USDA Rural Development

United States Department of Agriculture
Rural Development
Washington, DC

October 29, 2009

RECEIVED
NOV 0 2 2009
PUBLIC SERVICE COMMISSION

Mr. Jerry Lein
Utility Analyst
North Dakota Public Service Commission
600 E Boulevard Ave
Bismarck, ND 58505

RE: Proposed 345 kV high-voltage transmission line from the Milton R. Young Power Plant Station located near Center, North Dakota, to an existing substation near Grand Forks, North Dakota.

Dear Mr. Lein:

The U.S. Department of Agriculture (USDA) Rural Utilities Service (RUS) is serving as the lead federal agency responsible for compliance with the National Environmental Policy Act (NEPA) for the proposed 345 kV high-voltage transmission line from the Milton R. Young Power Plant Station located near Center, North Dakota, to Grand Forks, North Dakota. Existing substations near Center and Grand Forks will be modified to accommodate the new transmission line. The proposed project will be the construction of approximately 260 miles of 345 kV transmission line. This project is referred to as the Center to Grand Forks (CGF) Project. The CGF Project will deliver energy produced by the Young 2 power station to north-eastern North Dakota and northern Minnesota. In addition, the CGF Project would allow additional renewable wind energy to be delivered over the existing 250 kV DC transmission line that currently serves Young 2. Minnkota Power is seeking RUS financing for its portion of the investment.

Prior to making a financial decision about whether to loan funds, guarantee a loan, or award a grant for a proposed Project, RUS is required to conduct an environmental review under the National Environmental Policy Act. It conducts reviews in accordance with RUS regulations outlined in 7 CFR Part 1794. According to these regulations this project is classified as an Environmental Assessment with Scoping.

Enclosed for your review is a copy of the Alternatives Evaluation Study and the Macro Corridor Study prepared for the Proposed 345 kV transmission line.

Public scoping meetings will be held at the following dates, times, and locations:

- **Monday, November 16, 2009**
  - Grand Forks, N.D., Alerus Center, Eagle Room 10, 1200 S. 42nd St., 5 - 8pm
- **Tuesday, November 17, 2009**
  - Cooperstown, N.D., Cooperstown City Hall, 611 9th St. 10am – 1pm
  - Carrington, N.D., The Chieftain Conference Center, Teepee Room 60, 4th Ave S, Highway 281, 5 - 8pm
- **Wednesday, November 18, 2009**
  - McClusky, N.D., McClusky Community Hall, 117 Ave. B North, 10am – 1pm
  - Wilton, N.D., City of Wilton Memorial Hall, 10 Dakota Ave, 5 - 8pm
- **Thursday, November 19, 2009**
  - Center, N.D., Civic Center Building, 312 N Lincoln Ave, 5 - 8pm

The purpose of the meetings is to provide information regarding the proposed project, answer questions, and accept comments regarding the potential environmental and cultural resource impacts that may result from construction and operation of the Project. Comments will be accepted for 30 days after the final meeting. Information from the meetings will help RUS determine the scope of environmental review. Based on the comments received from public scoping, RUS will either prepare a finding of No Significant Impact or make a decision to prepare an Environmental Impact Statement. RUS will provide public notice of their decision.

Questions and comments should be directed to Dennis Rankin, Environmental Protection Specialist, USDA Rural Utilities Service, 1400 Independence Avenue SW, Stop 1571, Washington, DC 20250–1571, or e-mail: dennis.rankin@wdc.usda.gov\.

Sincerely,

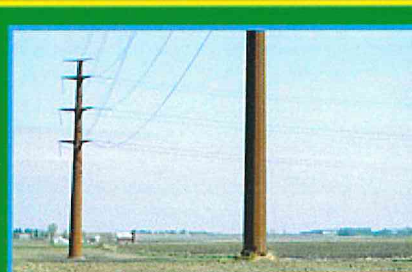
Mark S. Plank

Mark S. Plank
Director
Engineering and Environmental Staff
Rural Development, Utilities Programs

Enclosures (2)

Minnkota Power
MPC COOPERATIVE, INC.
Your Touchstone Energy® Partner

Alternative Evaluation Study



Center to Grand Forks 345 kV Line
A North Dakota Transmission Line Project

Prepared For:
Rural Utilities Service

Prepared By:
Minnkota Power Cooperative, Inc.
and HDR Engineering, Inc.

October 2009

HDR

ONE COMPANY | *Many Solutions*

Alternative Evaluation Study

Center to Grand Forks 345 kV Line

Minnkota Power Cooperative, Inc.

Prepared for

Rural Utilities Service

Prepared by

Minnkota Power Cooperative, Inc.

&

HDR Engineering, Inc.

October 2009

Executive Summary

Minnkota Power Cooperative, Inc. (Minnkota) proposes to construct a 345 kV high voltage transmission line from the Milton R Young Station near Center, North Dakota, to the Prairie Substation near Grand Forks, North Dakota (Center to Grand Forks Line or Project). The length of this line would be approximately 260 miles. It would be constructed using single pole steel structures. Various modifications to associated substations in the area would also be required. The current cost estimate for the line construction is about $286 million with an additional estimated $37 million required for substation modifications. Financing support will be requested from the Rural Utilities Services (RUS) in the form of a loan or loan guarantee.

The need for this transmission project is driven by the transaction to reallocate existing transmission and generation assets. In response to its members' growing load requirements Minnkota has evaluated various options. The most economical and effective option is a mutually beneficial transaction with Square Butte Electric Cooperative (Square Butte) and Minnesota Power. With this transaction, Minnesota Power will release to Minnkota the rights to its share of generation from the Square Butte-owned Milton R Young Station Unit 2 (Young 2) power plant. This will allow Minnkota to increase its allocation of power from the Young 2 power plant from 50 percent to 100 percent over the next several years. In return, Minnkota will agree 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. This arrangement will allow Minnesota Power to acquire the DC line from Square Butte in 2010, and use it to develop and transmit wind power generated in North Dakota to its loads in Minnesota.

As presented in Section 2.3 of this Alternative Evaluation Study (AES), regional transmission-system studies since 2005 have shown that even without additional load growth, there are system voltage stability and load serving issues in eastern North Dakota and northwestern Minnesota. The existing AC transmission system is already operating at capacity. With future load growth, these issues are of even greater concern. The system studies show that additional transmission into the eastern part of North Dakota from the area of concentrated generation in central North Dakota is the preferred alternative to alleviate this condition. These same studies have shown that additional transmission lines, such as the Bemidji to Grand Rapids 230 kV Line, are independently needed in Minnesota.

Therefore, when the HVDC line is no longer continuously available to transmit Young 2 output in 2013, a new transmission line will be required. As reviewed in Section 3 of this AES, additional system studies have been completed which show that a 230 kV line would not be adequate. These studies also assessed the relative merits of a new 345 kV line from Center, North Dakota, to Fargo, North Dakota, or Grand Forks, North Dakota. Either alternative would improve voltage stability and load-serving capabilities in the area. However, the studies demonstrate greater benefits to the northern Red River Valley load-serving area when terminating the line at Grand Forks.

The proposed transmission line project would provide a direct link into Minnkota's service territory while providing a major improvement to the regional transmission grid. It would also provide a sound technical solution to the well-identified northern Red River Valley voltage stability issue.

As a transmission provider in an attractive wind resource area, the Minnkota interconnection request queue has received requests for several hundred megawatts of new wind generation. These requests are currently being studied to determine the system impact and the technical solutions (and associated costs) to implement the solutions. The impact of the proposed new transmission facilities is presented in Section 3.1.3 of this AES. Possibilities include tapping the proposed line and adding a second circuit to the Fargo area.

Input is being solicited from the public and from federal, state, and local agencies and governing bodies. This input will be used to shape the final scope and configuration of the Project.

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Table of Abbreviations

Abbreviation	Definition
ACSR	Aluminum conductor steel reinforced
ACSS	Aluminum conductor steel supported
ACSS/TW	Aluminum conductor steel supported/trapezoidal wire
AES	Alternatives Evaluation Study
Arrowhead	HVDC converter station near Duluth, Minnesota
CapX 2020	Capacity Expansion 2020 initiative
Center	Center 345 kV Substation located at the Milton R Young generating station located near Center, North Dakota
CIP	Conservation Improvement Program
DSM	Demand side management
HVDC	High voltage direct current
kcmil	thousand circular mils (conductor diameter)
kV	Kilovolt
kW	Kilowatt
Maple River	Maple River Substation located near Fargo, North Dakota
MAPP	Mid-Continent Area Power Pool
MHEX	Manitoba Hydro Export Interface
MISO	Midwest Independent Transmission System Operator
MPUC	Minnesota Public Utilities Commission
MVA	Megavolt-ampere
MVAR	Megavolt-ampere reactive
MW	Megawatt
MWh	Megawatt hour
N-1	Single contingency
N-2	Double contingency
NDEX	North Dakota Export interface
NEPA	National Environmental Protection Act
NERC	North America Electric Reliability Council
NMORWG	The Northern MAPP Operating Review Working Group
NMPA	Northern Municipal Power Agency
NORDAGS	North Dakota Group Study
OPGW	Optical Ground Wire
Prairie	Prairie Substation located near Grand Forks, North Dakota
PPA	power purchase agreements
P-V	Power-voltage
PVRR	Present value revenue requirements
RUS	Rural Utilities Service
SIL	Surge impedance load

Abbreviation	Definition
SVC	Static VAR compensator
TIPS	Transmission Improvement Planning Study
VAR	Volt-ampere reactive
WAPA	Western Area Power Administration
Young 2	Milton R Young Station Unit 2
Young 3	Milton R Young Station Unit 3

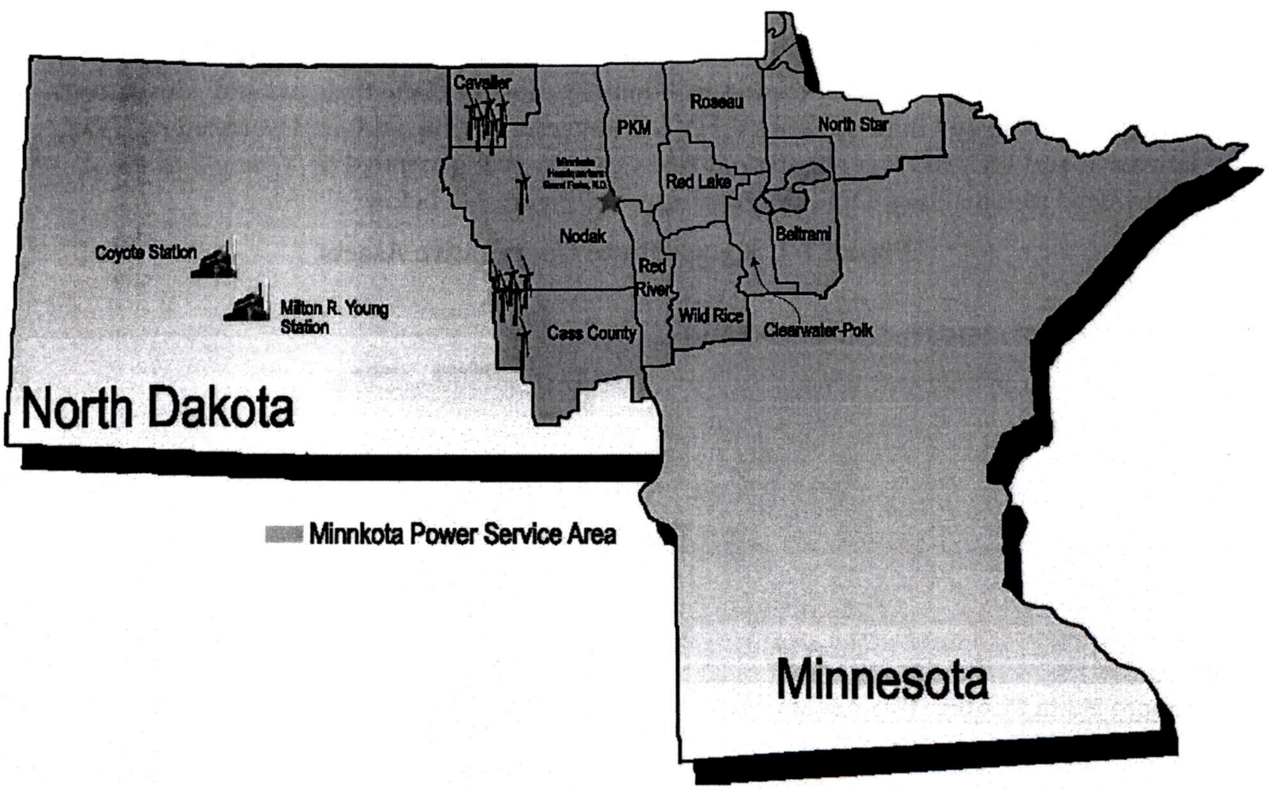
Section 1 Introduction

1.1 Background

This Alternative Evaluation Study (AES) was prepared by Minnkota Power Cooperative, Inc. (the Applicant or Minnkota) and HDR Engineering, Inc. to support the proposed action to construct an approximately 260-mile long, 345 kV transmission line between Center and Grand Forks, North Dakota (Project).

Minnkota is a wholesale electric generation and transmission cooperative headquartered in Grand Forks, North Dakota. Incorporated in 1940, Minnkota provides, on a nonprofit basis, wholesale electric service to 11 retail distribution cooperatives which are the members and owners of Minnkota. These co-ops, in turn, serve approximately 125,000 of the 300,000 retail customers in the area, including many of the region's schools, farms, homes and businesses such as LM Glasfiber (a wind turbine blade manufacturer) and Polaris Industries. The member systems' service areas encompass 34,500 square miles in northwestern Minnesota and the eastern third of North Dakota (see Figure 1-1 below).

Figure 1-1. Map of Minnkota Service Areas



Minnkota also serves as operating agent for the Northern Municipal Power Agency (NMPA), headquartered in Thief River Falls, Minnesota. NMPA is the energy supplier for 12 municipal utilities located within the Minnkota service area.

