5/8/2009	4/7/10 – email	Declined participation
Northern Cheyenne	3/22/10	12/02/09 – phone	Consulting party
Prairie Island Indian Community	5/8/2009	No response to date	Consulting party
Red Lake Band of Chippewa Indians	5/8/2009	12/17/09 – phone	Declined participation
Rosebud Sioux Tribe of the Rosebud Indian Reservation	5/8/2009	12/02/09 – phone	Consulting party
Santee Sioux Nation	5/8/2009	12/08/08 – email	Consulting party
Spirit Lake Tribe	5/8/2009	3/30/10 - phone	Consulting party
Sisseton-Wahpeton Oyate of the Lake Traverse Reservation	5/8/2009	12/01/09 – phone	Consulting party
Standing Rock Sioux Tribe	5/8/2009	Y6/11/2009 – Email	Consulting party
Three Affiliated Tribes of the Fort Berthold Reservation	5/8/2009	12/02/09 – phone	Consulting party
Turtle Mountain Band of Chippewa Indians	5/8/2009	12/03/09 – phone	Consulting party
Upper Sioux Community	5/8/2009	3/15/10 – phone	Consulting party
White Earth Band of Minnesota Chippewa Tribe	5/8/2009	12/02/09 – phone	Consulting party

To continue Section 106 Consultation for the proposed Project, RUS hosted a meeting on April 22, 2010 in Bismarck, North Dakota. RUS sent an email on March 22, 2010 inviting tribal representatives to participate in the meeting. The meeting was intended to discuss proposed route alternatives and begin preparation of the PA. Three tribes participated in the meeting. Tribal representatives requested an additional meeting to visit the proposed Project river crossings including the Missouri River, Sheyenne River, and James River.

Per participant request during the April 22, 2010 Section 106 Consultation meeting, RUS hosted a meeting for tribal representatives and agencies to review the proposed Project river crossings and continue preparation of the PA on June 8-10, 2010. Representatives from two tribes, (Standing Rock Sioux Tribe, and the Mille Lacs Band of Ojibwe) participated in the meeting. RUS will continue to consult with the active tribal and agency representatives to finalize the PA.

A meeting was hosted by RUS on August 17, 2010, for tribal representatives interested in participating and gathering more information on the proposed Project. RUS worked with the tribes present, Sisseton Wahpeton Oyate and Standing Rock Sioux, to develop an approach for cultural surveys and identify information the tribes had to share regarding the Study Area. RUS will continue to consult with the tribes to finalize the cultural survey approach and the PA.

In general, the tribes who participated in the consultation meetings expressed concerns that there may be areas within the proposed Project that may be important to them. The tribes

indicated that there is a possibility that the Project could affect spiritual or cultural resources particularly near major river crossings and areas of higher elevation adjacent a permanent water source, though tribes stressed that unrecorded burials might be found anywhere throughout the corridor.

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6.0 Identification of Required Permits or Approvals

Minnkota would be required to obtain approvals from a variety of federal, state, and local agencies prior to constructing the proposed Project. Agencies with primary approval/permitting authority include RUS and PSC. Table 6.0-1 identifies permits, approvals, and other project coordination that may be needed by federal agencies, tribal governments, the state of North Dakota, counties, and townships. This preliminary listing of regulatory requirements is subject to change as the proposed Project proceeds and enters into the state permitting process.

Table 6.0-1. Potential Required Permits and Approvals

Agency	Type of Permit, Regulatory Compliance, or Coordination	Need
Federal		
Rural Utilities Service	Approval of Financial Assistance	Approval of Financial Assistance
	NEPA Compliance, Section 7 of the Endangered Species Act	Section 7 Consultation under NEPA
	NEPA Compliance, Section 106 of the National Historic Preservation Act coordination	Section 106 Consultation under NEPA
	NEPA Compliance, Native American Consultation	Section 106 Consultation under NEPA
U.S. Fish and Wildlife Service	Section 7 of the Endangered Species Act, Migratory Bird Treaty Act of 1918, and Bald and Golden Eagle Protection Act of 1972	Section 7 Consultation under NEPA
	Right-of-Way Permit	Needed if permanent disturbance to land under a Grassland Easement or wetland under a Wetland Easement
	Special Use Permit	Needed if temporary disturbance to land under a Grassland Easement or wetland under a Wetland Easement
	Compatibility of Disturbed Easements	If constructed in wetlands within wetland easements or in grassland easements, then compatibility analysis is required
U.S. Army Corps of Engineers	Section 404 of the Clean Water Act	Permit required for dredging or filling in jurisdictional waters of the U.S.
	Section 10 of the Rivers and Harbors Act of 1899	Section 10 permit if the proposed Project requires structures or work in or affecting navigable waters
	Construction Plan Approval	Construction plan and permit will be required for construction in or adjacent to jurisdictional waters
Federal Aviation Administration	FAA Form 7460-1, Notice of Proposed Construction or Alteration	The FAA must confirm that construction of the proposed Project does not constitute a hazard to air navigation
	FAA Form 7460-2 - Notice of Actual Construction or Alteration	Notifies FAA of actual constructed or altered structure