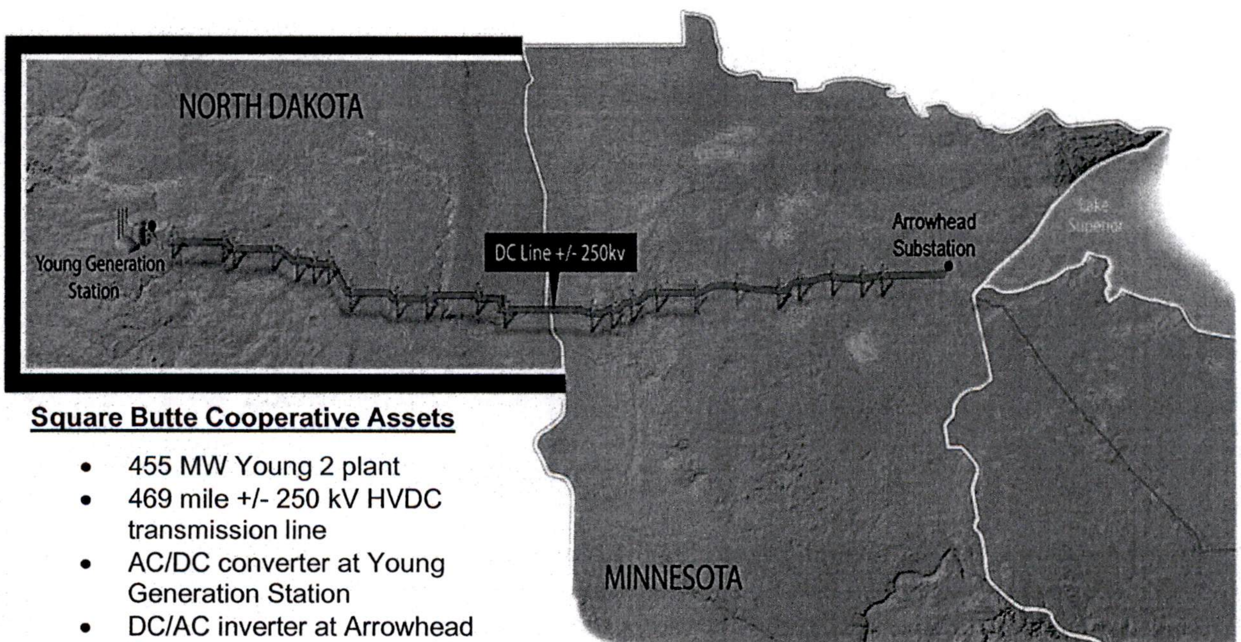
The primary source of base-load generation for the rural cooperatives is the Milton R Young Station located approximately 40 miles northwest of Bismarck, North Dakota, near the community of Center, North Dakota. As operating agent for the NMPA members, Minnkota oversees NMPA's 30 percent share of the output from the Coyote Station near Beulah, North Dakota. In addition, Minnkota has acquired, through recent power purchase agreements (PPAs) with large wind developers, significant North Dakota-based wind energy resources that will total 357 MW nameplate capacity by 2010.

Minnkota intends to obtain financing for ownership of the Project from the Rural Utilities Service (RUS). Minnkota would also operate and maintain this facility. RUS financing of the Project constitutes a "federal action," which requires RUS to conduct an environmental review under the National Environmental Protection Act (NEPA). This AES is one of the preliminary documents RUS requires in conducting an environmental review, and it was developed in accordance with the requirements of RUS Bulletin 1794A-603, *Scoping Guide for RUS Funded Projects Requiring Environmental Assessments with Scoping and Environmental Impact Statements* (Feb. 2002). It is designed to provide information about the proposed action to federal, state, and local agencies, and to the public to facilitate its participation in the NEPA process.

The AES describes the need for a new transmission line to deliver power from the existing Milton R Young Station Unit 2 (Young 2) power plant located near Center, North Dakota, to a delivery point in Minnkota's service area near Grand Forks, North Dakota.

Young 2 (455 MW) is owned by Square Butte Electric Cooperative (Square Butte) and is operated by Minnkota. Square Butte was formed in 1972 by the same 11 distribution cooperatives that are member/owners of Minnkota. Square Butte financed and constructed Young 2 and the 469 mile +/-250 kV HVDC transmission line with its associated AC/DC converter and DC/AC inverter stations that carries power generated by Young 2 to the Arrowhead terminal near Duluth, Minnesota. See Figure 1-2 below.

Figure 1-2. Square Butte Cooperative Assets



Minnkota and neighboring Minnesota Power Company (Allete) have had a long-standing business relationship associated with the Square Butte project. Minnesota Power currently has operating responsibility for the HVDC transmission system. Minnkota and Minnesota Power share maintenance responsibilities for the Square Butte HVDC transmission facilities.

Minnkota and Minnesota Power have established long-term power-purchase agreements (PPAs) with Square Butte for the energy output from Young 2. Transmission service agreements for transmission capacity on the Square Butte HVDC transmission system are also in place. The percentage of Young 2 output allocated to Minnkota and Minnesota Power has varied over time and is currently at 50 percent to each company.

In 2006, Minnkota and Minnesota Power began a joint effort to study options for meeting their respective future energy supply needs.

Historically, Minnkota's load has grown at a rate of 2.93 percent annually over the past 10 years. Furthermore, Minnkota's 2007 Load Forecast study shows that load will continue to grow at a rate of approximately 2.5 percent annually over the next 20 years. It is expected that much of this load growth will have a high load factor. Thus, Minnkota must increase its base-load generation resources to accommodate this future load growth. Adding a third unit at the Milton R Young Generation Station (Young 3) was identified as a prime candidate for meeting future load growth requirements. A system impact study was undertaken to determine the transmission requirements and impacts of a Young 3 generation addition to the AC transmission system. Although the Young 3 project is no longer being pursued, many of the results of this study are valid for the transition of Young 2 power onto the North Dakota AC system.

While exploring the potential for partnership in Young 3, Minnesota Power also identified a need to increase its renewable resource portfolio. Having previously selected the area near the Milton R Young plant as a viable and productive wind generation resource, Minnesota Power expressed interest in expanding this resource.

In 2008, Minnkota was approached by Minnesota Power with a proposal to restructure the agreements with Square Butte. By January 1, 2010, action will have been taken to amend Minnkota's and Minnesota Power's PPAs with Square Butte to increase the amount of energy Minnkota receives from Square Butte's Young 2 station from 50 percent to 100 percent between the years 2013 to 2026. In exchange, Minnkota will also amend its agreement with Square Butte to release its share of capacity in the Square Butte HVDC transmission system. This will facilitate Square Butte selling the HVDC system to Minnesota Power.

This transaction and modified PPAs will fulfill objectives of both companies. Minnkota will have access to additional base-load generation from a resource with a well established record of low cost, reliable power generation with a dedicated and dependable fuel source. Minnesota Power will be able to utilize the HVDC transmission system to transmit power from future wind power resources in central North Dakota to the Duluth, Minnesota, area. The higher capacity factor wind farms in North Dakota will provide a more cost-effective means for Minnesota Power to meet future renewable energy portfolio standards established by the state of Minnesota.

As the Square Butte HVDC transmission system currently provides the primary transmission path for generation from the Young 2 plant to serve Minnkota's loads in northeastern North

Dakota and northwestern Minnesota, a new AC transmission line would be required. This line will provide a more direct path from Young 2 generation to Minnkota's loads and will facilitate the development of additional wind generation in North Dakota by Minnesota Power for delivery to eastern Minnesota on the existing HVDC transmission system.

To facilitate this transaction and modified PPAs, Minnkota must establish this new transmission path from Young 2 and transition off of the HVDC line by 2013. This transmission path would consist of a new 345 kV AC transmission line from the Center 345 kV Substation near Center, North Dakota, to a centrally located substation (Prairie) near Grand Forks, North Dakota.

After 2026, the Square Butte to Arrowhead HVDC line may be used exclusively for transmitting power from proposed wind farms in North Dakota. Several hundred megawatts of wind generation are being considered for interconnection at the Square Butte 230 kV Substation by other parties. As a result of the HVDC line being reallocated for the transmission of wind energy, the only available transmission outlet for Young 2 will be the North Dakota AC transmission system, which drives the need for the proposed Center to Grand Forks 345 kV transmission line project.

1.2 Project Description

The Applicant proposes to construct a 345 kV transmission line from Center, North Dakota, to Grand Forks, North Dakota. Proposed corridors for this Project are shown in Figure 1-3 and Figure 1-4 below.

The proposed Center to Grand Forks Project would consist of the following six major components.

- 345 kV High Voltage Transmission Line – Consisting of about 260 miles (based on the average length of typical routes within the study corridor) of new high voltage transmission line from the Center 345 kV Substation at the Milton R Young generating station near Center, North Dakota, to the Prairie Substation near Grand Forks, North Dakota. A crossing of the Missouri River in central North Dakota would be required. The Center to Grand Forks Project would serve to deliver existing baseload generation to Minnkota's members.

  While final engineering and design has not been completed, the line would likely be constructed with single-pole steel structures. These structures may be designed with double circuit capability, which will allow significant upgrades. Typical structures would be approximately 150 feet high and be placed approximately 1,000 ft apart. The typical right-of-way (ROW) for a single pole 345 kV line is approximately 150 ft wide. It is anticipated that the Project would use 795 kcmil (thousand circular mils (conductor diameter)) or 954 kcmil ACSR (aluminum conductor steel reinforced) or ACSS (aluminum conductor steel supported) conductors (bundled) with a minimum thermal capacity of approximately 960 MVA (mega volt-ampere). The conductor size or type may need to be modified once the ultimate route is selected and additional electrical optimization studies are completed.
- Center 345 kV Substation Upgrades – All upgrades would occur within the existing substation's (owned by Otter Tail Power Company) fenced boundary. This would involve installing new 345 kV circuit breakers and 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. The existing 345/230 kV transformer may be replaced with a larger transformer for reliability improvement. A line reactor for open line voltage control may also be required.

- Second 230 kV tie line –This 1,500 ft 230 kV tie line between the Center 345 kV Substation and the Square Butte 230 kV Substation would parallel the existing tie line on Minnkota-owned property. It would be needed to complete this transmission to transmission interconnect with the Square Butte 230 kV substation.
- Square Butte 230 kV Substation – Existing 230 kV circuit breakers and line terminal equipment would be reallocated from the existing HVDC tie line to the new 345 kV interconnect as part of the agreement with Minnesota Power.
- Prairie Substation Upgrades – All upgrades would occur within the existing Minnkota-owned substation's fenced boundary. This would involve installing new 345 kV circuit breakers and 345 kV dead-end structures, two new 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 be required to be moved to convert the ring bus into a breaker-and-a-half bus arrangement.
- Fiber Optic Regeneration Stations – Two or more 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). Each station would require a 50 ft by 50 ft fenced area and small control building to house the electronic equipment.

The cost of constructing the proposed 345 kV line is estimated to be in the range of $1.1 to $1.8 million per mile in 2009 dollars (including ROW, permitting, and other ancillary costs) with a total estimated cost for line construction of approximately $286 million. An additional estimated $37 million will be required to modify the terminus substations near Center and Grand Forks for a total estimated construction cost for the Project of $323 million for a 260 mile line length. The Applicant has a target completion date for the Project of January 1, 2013.

Studies are underway to address third party impacts to neighboring transmission systems as well as to address the needs of potential interconnection customers who have requests listed on Minnkota's interconnection queue[1]. The results of these studies may indicate a need to increase the overall scope of this Project. Such scope changes could include the addition of one or more project components as described in Section 3.1.3 part B sub. b. The cost of these project additions would be borne by the beneficiaries of the additions.

[1] Current requests are for wind energy development projects.

Figure 1-3. Proposed Project Corridors

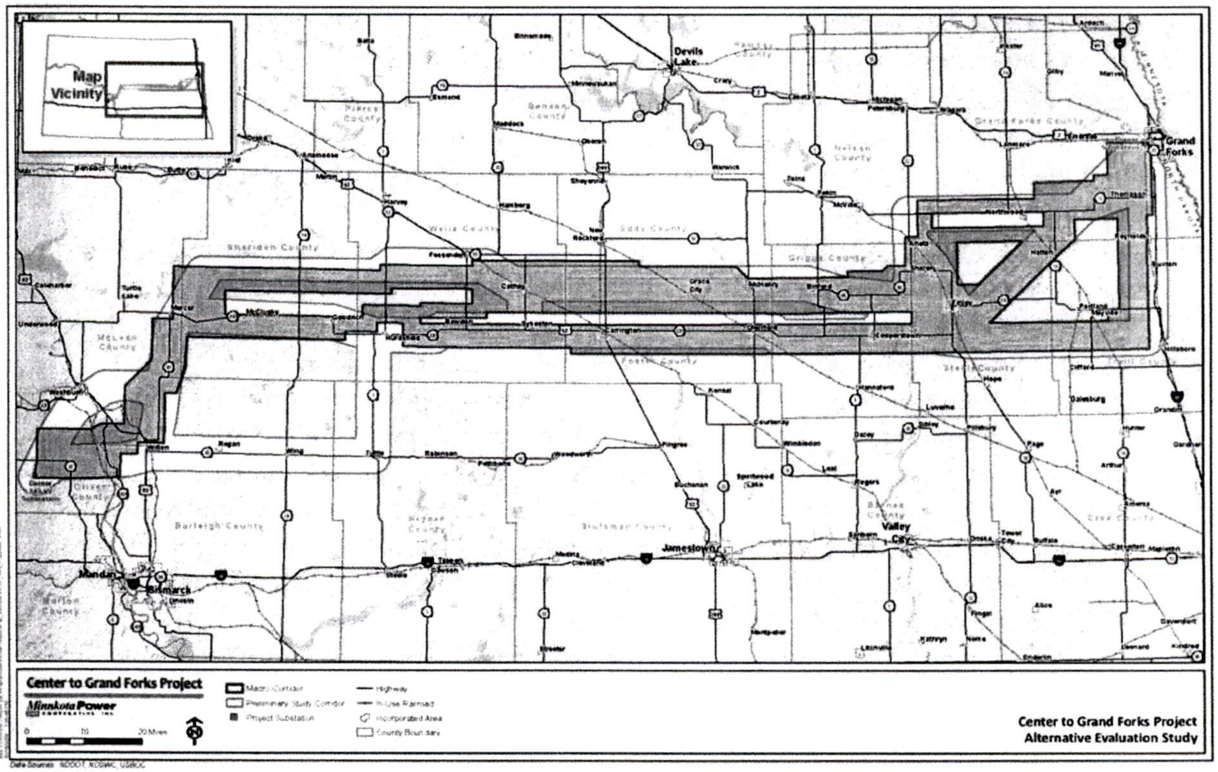
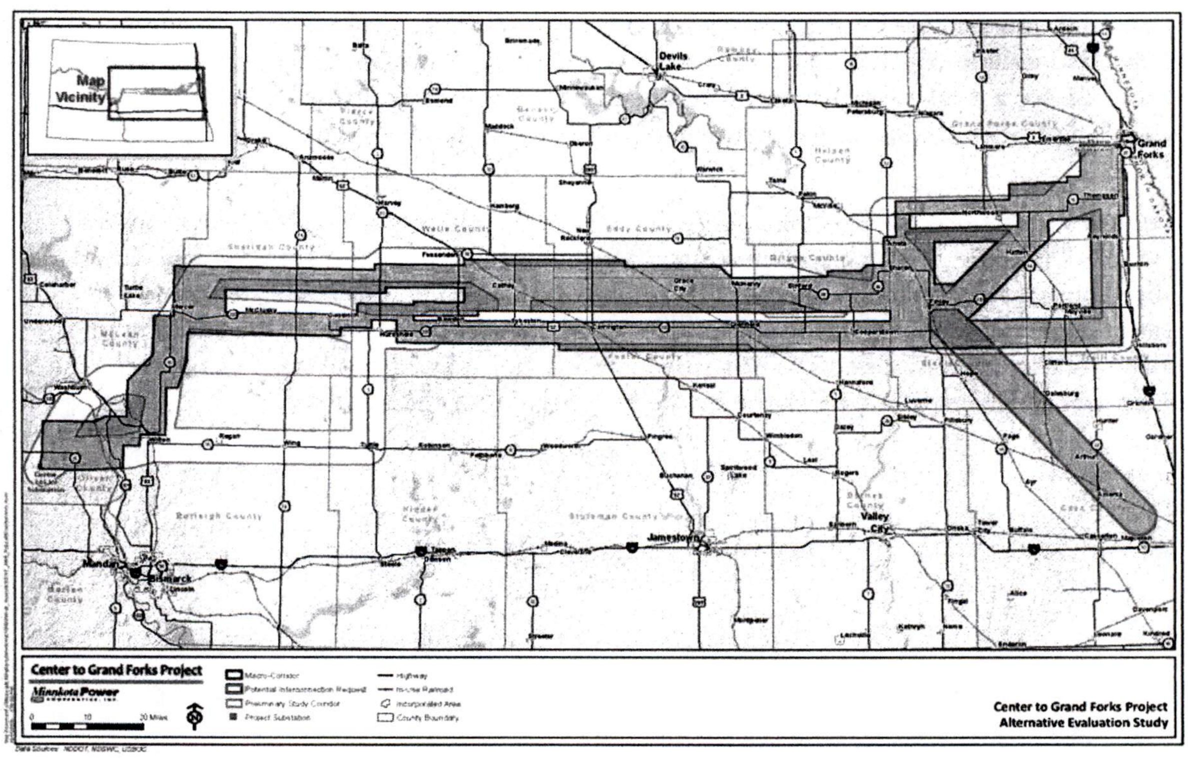


Figure 1-4. Proposed Project Corridors (blue) with Optional Corridor Concept (red) for Interconnection Requests



Section 2 Purpose and Need

By the year 2013, an alternative to using the existing HVDC system as a means of delivering energy from Young 2 to Minnkota's service area must be in place. Additionally, various regional transmission studies have been performed that demonstrate the need for additional transmission to enhance voltage stability and load serving capability to the Red River Valley region. Minnkota has completed various transmission system scoping and feasibility studies and has determined that a single 345 kV transmission line from Center to Grand Forks greatly enhances both Red River Valley voltage stability and Minnkota's ability to serve its load. This Section discusses the basis for that conclusion.

2.1 Overview of Minnkota's System

Minnkota's current transmission/distribution system consists of approximately 3,000 miles of high voltage AC lines (69 kV to 345 kV), 33,000 miles of distribution lines, and more than 200 transmission and distribution substations. Most of this infrastructure is located in the Red River Valley region of eastern North Dakota and northwestern Minnesota as shown in Figure 2-2 (Page 9).

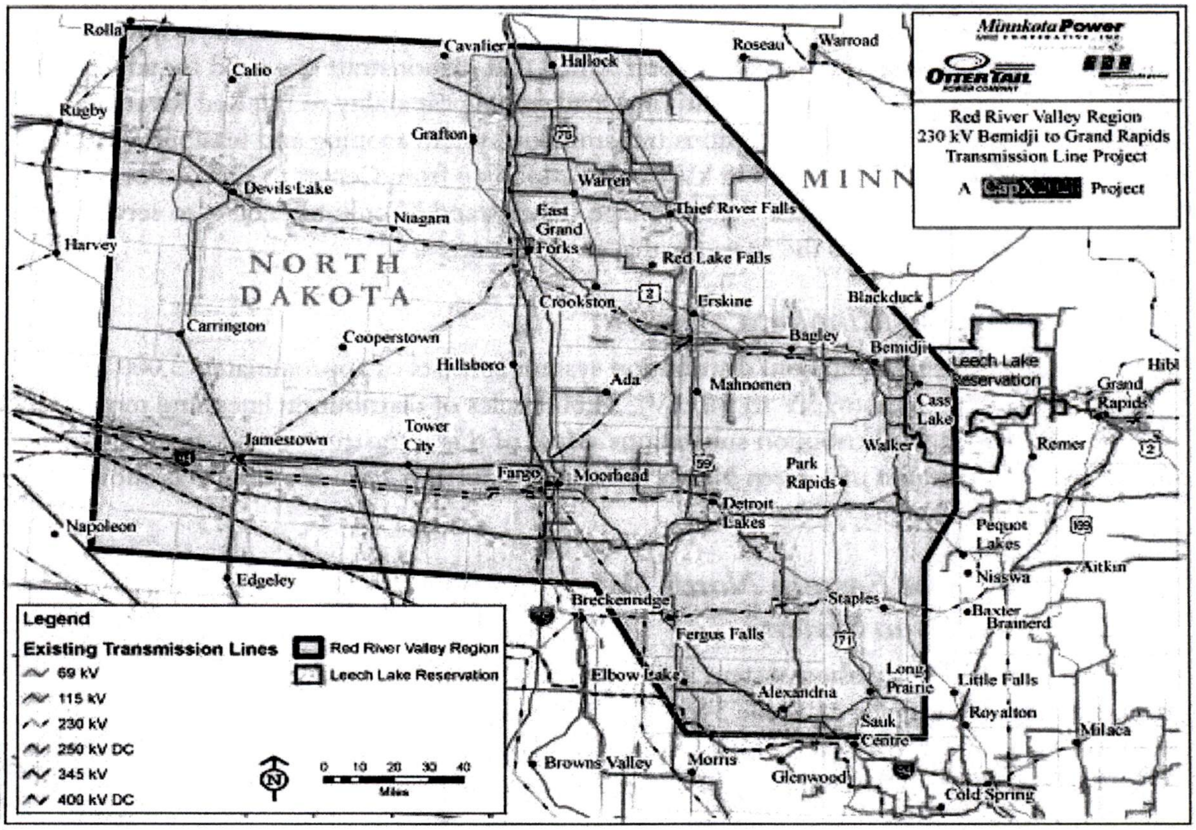
2.2 Overview of Eastern North Dakota and Red River Valley Regional Transmission System

The bulk electric transmission system in the Red River Valley primarily consists of a 230 kV network. There is a single 210-mile 345 kV connection from the Milton R Young generating station near Center, North Dakota, to the Maple River substation near Fargo, North Dakota. With the exception of recent and rapidly developing wind farms, nearly all of the power supply to the Red River Valley is from remote generation sources. The nearest base-load generation resources are to the west in central North Dakota and to the north in Manitoba Province, Canada. As a result, prevailing power flow through the Red River Valley region is typically west-to-east and north-to-south.

South-to-north power flows can occur during adverse hydrological conditions in Manitoba, which is served primarily by hydroelectric generation. The great majority of Manitoba's hydroelectric generation is in the northern part of the province. Two long HVDC lines provide the transmission connection between the northern generation and the load center in southern Manitoba. Manitoba Hydro (MH) has established long-term power purchase and capacity exchange agreements with United States power suppliers to sustain adequate service to their loads in the event of a problem with the MH HVDC system. These agreements require that adequate transmission capability be maintained to enable both northward and southward power transfers at all times of the year and all load levels.

During the mid-1990s, large capacitor installations were made at the Prairie 115 kV Substation (12 x 40 MVAR (Megavolt-ampere reactive)) near Grand Forks, North Dakota, the Sheyenne Substation in Fargo, North Dakota (5 x 40 MVAR), and the Ramsey substation near Devils Lake, North Dakota (2 x 30 MVAR). These capacitors were installed to maintain acceptable voltages in the Red River Valley during various regional flow patterns and transmission contingencies. See Figure 2-1 below, which was developed for the Bemidji to Grand Rapids Project Alternatives Evaluation Study previously submitted to RUS by the Bemidji to Grand Rapids project participants.

Figure 2-1. Red River Valley Transmission System

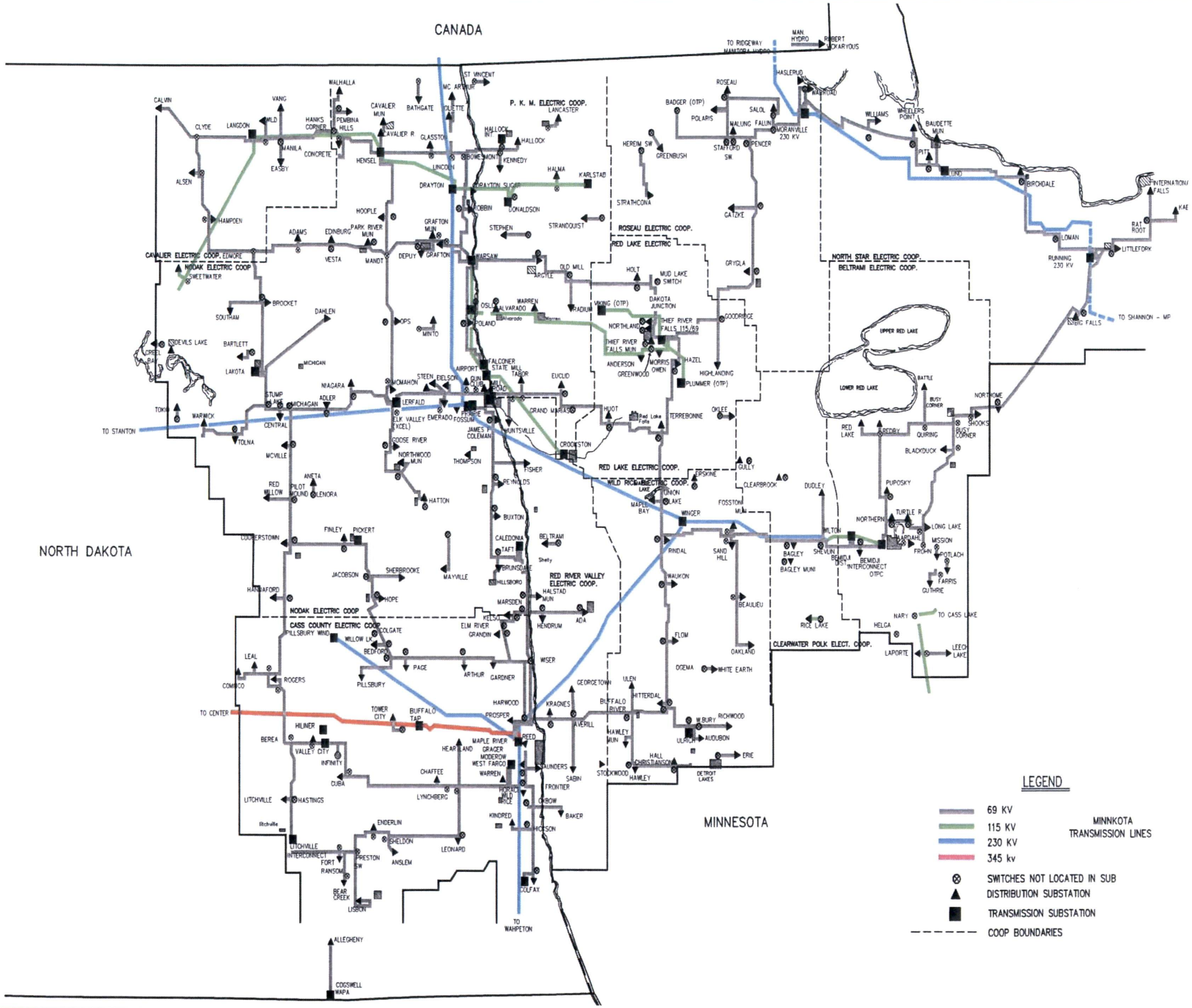


Load-serving capability in the Red River Valley is constrained by post-contingent voltage and loading concerns.

Peak load conditions result in high reactive power losses on the transmission grid, contributing to the risk of regional voltage collapse. The performance is of greatest concern during times when Manitoba is importing power from the United States. During these stressed system conditions, a prolonged outage of a high voltage transmission line in the area is difficult to sustain.

In the summer of 2000, the McHenry–Ramsey 230 kV line, which establishes a 230 kV tie from western North Dakota to Grand Forks, had about 10 miles of structures knocked down by severe storms. A coordinated emergency mobilization of the regional utilities' construction crews enabled the line to be temporarily restored to service in early December of that year to prepare for peak winter loads throughout the region. The resulting sustained outage raised operating concerns. The Northern MAPP (Mid-Continent Area Power Pool) Operating Review Working Group (NMORWG) alerted regional utilities of the potential risk of voltage collapse in the Red River Valley for various critical contingencies and system operating parameters.

Figure 2-2. Minnkota Transmission System



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2.3 Regional Transmission System Studies and Analyses

The need for the Center to Grand Forks line is supported by various transmission system studies. These studies analyzed transmission issues in west-central Minnesota and eastern North Dakota (Red River Valley). Minnkota's service area is in the center of this geographic area. A brief history of the studies is provided below. Additional system studies have been completed to identify the best alternative for meeting this need. These studies are discussed in Section 3.

2.3.1 2005 CapX 2020 Technical Update

Minnesota's largest transmission-owning utilities launched the Capacity Expansion 2020 (CapX 2020) initiative in 2004. This initiative focused on prioritizing the transmission infrastructure investments needed in Minnesota to meet the growing demand for electricity in the region and to ensure timely and efficient regulatory review and approval of those investments. The result was the CapX 2020 Vision Plan. This plan and other information about this initiative can be found at <www.capx2020.com>.