Agency	Type of Permit, Regulatory Compliance, or Coordination	Need
	FAA Form 7461-1, Notice of Proposed Construction Hazard Determination	Notifies FAA of proposed structures that might affect navigable airspace. Form requires proposed markings and lighting. FAA must review possible impacts to air safety and navigation, as well as the potential for adverse effects on radar systems.
U.S. Department of Agriculture – Natural Resources Conservation Service	Farmland Conversion Form - Form AD-1006	Farmland conversion impact rating
Environmental Protection Agency	Spill Prevention Control and Countermeasure (SPCC) Plan	Required if the substation facility has greater than 1,320 gallons of oil. Current SPCC Plans will be revised as necessary. A copy of the plan will be maintained on file with the substation's owner/operator and will be reviewed by the certifying engineer every five years.
State		
Public Service Commission	Certificate of Corridor Compatibility	Required prior to construction of a transmission facility; designates corridor within which a route may be located
	Route Permit	Required prior to construction of a transmission facility; designates route location within approved corridor
Department of Health	401 Water Quality Certification	Required for fill in jurisdictional Waters of the United States
	NPDES Permit: General Construction Storm Water	Required for disturbance of over 1 acre of land. Must prepare a Storm Water Pollution Prevention Plan (SWPPP)
Department of Emergency Management	Emergency Planning and Community Right-to-Know Act (EPCRA) Tier II report	Required for owner/operators of facilities containing hazardous materials. A copy of the report must be filed annually by March 1st
Parks and Recreation Department	Natural Heritage Inventory	Compliance with NDCC 20.1-02-05 – Management programs have been established for protection of threatened and endangered species in North Dakota. North Dakota does not have a list of threatened and endangered species
State Water Commission – Office of State Engineer	State Sovereign Lands Permit	If a project's proposed construction activities could impact an island or bed of a navigable water or stream, a Sovereign Lands Permit must be obtained from the North Dakota State Water Commission, Office of the State Engineer
	Conditional Water Permit	Water appropriation

Agency	Type of Permit, Regulatory Compliance, or Coordination	Need
State Historical Society of North Dakota	Section 106 of the National Historic Preservation Act Coordination	Compliance with NDCC 55-03-01 and 55-03-01.1 and Coordination with Section 106 of the NHPA is required for projects considered a federal undertaking (i.e., federal funding, USACE)
	Permit to Investigate Effects on Cultural Resources	Compliance with NDCC 55-03 to assess the potential project effects to cultural resources
North Dakota State Highway Patrol	Overheight/Overweight Permit	Permit required for hauling construction equipment and materials on state highways. Contractors will obtain as necessary
State Land Department	Right-of-Way Permit	Permit to obtain an easement on a state surface tract
Department of Transportation	Road Approach/Access Permit	Permit required for construction of access roads from state highways
	Utility Permit/Risk Management Documents	Permit required for utility crossings on state highway ROW
Local		
Counties – Barnes, Burleigh, Eddy (some township with permit), Foster (one township with permit), Griggs, Kidder, McLean, Oliver, Sheridan (one township with permit), Steele	Conditional Use Permits	Permit may be required for project construction depending on zoning regulations
	Building Permit	Permit may be required for substation construction and generation outlet line
	Haul Road Agreement	Permit may be required for hauling construction equipment and materials on county roads
	Utility Permit	Permit required for utility crossings on county road ROW
Townships – Cass Co. (all townships), Eddy Co. (some townships retain permitting), Foster Co. (Bordelach Township), Grand Forks Co. (all townships), Sheridan Co. (Berlin Township), Traill Co. (all towships), Wells Co. (all townships)	Conditional Use Permits	Permit may required for project construction depending on zoning regulations
Cities	Building Permit	Permit required if construction within city municipal boundary
Miscellaneous		
Railway Companies	Temporary Occupancy Permit	Required for any work within railroad ROW
	Wire Line Crossing or Longitudinal Communication and Electric Permit	Required for locations where a project crosses or is within railroad ROW

Agency	Type of Permit, Regulatory Compliance, or Coordination	Need
Pipeline Companies	Utility Crossing Permit	Permit required to cross existing pipeline facilities
Transmission Line Utility Companies	Utility Crossing Permit	Permit required to cross existing transmission facilities

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Figures

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Appendix A:
North Dakota Public Service Commission Siting Criteria

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Appendix B:
Detailed Route Maps

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Appendix C:
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Appendix I:
Meetings Notes

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