CapX 2020 released its written report in May 2005 describing its planning effort. The report is entitled *CapX 2020 Technical Update: Identifying Minnesota's Electric Transmission Infrastructure Needs*. The Technical Update is on the CapX webpage at: <http://www.capx2020.com/Images/5-11-05%20CapX2020%20Tech%20Update.pdf >. This study concluded that a number of new high-voltage transmission lines will be required to accommodate the Red River Valley and surrounding region's increasing demand for electricity, and the additional generation capacity required to meet that demand. The Bemidji, Minnesota, to Grand Rapids, Minnesota, 230 kV Line[2], and the Fargo, North Dakota, to Monticello, Minnesota, 345 kV line[3] were preferred transmission alternatives for this region. They were shown to be effective in: 1) addressing the voltage stability and load serving needs of Bemidji and other principal load centers within the Red River Valley, and 2) improving the load-serving capability of the transmission system in Minnesota and the surrounding region to meet the load growth anticipated by 2020.

2.3.2 2005 Minnesota Biennial Transmission Projects Report

In 2005, sixteen utilities that own or operate high voltage transmission lines in Minnesota prepared the third Minnesota Biennial Transmission Projects Report (2005 Biennial Report) for the Minnesota Public Utilities Commission (MPUC or Commission). The Biennial Report was prepared pursuant to Minnesota Statutes, Section 216B.2425, which requires utilities owning or operating electric transmission facilities in the state to report on the status of the transmission system, including present and foreseeable inadequacies and proposed solutions.

Referencing the 2005 CapX 2020 Technical Update, the 2005 Biennial Report indicated that upgrades of the Red River Valley's transmission system were necessary to handle the increasing loads in the region and maintain reliable voltage stability margins. The 2005 Biennial Report included preliminary study results of four new transmission options, which indicated that the combination of the Bemidji to Grand Rapids 230 kV line and the Fargo to

[2] This line is described as the Boswell-Wilton 230 kV line in the Technical Update

[3] This line is described as the Fargo-Alexandria-Benton County 345 kV line in the Technical Update

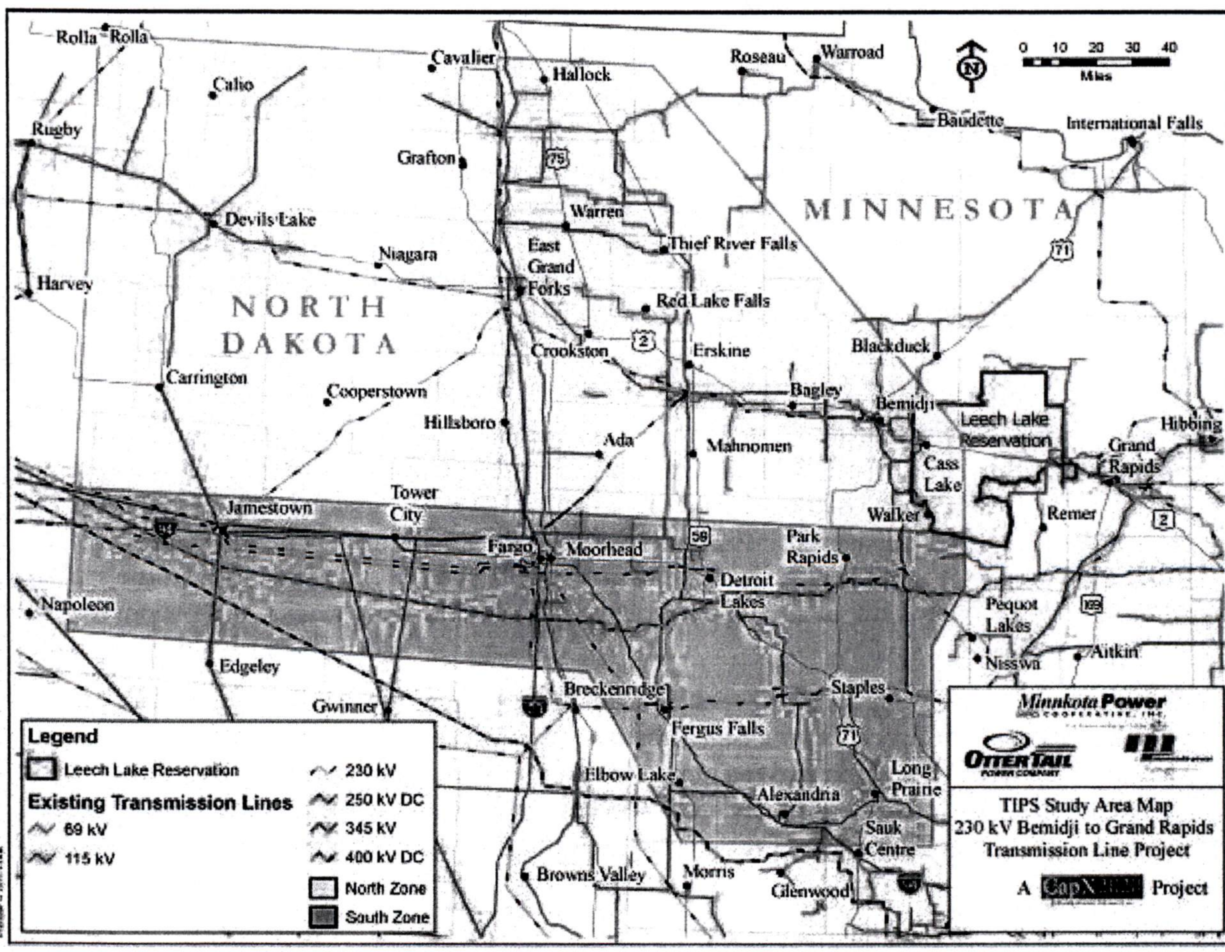
Monticello 345 kV line would provide the most robust, economic, and efficient transmission solution to address the concerns regarding the Bemidji and Red River Valley areas' voltage stability and load-serving capability.

2.3.3 2006 Red River Valley/Northwest Minnesota Load-Serving Transmission Study (2006 TIPS Update)

In 2006, the CapX 2020 group collaborated on a study to verify that the proposed transmission solutions were valid and optimal in addressing specific voltage stability issues and load serving deficiencies within the Red River Valley. The study report was called the TIPS Update because it followed several previous efforts, which had become known as the TIPS (Transmission Improvement Planning Study) studies. Two transmission projects in particular were investigated, the Bemidji to Grand Rapids 230 kV line, and the Fargo to Monticello 345 kV line.

For the study, the Red River Valley was divided into zones, as shown in Figure 2-3, below, which was developed for the Bemidji to Grand Rapids Alternatives Evaluation Study. These zones were: the northern portion of the Red River Valley region (North Zone), the southern portion of the Red River Valley region (South Zone), and the entire Red River Valley region (Combined Zone).

Figure 2-3. TIPS Update Study Area



Consistent with previous studies, the 2006 TIPS Update confirmed that transmission improvements are needed to maintain post-contingent voltages above established criteria. Whereas the Fargo to Monticello 345 kV line showed promise in supporting the Combined Zone, the Bemidji to Grand Rapids 230 kV line provide the greatest benefit to the Northern Zone of the Red River Valley.

A review of the power system topology and loading levels lends insight into the TIPS results. The transmission interface into the North Zone consists of four 230 kV lines. The South Zone has one 345 kV line and nine 230 kV lines. The Bemidji to Grand Rapids line will add one 230 kV circuit to the North Zone, and the Fargo to Monticello line will add one 345 kV circuit to the South Zone.

The historic peak loads, as presented in the TIPS report, summed to 1,880 MW of non-coincident peak load in the North and South Zones. Given that nearly half of this load (45 percent) was in the North Zone, it is clear that the North Zone transmission system is in the greatest need of development.

2.3.4 North Dakota Group Study (NORDAGS) – December 14, 2007

In 2007, Minnkota and three other utilities in the region assessed the possibility of jointly building a third generating unit (Young 3 – 600 MW) at the Milton R Young power station. As part of that assessment and as part of the MISO (Midwest Independent Transmission System Operator) interconnection study process, Minnkota commissioned a system impact study. Two other generation projects were included in the study, because they were located in the same general area in North Dakota. The MISO queue information for this group study was:

- G531: 68 MW facility upgrade at the Stanton generation plant in Mercer County, North Dakota – MISO Queue # 38534-01
- G581: 600 MW (Young 3) steam generation facility in Oliver County, North Dakota, with connection to the Minnkota transmission system at the Center 345 kV bus – MISO Queue # 3871301
- G607: 25 MW facility upgrade at the Coyote generation plant in Mercer County, North Dakota – MISO Queue # 38777-01

This study evaluated the collective impact of the proposed projects on the transmission system and is referred to as the North Dakota Group Study (NORDAGS). The study comprised stability, steady-state, constrained interface, and short-circuit analyses. MISO performed a separate Deliverability Study to identify any additional upgrades that may be required for Network Resource status.

The proposed projects were all expected to be in service by 2015. Some prior-queued generation projects were excluded from the study models due to lack of sufficient information on those studies at the time the NORDAGS study started.

The primary findings of this study were that a significant transmission system improvement would be needed to achieve acceptable performance under system intact and contingency conditions. Options included a new 345 kV transmission line from Center to either Fargo or Grand Forks, and adding switched shunts and static VAR (volt-ampere reactive) compensation at strategic locations within the region.

Although the Young 3 project is no longer being pursued, many of the results of the NORDAGS study are valid for the transition of Young 2 power onto the North Dakota AC system.

2.4 Conclusion of Purpose and Need

The aforementioned studies point to the need for additional transmission infrastructure to meet the need for delivering Young 2 power to the Minnkota load through the AC transmission system. This will be necessary as a result of the amendments of the PPAs between Square Butte, Minnkota, and Minnesota Power. Minnkota's share of the Young 2 output will increase from 50 percent to 100 percent, and the capacity of the existing Square Butte HVDC transmission line will be allocated to Minnesota Power for wind generation development in central North Dakota.

The NORDAGS study, discussed in Section 2.3.4 above, identified several viable transmission projects that could support acceptable dynamic and steady state performance for the added loading that a 600 MW power plant at Center, North Dakota would place on the AC system. It provides helpful insight into an appropriate AC transmission improvement after Young 2's 455 MW of power is transitioned off of the Square Butte HVDC line.

The TIPS Update study discussed in Section 2.3.3 provided definition of the steady state and voltage stability limitations for serving the loads in eastern North Dakota and west-central Minnesota. It outlined a constrained region, and further divided it into northern and southern zones. This information helps to ensure that transmission outages of critical tie lines into the constrained region are analyzed when considering suitable transmission improvements to the area.

The study results demonstrate the need to establish a transmission project. This project meets the requirements of providing a plant outlet and improved voltage stability in Minnkota's load serving region.

Alternatives for this line are discussed in the next section.

Section 3 Alternatives Evaluated

3.1 Transmission Alternatives

According to RUS Bulletin 1794A-603, § 3.1.1, when there is a need for additional capacity in an area, the Applicant responsible for serving the area may address the need with upgrades of the existing power system, new transmission, new generation, power purchases, load management, or energy conservation. A proposed action to meet the capacity need must be analyzed along with the other relevant alternatives. Since the transaction and modified PPAs with Minnesota Power and Square Butte, and the sale of the existing HVDC line to Minnesota Power, as described in Section 1.1, eliminates 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 load.

This section discusses the following alternatives to the proposed Center to Grand Forks 345 kV Line: 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 instead of Grand Forks. This section also explains why these alternatives are unacceptable or less than optimal in comparison with the proposed transmission line.

3.1.1 No Transmission Addition

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 have been completed to evaluate these impacts. The studies have revealed significant problems in system performance for the "no transmission addition" alternative. The study results are summarized below.

A. Young 2 AC Transmission Outlet Study – Preliminary Near-Term Analysis Results – June 15, 2009

Minnkota commissioned ABB to perform a technical study to evaluate near term issues of exporting power from the Young 2 generating unit to the North Dakota AC transmission system.

A typical study goal for out-year studies is to demonstrate that the project under study does not degrade the dynamic response to regionally limiting faults. This approach is used, instead of simply watching for criteria violations, because of other unanticipated transmission and generation system developments that may take place before the project is in service. Minimum dynamic swing voltages at critical buses are compared in the pre- and post-project models to document impact. In the "no transmission addition" case, the Young 2 AC transition caused an 8 percent reduction in the minimum dynamic voltage for the most limiting fault. Demonstration of "no degradation" would require that the change be zero or positive at the critical bus. Therefore, affected neighboring transmission owners would normally not accept this impact.

In addition to regional fault review, faults near the Young 2 location were also studied. For the "no transmission addition alternative," several local faults produced dynamic under-voltage violations on the existing 345 kV outlet from Center, North Dakota.

B. Young 2 AC Transmission Outlet Study – 2015 Summer Off-Peak Powerflow Analysis Results – June 23, 2009

Steady state flow impacts were analyzed on the Center, North Dakota, area AC transmission system for the "no transmission addition" case. This evaluation was done for the summer off-peak condition, with generation assumptions consistent with a 2015 time frame. The summer off-peak condition is generally considered to be the most limiting because it results in the maximum amount of power being exported from the region.

One outlet line, the Center to Heskett 230 kV line, was consistently loaded above its limit as a result of the increased flows. System Intact pre-contingent flow was increased from 70 percent to 110 percent of the 428 MVA continuous rating by the reallocated 455 MW of Young 2 generation. The reallocated generation increased post-contingent flow from approximately 70 percent to 105 percent of the 471 MVA short-term emergency rating for numerous local contingencies. For the contingency that has the most impact on Center to Heskett, post-contingent flow was increased from 100 percent to 143 percent of the emergency rating.

Post-contingent overloads were observed on numerous other circuits. Table 3-1 below, summarizes the impacts.

Table 3-1. Peak Powerflow Results

Monitored Facility	Emergency Rating (MVA)	Post-contingent flow (Percent of Emergency Rating)		Critical Contingency
		Pre-project	Post-project	
Square Butte 345/230 kV transformer	352 MVA	89%	112%	*(This content has been removed because it may be classified as Critical Energy Infrastructure Information.)*
Maple River 345/230 kV transformer #1	420 MVA	93%	105%	
Center-Heskett 230 kV line	471 MVA	100%	143%	
Beulah-Coyote 115 kV line	101 MVA	89%	126%	
Coyote 345/115 kV transformer	172 MVA	90%	122%	
Bismarck-Ward 230 kV line	352 MVA	72%	105%	
Ward-Heskett 230 kV line	352 MVA	74%	108%	
Bismarck-Weber 230 kV line	350 MVA	93%	106%	
Weber-Jamestown 230 kV line	350 MVA	93%	106%	
G132 Point of Interconnect-Ellendale 230 kV line	319 MVA	92%	101%	

The Western Area Power Administration (WAPA) is the neighboring transmission owner with the largest presence near the Young 2 generator. Several of the monitored circuits in the table above belong to WAPA. Overall, the Young 2 transition to the AC system increased WAPA's system losses in the 2015 summer off-peak case by more than

7 percent. It is generally understood that this would present an undue burden on the WAPA system.

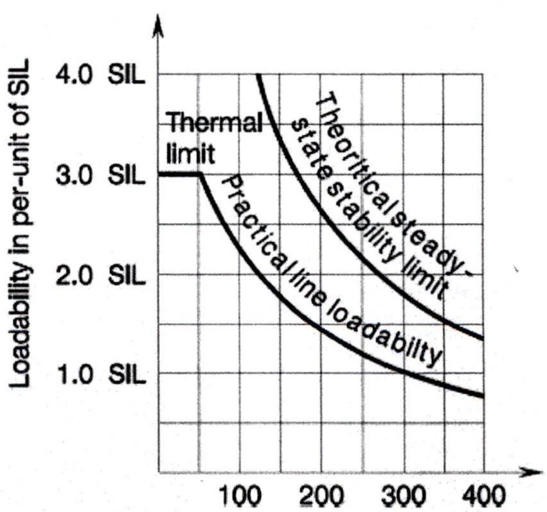
Based on results of the above studies, the "no transmission addition" option is not feasible due to the dynamic stability and steady state impacts on the North Dakota AC transmission system. Study results show that a new transmission line is required to transition the output of Young 2 off of the Square Butte DC line and onto the AC system.

3.1.2 New Transmission – 230 kV Center to Grand Forks

Minnkota conducted a study in 2005[4] 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. Figure 3-1 below illustrates the relationship between line length and practical loadability.

Figure 3-1. 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.

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

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.

3.1.3 New Transmission – 345 kV Center to Red River Valley

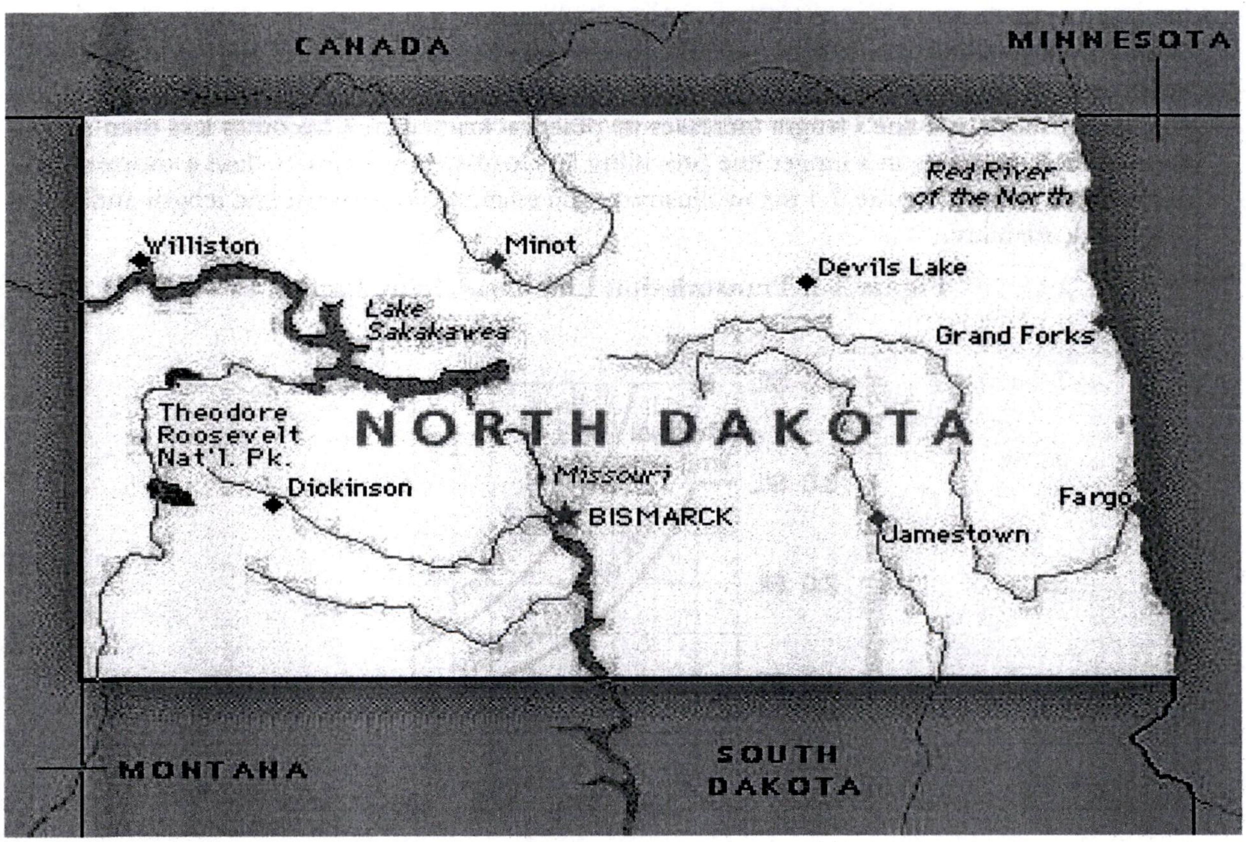
Minnkota then evaluated various 345 kV transmission line options/configurations to determine the optimal transmission solution to meet its load serving needs and the needs of the northern Red River Valley region as a whole. Options/configurations evaluated were: A.) eastern terminus options and B.) line capacity and configuration options

A. Eastern Terminus Alternatives

The Applicant evaluated two new general transmission line options; see Figure 3-2 below:

- A new Center to Grand Forks 345 kV line (from the existing substation near Center, to the existing Prairie Substation near Grand Forks)
- A new Center to Fargo 345 kV line (from the existing substation near Center, to the existing Maple River Substation near Fargo)

Figure 3-2. Eastern Terminus Options



Variations of these two options were studied to determine which other system modifications and/or configurations would result in the best overall performance. Two studies were performed by ABB to analyze and compare the performance of each option:

a. Young 2 AC Transmission Outlet Study – Preliminary Near-Term Analysis Results - June 15, 2009

As discussed in Section 3.1.1, Minnkota commissioned ABB to perform a technical study to evaluate near term issues of exporting power from the Young 2 generating unit to the North Dakota AC transmission system.

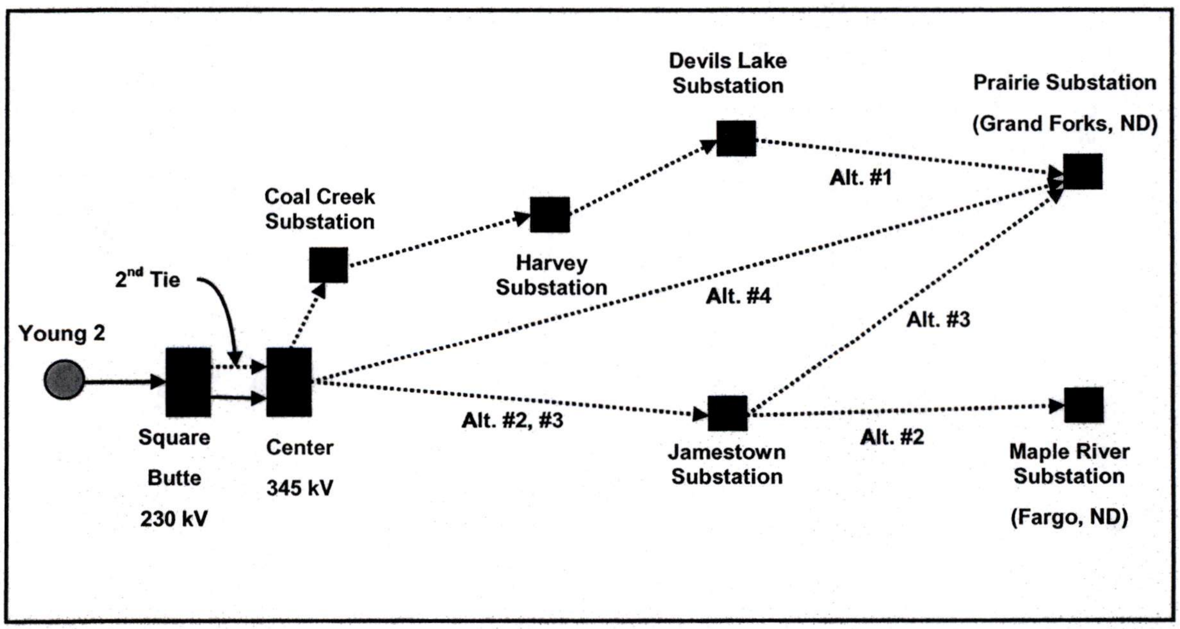
Five cases were developed. The base case had no additional transmission for Young 2. Four alternative cases (Figure 3-3 below) looked at various combinations of 345 kV line paths from the Center 345 kV Substation to the Prairie Substation and Maple River Substation. Each alternative included a second transformer connecting the Center 230 kV Substation to the Center 345 kV Substation.

The results of the study indicated that stability performance is acceptable for all four alternatives; however, there are some performance differences between the proposed 345 kV transmission alternatives.

Transmission Alternative #1 resulted in the worst transient voltage impacts and was eliminated from further study.

Transient voltage impacts in transmission Alternatives #2, #3, and #4 may require capacitor additions at the Groton 345 kV Substation located near Groton, South Dakota (not shown on the diagram below), an SVC at the Jamestown or Maple River Substations, and a capacitor bank at the Jamestown or Maple River Substations.

Figure 3-3. New 345 kV Center to Red River Valley Line Alternatives for Preliminary Near-Term Analysis



b. Young 2 AC Transmission Outlet Study – Voltage Stability Analysis Memo – July 27, 2009

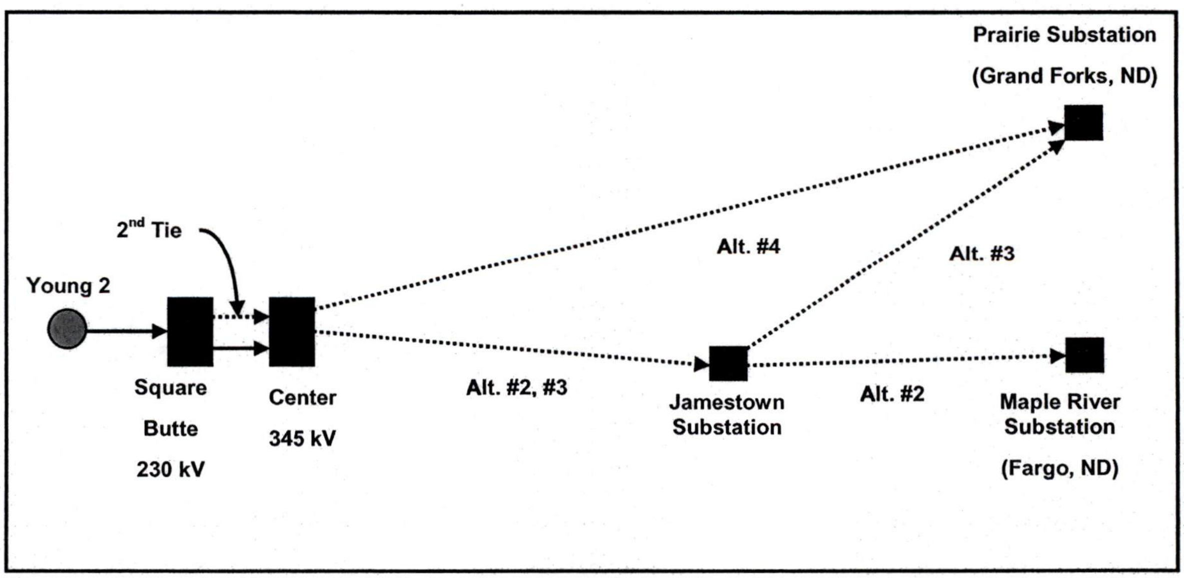
The June 15, 2009 Near Term Analysis (previous Section 3.1.3 Part A, sub. a) identified four 345 kV AC transmission alternatives for which acceptable dynamic stability performance could be achieved with the proposed transfer of power from Young 2 onto the North Dakota AC transmission system. Three of the four alternatives examined in that study were found to exhibit the best performance. Those alternatives were #2, #3, and #4.

In this study, system performance was examined from a voltage stability perspective. The analysis focused on the effectiveness of improving voltage stability performance in the Red River Valley/Bemidji areas for each of the three alternatives.

As described in Section 2, load-serving capability in the Red River Valley and Bemidji areas is generally limited by voltage stability, especially during prior outage situations. Voltage stability performance was examined for the two transmission alternatives. Performance was observed following critical contingencies in the system intact and prior-outage conditions. Load-serving limits were determined for the different transmission alternatives and compared.

After an initial development and screening of alternatives, alternative #3 was dismissed due to the longer line distance and the understanding that its benefit to eastern North Dakota voltage stability would be generally the same as alternative #4. Alternatives #2 (new Center to Jamestown-Maple River 345 kV line) and #4 (new Center to Prairie 345 kV line) were studied in greater detail. These alternatives are shown in Figure 3-4.

Figure 3-4. New 345 kV Center to Red River Valley Line Alternatives for Voltage Stability Analysis



The voltage stability model was set up to simulate winter peak load conditions in 2010. For this analysis, out-year assumptions for queued wind generation projects was less critical, because all generation in or near the constrained region was turned off to demonstrate the most limiting case.

Post-project results were compared with pre-project results for assumed Manitoba Hydro Export Interface (MHEX) power flows of 700 MW north, and 1,000 MW south. The MHEX north-flow case demonstrated the limiting boundary condition, and the south-flow case represented normal winter operation.

The concept of a voltage-constrained north zone in eastern North Dakota/ west-central Minnesota, as presented in the 2006 TIPS Update, was explored and confirmed. The four 230 kV lines crossing the boundaries of this north zone proved to be critical to maximizing North Dakota load serving capability. These four lines are:

- Letellier to Drayton 230 kV line
- Balta to Ramsey 230 kV line
- Jamestown to Pickert to Grand Forks 230 kV line
- Maple River to Winger 230 kV line

Simulation of N-2 conditions in which two of the four lines were out of service proved to be limiting cases. N-2 conditions would occur when one of the lines is out of service for planned maintenance or emergency repairs, and the system must be prepared for the next critical contingency. For simulations involving the Letellier to Drayton 230 kV line, results were relatively independent of MHEX flow, implying that these load-serving limitations would apply any time that high winter load conditions occur, regardless of Manitoba operating conditions.

Based on the results obtained in this study, it was concluded that the termination of a new 345 kV line in the Prairie/Grand Forks area provides the most benefit to the Minnkota load region, and to the eastern North Dakota/west-central Minnesota regions as a whole.

The Minnkota load region is best served by alternative #4 because it provides significantly better load-serving performance over alternative #2 for contingencies and prior outages involving the critical north zone ties. This is because alternative #4 provides a new 345 kV connection across the north zone boundary, and alternative #2 does not.

On a broader scale, the studies demonstrate that system response for the MHEX north-flow condition is significantly improved by the alternative #4 transmission project. This is because the addition of a 345 kV line to the Prairie Substation strengthens the connection between the North Dakota generation and the MHEX interface. In the north-flow case, Alternative #4 supports a North Dakota load-serving limit that is 18 percent higher than that of alternative #2 for the regionally limiting contingency (see Figure 3-5 below).

The most definitive case for alternative #4 appears to be the prior-outage of the Jamestown to Pickert 230 kV line and the subsequent loss of the Maple River to

Winger 230 kV line during the MHEX north flow condition. Under this scenario, voltage stability limits for alternative #4 are approximately 28 percent higher than those exhibited by transmission alternative #2.

Several scenarios were investigated as part of this study. The conclusions from these scenarios are summarized below.

Series compensation of the Center to Prairie 345 kV line was tested in the model, and was found to have a modest impact on North Dakota voltage stability limits. Adding 40 percent series compensation increases voltage stability limits by 2 to 7 percent.

The voltage stability impact of eastern North Dakota and northwestern Minnesota generators was also modeled. The generators were found to benefit voltage stability performance. These generators, however, do not affect the relative performance of the two transmission alternatives proposed for Young 2.

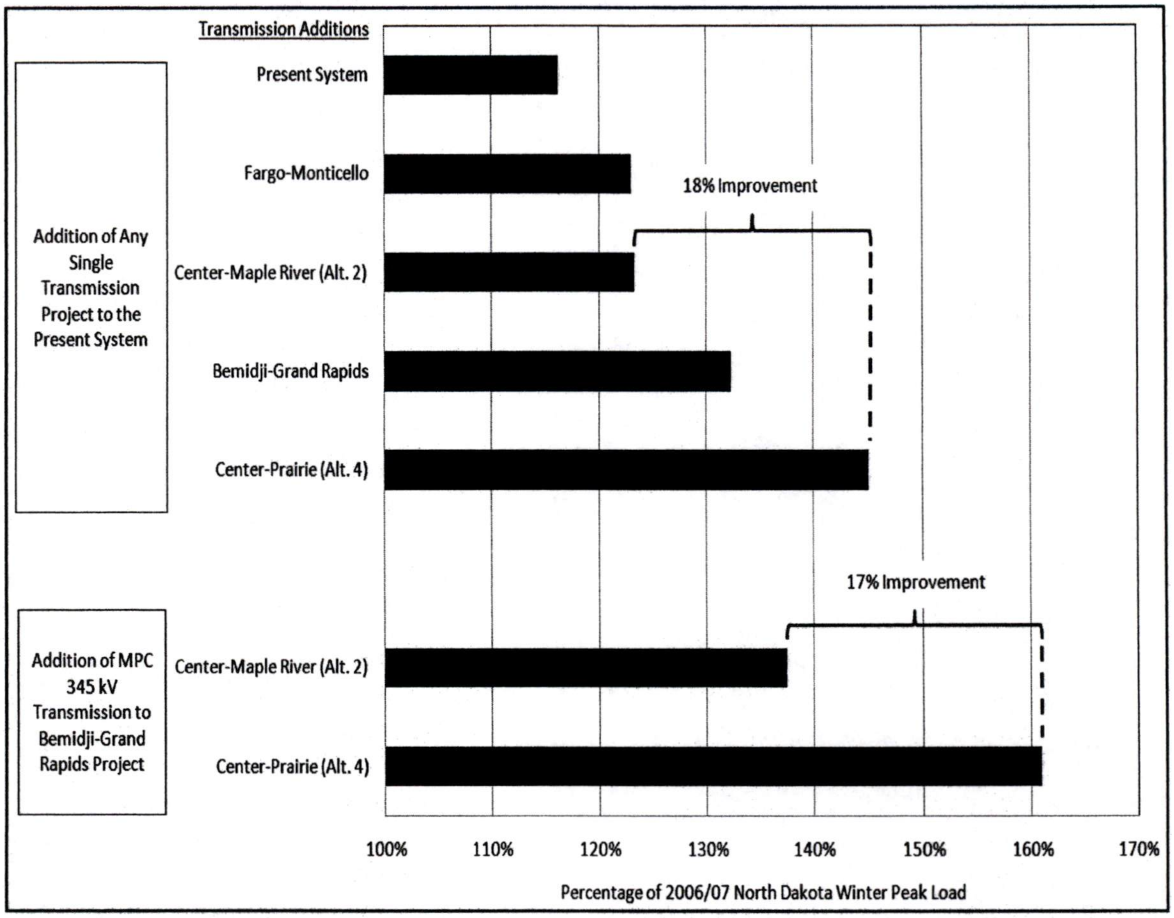
Sensitivity analyses were completed to evaluate voltage stability performance impacts of the two CAPX 2020 project lines closest to the study region; the Bemidji to Grand Rapids 230 kV line and the Fargo to Monticello 345 kV line. Both of these lines are expected to be in service by the end of 2015.

The CAPX 2020 Bemidji to Grand Rapids 230 kV line increases North Dakota voltage stability limits by 400 to 600 MW, but it does not affect the relative performance of the two transmission alternatives proposed for Young 2. During the MHEX north flow condition, alternative #4 continues to support a North Dakota load-serving limit that is 17 percent higher than that of alternative #2 for the regionally limiting contingency even with the Bemidji to Grand Rapids line in service (see Figure 3-5 below).

The addition of the CAPX 2020 Fargo to Monticello 345 kV line increases North Dakota voltage stability limits by 200 to 500 MW. In cases where transmission alternatives #2 and #4 had previously exhibited similar performance (without Fargo to St. Cloud), results show that the addition of Fargo to St. Cloud 345 kV tilts the balance more in favor of alternative #4.

When both CAPX lines were included, transmission alternative #4 continues to perform better than alternative #2 from the viewpoint of providing voltage support to the Bemidji and Red River Valley areas.

Figure 3-5. Benefit of Various Transmission Additions to ND Load-Serving Capability Following Worst-Case Regional Contingency (with U.S. to Manitoba Flow = 700 MW North)



B. Line Capacity and Configuration

a. Minnkota System Requirements

The Applicant developed a minimum line capacity criteria based on the full nameplate rating of Young 2, the expected cruise loading of the proposed 345 kV transmission line and the expected maximum emergency loading during N-1 and N-2 conditions. Preliminary load flow modeling indicates a maximum normal system cruise loading occurs during winter peak conditions with south flows. This loading level is approximately 404 MVA. The preliminary models also demonstrate that the expected maximum emergency loading on the proposed line will be 598 MVA during winter peak with north flow and prior outage of the Center to Jamestown 345 kV line and loss of the Center to Heskett 230 kV line.

To minimize corona, all design options reviewed for 345 kV constructions are based on a bundled conductor concept. According to RUS design recommendations the minimum recommended conductor size (to minimize corona) for a transmission line 230 kV and above is 795 kcmil. A two-conductor bundled 795 ACSR configuration per phase will provide a thermal limit with adequate margin above the expected maximum emergency loading.

For long transmission lines such as the Project's, the maximum power delivery capability and practical line loading limits are governed by the AC impedance of the circuit and will be less than the thermal limit. Preliminary study efforts demonstrate that the maximum expected emergency loading of 598 MVA is also below the calculated maximum power delivery capability level estimated for this 260-mile circuit with reasonable margin.

Representative routes within the study corridor identified for the Macro-Corridor Study (MCS) and shown in Figure 1-3 and Figure 1-4 on page 6 range from 248 miles to more than 280 miles, with 260 miles selected as the average potential route length for preliminary model development.

Single pole towers of steel construction with concrete foundations are proposed to minimize ROW width and eliminate guy wires. This construction type has been receiving favorable comments from the mostly rural landowners along the proposed corridor. Single pole, self supporting structures help minimize the obstacles in tillable soils helping to overcome objections to transmission line placement where GPS steering and extra large farm equipment are used.

The proposed base design configuration is then summarized as follows:

> A single circuit 260-mile long 345 kV transmission line with bundled, two-conductor 795 ACSR on steel self supporting structures with a thermal limit exceeding the maximum expected emergency loading.

As Young 2 presently terminates in an existing 230 kV substation and the proposed 345 kV transmission line will also terminate at an existing 230 kV substation at the Prairie Substation, additional 345 to 230 kV transformations will be required. Preliminary studies also indicate the potential for overload on the existing Center 345/230 kV transformer for N-1 conditions. Three new, and one replacement, transformers rated 400/533/666 MVA @ 65°C are included in the base design to provide adequate and redundant capacity to avoid Young 2 reductions for transformer outages. The proposed substation modifications at Center and Prairie provide for the addition of the three new transformers and the connections to the existing 230 kV buses.

b. Wind Project Interconnection Request

As a transmission owner in a wind resource rich area, Minnkota has several interconnection requests in progress in the interconnection request queue. Three requests have listed the point of interconnection to be the proposed Center to Grand Forks 345 kV project. The three proposed wind projects are about 400 MW each, with two projects requesting a western end interconnection and one project requesting a mid-line interconnection. The Applicant has chosen to develop the base-case design based on the output capacity of Young 2 only, to help determine the incremental impact of each 400 MW wind project on the transmission system. This study approach will allow the Applicant to proceed with system impact studies for each interconnection request based on a system model with the Project in service, as it would for typical interconnection requests made to existing transmission facilities.

This study work is ongoing and will be presented to each interconnection requester to allow them to determine the economic feasibility of the wind project with transmission improvements and third party impacts considered.

As the impact to the Project base design is dependent on the number of wind projects that progress to construction stages, the transmission improvements are being developed as modifications to the base design. The interconnection requesting parties would be financially responsible for the modifications required to the base design which may include one or more of the following changes:

- Tap the proposed Center to Grand Forks 345 kV transmission line in the Finley, North Dakota, area and develop a 345 kV line section between Finley and Fargo, North Dakota. (See Figure 1-4 on page 6) Develop a new 345 kV substation near Finley.
- Increase conductor size or type on the base project between Center and Finley, North Dakota. The use of ACSS or ACSS/TW (Aluminum conductor steel supported/trapezoidal wire) can be used to raise the thermal capability without increasing conductor diameter.
- Insert a series compensation station at the Finley tap point to lower the effective impedance of the line and increase the transfer capability.
- Convert all structures between Center and Finley, North Dakota, to double-circuit-ready structures to accommodate a future second 345 kV circuit.
- Add a second 345 kV circuit between Center and Finley, North Dakota.
- Add phase shifting transformers to the Square Butte 230 kV substation to decrease flows into the 230 kV system at Center.
- Add shunt capacitors to the Jamestown 345 kV substation to increase transfer capability.
- Add an SVC (Static VAR compensator) to the Maple River substation to increase transfer capability.

The Applicant acknowledges that there is potential for some of the above listed project modifications to significantly alter the proposed overall Project scope and some may require additional environmental review and scoping as connected actions to the base Project. With the inherent uncertainty in the early stages of large wind projects and their associated interconnection requests, the Applicant must proceed with the review process for the base Project in order to meet its obligations for reliability and load serving capability.

c. Conservation Improvement Plan (CIP)

In 2008, the state of Minnesota passed Statute 216B.241 Energy Conservation Improvement, which states "Each individual utility and association shall have an annual energy-savings goal equivalent to 1.5 percent of gross annual retail energy sales." The Applicant has identified new transmission construction as one potential resource for reducing losses (thereby saving energy) by choosing a conductor type or size with a lower electrical resistance than one selected in standard design practice. Even though the thermal limit of the proposed 795 kcmil conductor is adequate for the base design, it can be demonstrated that choosing 954 or 1,272 kcmil conductor will save significant energy which can be used to meet the requirements of the Minnesota CIP. The use of trapezoidal wire is another option to reduce losses because of the larger aluminum surface area provided in the same size conductor.

The Minnesota statute allows for one third of the 1.5 percent goal to be met by supply-side projects. Preliminary studies indicate that increasing the conductor size to 954 ACSR would provide a 197 percent kWh loss savings over the CIP target KWh value. Using a shaped wire conductor of the same outside diameter as 795 ACSR, such as ACSS/TW, would provide a 170 percent KWh loss savings over the CIP target with a significant increase in the thermal limit over the 954 ACSR conductor.

d. Conductor Type and Sizing

The selection of bundled two-conductor 795 ACSR for the base design has been shown to be adequate from a thermal limit and a mechanical performance perspective. The final conductor type will take into consideration the economics of reduced losses offered by a larger conductor which may be offset by additional costs for heavier structures and increased construction costs. Newer technologies being analyzed for the proposed line include ACSS/TW, which is a shaped wire with concentric-lay compact aluminum conductors over a steel support, that provides lower losses than its equivalent outside-diameter sized ACSR wire. The additional advantage offered by the ACSS or ACSS/TW conductor is the ability to work at higher operating temperatures, which can provide a 100 percent or greater increase in the thermal limit of a similar sized ACSR wire. The use of ACSS or ACSS/TW conductor may provide a capacity upgrade option without the need for heavier poles and structures or increasing the number of conductors bundled per phase.

The final conductor chosen will take into consideration losses, thermal capacity, constructability, and strength. Until the final route is selected and maximum span lengths are determined for river crossings and other challenging areas, the conductor and pole designs are continuously being optimized with the overall goal of minimizing project lifetime cost.

3.1.4 Conclusions on Transmission Alternatives

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 Valley and Bemidji 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.

Adding significant generation in central North Dakota will adversely impact the existing area transmission system performance, both under system intact and contingency conditions. For the Young 2 AC transition plan, various transmission improvements were identified to alleviate these impacts. Such improvements included a new 345 kV transmission line from Center to either Fargo or Grand Forks and possibly the addition of switched shunts and static VAR compensation at midpoints and/or endpoints of the new line.

Additional mitigation may be needed to address overloads on the Maple River 230/345 kV transformers, the Maple River to Sheyenne 230 kV line, and the Sheyenne to Audubon 230 kV line. Mitigation may also be needed for other criteria violations reported in the studies.

Feasibility studies show that moving the Young 2 connection to the Center 345 kV Substation generally performs better than leaving Young 2 connected to the Square Butte 230 kV Substation. However, either option will perform satisfactorily. Switching procedures have been identified that would isolate Young 2 from the 230 kV system with a direct connection to the Center 345 kV Substation to take advantage of these performance benefits if system conditions would warrant it.

Stability performance is acceptable with a new 345 kV line from Center, North Dakota, to either the Maple River Substation or the Prairie Substation. Although both of these alternatives meet MAPP criteria, there are some performance differences between them. Required mitigations may include capacitor additions at the Groton, South Dakota, 345 kV Substation, an SVC at Jamestown or Maple River, and a capacitor at Jamestown or Maple River.

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 Prairie/Grand Forks area significantly increases voltage stability performance in the Red River Valley and Bemidji areas. This alternative, in general, exhibits higher voltage stability limits compared to the Maple River/Fargo alternative.

The most definitive case for the Prairie/Grand Forks alternative appears to be the prior-outage of the Jamestown to Pickert 230 kV line, together with the subsequent loss of the Maple River to Winger 230 kV line for MHEX North Flow conditions. Under this contingency, voltage stability limits are approximately 28 percent higher for the Center to Prairie/Grand Forks alternative than those exhibited by the Center to Maple River/Fargo alternative.

In cases where these alternatives had previously exhibited similar performance (without the proposed 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 Center to Prairie/Grand Forks line.

Sensitivity analysis with both CAPX lines (Bemidji to Grand Rapids 230 kV and Fargo to St. Cloud 345 kV) included shows that the Center to Prairie/Grand Forks line would continue to perform better than the Center to Maple River/Fargo line from the viewpoint of providing voltage support to the Bemidji area and the Red River Valley.

Section 4 Total Project Cost Estimate

The Project has two major cost components. The transmission line portion of the Project is estimated on a cost per mile basis and the substation portion is estimated on a facilities improvement cost basis.

The current study corridor as identified in the Applicant's MCS provides for several line routing options. Route lengths through the study corridor are estimated to be between 248 and 284 miles. The average length of 10 possible routes reviewed that met the minimum avoidance area impact criteria is 260 miles. These preliminary routes are based on the Project's principle of following section lines and quarter section lines, as cross-country construction through tillable farmland is generally not accepted by landowners. 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 4-1, below, provides the current total project cost estimate (2009 dollars) for three line length options.

Table 4-1. Center to Grand Forks Transmission Project Options Cost Estimates

Option	Line Length (miles)	Line Cost	Project Total
Center to Prairie Shortest Case	248	$272,800,000	$309,800,000
Center to Prairie Typical Case	260	$286,000,000	$323,000,000
Center to Prairie Longest Case	284	$312,400,000	$349,400,000

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 substations

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 400 MVA power transformers.

The estimate for modifications to the Prairie 230 kV substation is $22 million of which $11 million is for improvements and additions and $11 million is for two new transformers equivalent to the 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.

Section 5 Conclusion

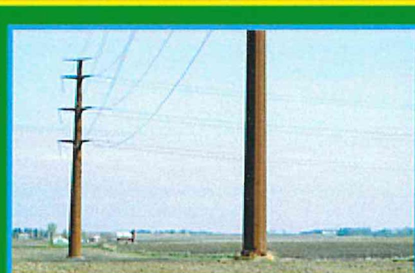
Minnkota has a need to transmit power from its base-load generating source at the Milton R Young plant near Center, North Dakota, to its load center in the Red River Valley and surrounding area. Previously, transmission service was provided by the Square Butte HVDC transmission facility. By 2013, this transmission service will no longer be available.

Minnkota has studied both no-action and new transmission alternatives to deal with the Young 2 AC transition. This AES demonstrates that the no-build and the 230 kV alternatives are neither responsible nor feasible options for Minnkota.

The best alternative to address Minnkota's transmission requirements and provide load serving benefit to the entire Red River Valley region is the addition of a 345 kV line from Center to the Red River Valley. A comparison of two new transmission options that could address the issue demonstrates that the Center to Grand Forks 345 kV line has better electrical performance and lower cost potential than the Center to Fargo 345 kV line.

The Project would provide a direct transmission link into Minnkota's service territory, a sound technical solution to the well-identified northern Red River Valley voltage stability issue, and a major improvement to the regional transmission grid.

Minnkota has also developed an MCS, which provides information on environmental, social, and cultural resources for each of the corridor alternatives. RUS makes both the AES and MCS publicly available during the public scoping process to facilitate the participation of interested parties in the environmental review of the proposed action. Input received from the public and interested parties will be used to determine the range of alternatives and impacts to be considered in the scope of the environmental assessment.



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Minnkota Power
MPC COOPERATIVE, INC.
Your Touchstone Energy® Partner

Macro-Corridor Study



Center to Grand Forks 345 kV Line
A North Dakota Transmission Line Project

Prepared For:
Rural Utilities Service

Prepared By:
Minnkota Power Cooperative, Inc.
and HDR Engineering, Inc.

October 2009

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October 2009

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List of Acronyms

Abbreviation	Definition
ACSR	Aluminum conductor steel reinforced
ACSS	Aluminum conductor steel supported
AES	Alternatives Evaluation Study
CRP	conservation reserve program
CWCS	Comprehensive Wildlife Conservation Strategy
EA	Environmental Assessment with scoping
ESA	Endangered Species Act
EVAL	Environmental Analysis Document
FAA	Federal Aviation Association
FCC	Federal Communications Commission
FHWA	Federal Highway Administration
GAP	Gap Analysis Program
GDU	Garrison Diversion Unit Import
GIS	Geographic Information System
gpm	gallons per minute
HVDC	high voltage direct-current
kV	Kilovolt
MCM	Thousand circular mills (conductor diameter)
MCS	Macro-Corridor Study
NDDOT	North Dakota Department of Transportation
NDGFD	North Dakota Game and Fish Department
NDPRD	North Dakota Parks and Recreation Department
NDSWC	North Dakota State Water Commission
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electricity Safety Council
NFIP	National Flood Insurance Program
NMPA	Northern Municipal Power Agency
NPS	National Parks Service
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
PLOTS	Public Lands Open To Sportsmen
PPA	power purchase agreements
PSC	Public Service Commission
QCEW	Quarterly Census of Employment and Wages
ROW	Right-of-Way

Abbreviation	Definition
RUS	Rural Utilities Service
STATSGO	State Soil Geographic Database
SSURGO	Soil Survey Geographic Database
SVC	Static VAR Compensator
TNC	The Nature Conservancy
USACE	United States Army Corps of Engineers
USBOR	United States Bureau of Reclamation
USBC	United States Census Bureau
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WDA	Wildlife Development Area
WMA	Wildlife Management Area
WPA	Waterfowl Production Area

1.0 Introduction

Minnkota Power Cooperative, Inc., (Minnkota) proposes to construct an approximately 260-mile-long 345 kilovolt (kV) transmission line in North Dakota between the Center 345 kV Substation (northeast of the Milton R. Young Generation Station, near Center) and the Prairie Substation (west of Grand Forks) (Figure 1). The proposed Center to Grand Forks 345 kV Transmission Line Project (Project) is needed to replace the capability of transmitting the output of Milton R Young Station Unit 2 over an existing high voltage direct-current (HVDC) line (which will be used to transport wind energy), and improve regional electrical system reliability. The Project could also support wind generation development in North Dakota.

This Macro-Corridor Study (MCS) was prepared by Minnkota and its consultant; HDR Engineering, Inc. (HDR). Minnkota will be requesting financial assistance from the Rural Utilities Service (RUS), an agency which administers the U.S. Department of Agriculture's Rural Utilities Programs. RUS has determined that its funding of Minnkota's Project would be a federal action and therefore subject to National Environmental Policy Act (NEPA), 42 U.S.C. § 4321, review. See 7 Code of Federal Regulations (C.F.R.).) § 1794.3.

The MCS and Alternative Evaluation Study (AES) are the two preliminary documents that RUS requires when conducting an environmental review for proposed transmission lines. This MCS was developed in accordance with the requirements of 7 C.F.R. § 1794.51 and RUS Bulletin 1794A-603, Scoping Guide for RUS Funded Projects Requiring Environmental Assessments with Scoping and Environmental Impact Statements (February 2002).

This document would also support preparation of an Environmental Assessment with scoping (EA) required for the construction of the transmission facilities pursuant to 7 C.F.R. § 1794.24(b)(1).

The Environmental Analysis document (EVAL) for the Project would be developed to comply with the National Environmental Policy Act of 1969 (NEPA), Council on Environmental Quality Regulations (40 C.F.R. §§ 1500–1508), and RUS's Environmental Policies and Procedures for Electric and Telephone Borrowers (7 C.F.R. § 1794). Agency and public input would be accepted throughout the process. Along with agency and public input, Minnkota would submit an EVAL to RUS. RUS would make a judgment to either use the EVAL as its EA and issue a Finding of No Significant Impact, or prepare an Environmental Impact Statement.

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 system's service areas encompass 34,500 square miles in northwestern Minnesota and the eastern third of North Dakota (Figure 2). The member systems serve approximately 125,000 of the 300,000 residents in the area. These co-ops in turn serve more than 116,000 retail customers including many of the region's schools, farms, homes, and businesses.

Minnkota also serves as operating agent for the Northern Municipal Power Agency (NMPA) in Thief River Falls, Minnesota. NMPA is the energy supplier for 12 municipal utilities located within the Minnkota service area.

The primary source of baseload generation for the rural cooperatives is the Milton R. Young Generation Station located approximately 40 miles northwest of Bismarck, North Dakota, near the community of Center, North Dakota (Photo 1 – Appendix D). As operating agent for the NMPA members, Minnkota also represents NMPA's 30 percent share of the output from the Coyote Station near Beulah, North Dakota. In addition, Minnkota has acquired, through power purchase agreements (PPAs) with large wind developers, significant North Dakota-based wind energy resources that would total about 357 MW nameplate capacity by 2010.

1.2 Environmental Review Process

Prior to making a decision about whether to loan funds, guarantee a loan, or award a grant for a proposed project, RUS is required to conduct an environmental review under the NEPA 42 United States Code (U.S.C.) § 4321, pursuant to Council on Environmental Quality (CEQ) regulations found in 40 C.F.R. §§1500–1508. As the lead federal agency, RUS would conduct the review in accordance with RUS regulations outlined in 7 C.F.R. § 1794 et seq. The RUS NEPA process would consider a broad range of environmental issues as well as potential impacts to farmland, threatened and endangered species, wetlands, and cultural and historic resources. It would also consider socioeconomic, environmental justice, and Native American issues.

The U.S. Fish and Wildlife Service (USFWS) could also participate in the NEPA process for this Project. The transmission line could cross a number of wetland and grassland easements where a Special Use Permit from USFWS could be required (50 C.F.R. 25 et seq.). In addition, the USFWS would consider potential impacts of the Project under Section 7 of the Endangered Species Act (ESA) (16 U.S.C. § 1531 et seq.), the Migratory Bird Treaty Act of 1918 (16 U.S.CC. 703–712 and 50 C.F.R. 25 et seq.), and the Bald and Golden Eagle Protection Act of 1972 (16 U.S.C. § 668). Permits would also be required from the U.S. Army Corps of Engineers (USACE) under Sections 401 and 404 of the Clean Water Act (33 U.S.C. § 1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. § 403). USACE regulatory authority would apply under Section 404 of the Clean Water Act, which requires a permit for discharge of dredged or fill material into waters of the U.S. In addition, Project impacts on prehistoric and historic properties must be considered under the National Historic Preservation Act of 1966 (16 U.S.C. § 470 et seq. and 36 C.F.R. § 800).

Figure 3 illustrates the steps in the RUS NEPA process for developing an EA. The scoping process includes a notice in the *Federal Register*, public scoping meetings, and agency consultations and coordination. In preparation for scoping, RUS required Minnkota to prepare an AES and an MCS. The AES identifies and evaluates the electrical problems and the best solutions for meeting electrical needs. The MCS identifies corridor alternatives for potential routing of the Project, and provides information on environmental, social, and cultural resources for the corridor alternatives within the preliminary study corridors. Based on information included in these studies, and input received from the public scoping process, RUS would determine the scope of the EA.

In addition, Minnkota would submit a Consolidated Certificate of Corridor Compatibility and Route Permit Application to the North Dakota Public Service Commission (PSC) focusing on identifying the appropriate corridors and routes for the Project within the macro-corridors. However, the scoping process may identify other corridor options. A detailed EVAL would be conducted on all feasible options that evolve from the scoping process. The North Dakota PSC application would be filed after completion of the RUS Draft EA.

1.3 Agency, Tribal, and Government Involvement Process

Minnkota mailed initial contact letters to federal, state, and local agencies and governments to provide information and request review of the Project, and provide comments regarding potential concerns. Letters to county commissioners were mailed on April 22, 2009. Federal and state agency letters were mailed on April 27, 2009. Letters were mailed to city mayors on May 5, 2009. Letters were mailed to the Native American tribes on May 8, 2009. Note that tribal letters were not initiating Section 106 consultation and did not request a reply. Appendix A includes a table that lists each recipient agency, date sent, response type (i.e. letter, e-mail, phone call), and date (if warranted).

Minnkota received response letters from the following agencies: North Dakota Game and Fish Department (NDGFD), North Dakota Department of Transportation (NDDOT), North Dakota State Engineers Office, North Dakota Parks and Recreation Department (NDPRD), Natural Resource Conservation Service (NRCS), USACE, USFWS, Federal Aviation Association (FAA), Mille Lacs Band of Ojibwe, and Leech Lake Band of Ojibwe. The bullets below identify main topics discussed in the agency response letters.

- NDGFD discussed resource concerns including native prairie, wetlands, wildlife management areas (WMAs), and avian species.
- NDDOT stated that the Project would have no adverse affect on NDDOT highways
- North Dakota State Engineers Office stated requirements to apply for Sovereign Lands permits for specific river crossings (Missouri, Sheyenne, James, and Red Rivers)
- NDPRD provided comments on potential impacts to natural, historic, scenic, and cultural resources within the macro-corridors
- NRCS discussed agricultural lands and wetlands concerns
- USACE stated regulations for the Project if impacts occur to Waters of the U.S. under Section 10 or Section 404 of the Clean Water Act
- USFWS stated threatened and endangered species concerns along with potential impacts to avian species
- FAA provided comments and regulations regarding construction near air facilities including Form 7460-1, required for notification for construction or alternation
- Mille Lacs Band of Ojibwe – no project concerns at this time
- Leech Lake Band of Ojibwe - no project concerns at this time

Minnkota also held the following meetings with federal, state, and local agencies to discuss the project:

- March 5, 2009, met with RUS and discussed project schedule, MCS and AES documents, and Section 106 compliance
- April 13, 2009, met with PSC staff and discussed project schedule, state process, and route application
- April 30, 2009, met with NDGFD, USACE, USBOR, USFWS, Federal Highway Administration (FHWA), NRCS, NDDOT, and State Engineers Office to discuss the Project and permitting requirements
- May 2, 2009, through May 15, 2009, met with county commissioners and discussed the Project, purpose, schedule, and contact information
- May 6, 2009, met with the USFWS to discuss Section 7 consultation, sensitive resources, and constraint areas

Agency consultation will continue throughout the Project.

1.4 Required Permits/Approvals

Minnkota would be required to obtain approvals from a variety of federal, state, and local agencies prior to constructing the Project. During development of the MCS, permitting and regulatory requirements were reviewed to identify jurisdictional authorities.

Agencies with primary approval/permitting authority include RUS and North Dakota PSC. Table 1-1 identifies 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 Project proceeds.

Table 1-1. Required Permits and Approvals

Agency	Permit, Regulatory Compliance, or Coordination
Federal	
Rural Utilities Service	NEPA Compliance and Approval of Financing Assistance
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
U.S. Army Corps of Engineers	Sections 401 and 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899
Federal Aviation Administration	Form 7460-1, Notice of Proposed Construction or Alteration and FAA Form 7460-2 - Notice of Actual Construction or Alteration
Department of Agriculture – Natural Resources Conservation Service	Farmland Conversion Form - Form AD-1006
State	
Public Service Commission	Certificate of Site Compatibility, Certificated of Public Convenience and Necessity, and Route Permit
Game and Fish	Protection of wildlife, fish and recreation areas
Parks and Recreation	Natural Heritage Inventory
State Historical Society	Section 106 Compliance Approval
Department of Transportation	Road Approach/Access Permit, and Utility Permit/Risk Management Documents
Counties	Conditional Use Permits
Townships	Conditional Use Permits

1.5 Applicant Public Involvement Process

To implement an open and comprehensive community outreach program throughout the siting and permitting process, a variety of tools and techniques have been employed by Minnkota (the Applicant). Early notification, accessible information, and opportunities to provide input are vital for a successful public involvement effort, particularly with those stakeholders potentially affected by the Project.

Community outreach efforts used existing relationships and interactions between Minnkota and the public. Various public participation tools and techniques were used to provide relevant information to the various stakeholders, and to receive input on corridors. These tools have been, and will continue to be, updated or modified as necessary during the course of the Project, and include the following: a Website describing the Project and related information, call-in hotline, stakeholder notification mailings, news releases and display advertisements, and public information meetings. Public hearings will be held in the future as required in the RUS environmental process.

Minnkota held five public meetings in May 2009, plus a sixth meeting in August 2009. These meetings were not related to specific permitting documents and procedures, but were intended to engage the public in the Project. About 220 people attended the meetings, including landowners and representatives from local, state, and federal government agencies.

The meetings were held in an open-house format featuring large informational displays, aerial maps, and project video. Handouts were made available for the public to review. Minnkota representatives were present to answer questions and engage the public in discussion. The meetings provided corridor criteria information, allowing Minnkota to gather input (comments, data, etc.) from the public on the preliminary study corridors as part of the siting process. In addition, the meetings provided an opportunity for the public to put their names on Minnkota's Project mailing list.

Approximately 77 recorded comments have been collected to date from the public meetings, Website, and hotline. These comments have been used to refine the corridors as appropriate, given the purpose and need of the Project. The majority of comments received from the public were requests to be added to the Project mailing list (35 comments). The remaining comments concerned general project involvement timing/procedures and routing (13 comments and 18 comments, respectively). Nearly 1,100 unique visitors have logged on to the Project Website as of July 2009 (http://www.minnkotacgf.com).

2.0 Project Description

Minnkota proposes to construct a 345 kV transmission line from Center to Grand Forks, North Dakota. Proposed corridors for this line are shown in Figure 1.

The Project would consist of the following six major components.

1. **345 kV High Voltage Transmission Line** – Consisting of about 260 miles (based on the average length of typical routes within the study corridor) of new, high-voltage transmission line from the Center 345 kV Substation at the Milton R. Young generation station near Center, North Dakota, to the Prairie Substation near Grand Forks, North Dakota. A crossing of the Missouri River in central North Dakota would be required. The Project would deliver existing baseload generation to Minnkota's members. While

final engineering and design has not been completed, the line would likely be constructed with single-pole steel structures (Table 2-1). These structures may be designed with double-circuit capability, to allow significant upgrades. Typical structures would be approximately 150 ft high and placed approximately 1,000 ft apart. The typical right-of-way (ROW) for a single pole 345 kV line is approximately 150 ft wide. It is anticipated that the Project would use 795 MCM or 954 MCM ACSR or ACSS conductors (bundled) to minimize corona. The conductor size may need to be modified once the ultimate route is selected and additional electrical optimization studies are completed. In addition, a fiber-optic cable would be part of the static line for the entire 260 mile transmission line length.

2. **Center 345 kV Substation Upgrades** – Most upgrades would occur within the existing substation's (owned by Otter Tail Power Company) fenced boundary. 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 addition to the north end of the substation would be needed.
3. **Additional 230 kV Tie Line** –This approximately 1,500 ft long 230 kV tie line would parallel the existing tie line on Minnkota owned property. It would be needed to complete the transmission-to-transmission interconnection with the Square Butte 230 kV Substation.
4. **Square Butte 230 kV Substation Upgrades** – Existing 230 kV circuit breakers and line terminal equipment would be re-allocated from the existing high-voltage direct-current (HVDC) tie line to the new 345 kV interconnect as part of the agreement with Minnesota Power.
5. **Prairie Substation Upgrades** – 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 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.
6. **Fiber Optic Regeneration Stations** – Two or more 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). Each station would require a 50 ft by 50 ft fenced area and small control building to house the electronic equipment.

The cost of constructing the proposed 345 kV line is estimated to be in the range of $1.1 to $1.8 million per mile in 2009 dollars (including ROW, permitting, and other ancillary costs) with a total estimated cost for line construction of approximately $286 million. An additional estimated $37 million will be required to modify the terminus substations near Center and Grand Forks for a total estimated construction cost for the Project of $323 million for a 260 mile line length. The Applicant has a target completion date for the Project of January 1, 2013.

Studies are underway to address third party impacts to neighboring transmission systems as well as to address the needs of potential interconnection customers who have requests listed on Minnkota's interconnection queue[1]. The results of these studies may indicate a need to increase the overall scope of this Project. Such scope changes could include the addition of one or more of the following eight project components. The cost of these Project additions would be borne by the beneficiaries of the additions.

1. Tap the proposed Center-Grand Forks 345 kV transmission line in the Finley, North Dakota, area and develop a 345 kV line section between Finley and Fargo, North Dakota. Develop a new 345 kV substation near Finley.
2. Increase conductor size or type on the base project between Center and Finley, North Dakota. The use of ACSS or ACSS/TW (Aluminum conductor steel supported/trapezoidal wire) can raise the thermal capability without increasing conductor diameter.
3. Insert a series compensation station at the Finley tap point to lower the effective impedance of the line and increase the transfer capability.
4. Convert all structures between Center and Finley, North Dakota, to double-circuit-ready structures to accommodate a future second 345 kV circuit.
5. Add a second 345 kV circuit between Center and Finley, North Dakota.
6. Add phase shifting transformers to the Square Butte 230 kV substation to decrease flows into the 230 kV system at Center.
7. Add shunt capacitors to the Jamestown 345 kV substation to increase transfer capability.
8. Add an SVC (Static VAR compensator) to the Maple River substation to increase transfer capability.

Table 2-1. Typical Characteristics of 345 kV Transmission Line Structures

345 kV Transmission Line	Details
Voltage (kV)	345 kV
ROW width (feet)	150
Span (feet)	1,000
Range of structure heights (feet)	120 - 150 (single circuit) 120 - 175 (double circuit)
Number of structures per mile	5 – 7
Minimum ground clearance beneath conductor (feet)	35 - 40
Depth of concrete footings for the poles (feet)	20 – 40
Diameter of concrete footings for the poles (feet)	7 – 10

2.1 Project Purpose and Need

The Milton R. Young Generation Station has two generating units, Young 1 and Young 2. Young 2 output is carried over a dedicated HVDC transmission line from central North Dakota to eastern Minnesota. Over the next few years two main actions would take place through anticipated amendments of the PPAs between Square Butte Electric Cooperative, Minnkota, and Minnesota Power, as follows:

[1] Current requests are for wind energy development projects.

- Rights to the existing HVDC transmission line from the Milton R. Young Generation Station to Duluth, Minnesota, would be transferred to Minnesota Power and it would no longer be continuously available to carry the generation output of Young 2.
- Rights to the total output (455 MW) of Young 2 would be transferred to Minnkota.

With no continuous capacity available to Minnkota on the HVDC system, the power would need to be moved over the Alternating-Current (AC) transmission system to Minnkota's service territory. As discussed in the AES, system studies have shown that the transfer capacity on the AC system needs to be increased between Young 2 and Minnkota's service territory, and that a new 345 kV transmission line from Young 2 to the Prairie Substation would be the best solution. A new line between these endpoints would also improve voltage stability and load serving capability to the northern Red River Valley. This would not be new generation, but a change in how the power is delivered to the users.

2.2 Political Jurisdictions

The Project's macro-corridors span a number of political jurisdictions, including counties, townships, and cities.

2.2.1 Counties

The macro-corridors include portions of 12 North Dakota counties: Oliver, Burleigh, McLean, Sheridan, Wells, Foster, Eddy, Griggs, Nelson, Steele, Traill, and Grand Forks (Figure 1).

2.2.2 Cities

Minnkota attempted to avoid established cities and communities as much as possible. The macro-corridors may include, or are adjacent to, the following cities: Wilton, Mercer, McClusky, Goodrich, Hurdsfield, Bowdon, Fessenden, Cathay, Sykeston, Carrington, Grace City, McHenry, Glenfield, Binford, Cooperstown, Finley, Sharon, Aneta, Hatton, Northwood, Buxton, Reynolds, Thompson, and Grand Forks.

2.2.3 Townships

The macro-corridors encompass a number of townships. The following list identifies townships located within sections of the macro-corridors. Appendix B provides a complete list of all townships, by county, with public land survey section, township, and range.

- Center to Mercer Section (refer to Section 3.4) includes Grass Lake, Painted Woods, Wilson, Mercer, Edgemont, and Pickard townships, along with ten unorganized territories.
- Mercer to Sheyenne River Section (refer to Section 3.4) includes Cherry Lake, Columbia, Paradise, Pleasant Prairie, Rosefield, Superior, Birtsell, Bordulac, Bucephalia, Carrington, Eastman, Estabrook, Florance, Glenfield, Haven, Larrabee, Longview, McHenry, McKinnon, Melville, Nordmore, Rolling Prairie, Rose Hill, Wyard, Addie, Ball Hill, Bryan, Clearfield, Cooperstown, Helena, Kingsley, Lenora, Mabel, Pilot Mound, Romness, Sverdrup, Tyrol, Washburn, Medicine Hill, Mercer, Wise, Boone, Denhoff, Fairview, Goodrich, Holmes, Lincoln Dale, McClusky, Pickard, Prophets, Franklin, Riverside, Bilodeau, Bull Moose, Cathay, Chaseley,

Crystal Lake, Delger, Fairville, Germantown, Haaland, Oshkosh, Pony Gulch, Rusland, South Cottonwood, Speedwell, St. Anna, Sykeston, West Ontario, and Woodward townships, along with five unorganized territories.

- Sheyenne River to Prairie Substation Section (refer to Section 3.4) includes Allendale, Americus, Avon, Brenna, Fairfield, Grace, Grand Forks, Lind, Logan Center, Loretta, Michigan, Northwood, Oakville, Pleasant View, Union, Walle, Washington, Lenora, Romness, Sverdrup, Washburn, Ora, Rugh, Beaver, Easton, Edendale, Enger, Finley, Franklin, Golden Lake, Greenview, Hugo, Melrose, Newburgh, Primrose, Riverside, Sharon, Sherbrooke, Westfield, Blanchard, Bloomfield, Buxton, Garfield, Mayville, Norman, Norway, Roseville, and Wold townships.

3.0 Macro-Corridor Development

3.1 Macro-Corridor Study Requirements

The purpose of this MCS is to identify potential transmission line corridors that use existing linear features/field lines, while avoiding residences and sensitive areas. RUS provides the following guidance for developing a MCS (RUS 2002):

> A Macro-Corridor Study should define the project study area and show the end points on a linear project (e.g., electric transmission line or natural gas pipeline). Within this project 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 to up to a mile. The use of existing rights-of-way or double circuiting of existing electric transmission lines should be addressed as appropriate.

Minnkota applied a two-step methodology to develop corridors that meet federal and state requirements for routing transmission facilities as well as addressing landowner concerns. The steps included identifying preliminary endpoints, developing preliminary study corridors, and developing macro-corridors. Data acquisition, mapping, and stakeholder input/public involvement occurred throughout the development of the preliminary study corridors and refining of the macro-corridors. A summary of macro-corridor development is provided below in Section 3.3.

3.2 Data Acquisition

Minnkota gathered data from field assessments, landowner comments, and federal and state agencies to help identify potential opportunities and constraints for routing the proposed transmission line. Landowner comments were digitized into a Geographic Information System (GIS) database. Agency data related to natural resources, cultural resources, and land use issues were also placed within a GIS database. Agencies and non-government agencies included:

- North Dakota Game and Fish Department
- North Dakota Parks and Recreation Department
- North Dakota Data Clearinghouse
- State Historical Society of North Dakota
- The Nature Conservancy

- U.S. Fish and Wildlife Services

Data collected included information related to the natural environment (such as water, soils, vegetation, and wildlife habitat), and the human environment (such as land use, infrastructure, and listed cultural resources). Minnkota also collected data on electrical reliability factors, engineering feasibility, and cost, and comments from stakeholders, including individuals and agencies. The data were compiled in a GIS database and used in the resource review phase of macro-corridor refinements. Minnkota staff, along with environmental, permitting, and engineering team members, reviewed collected data to analyze potential opportunities or constraints within the corridors.

3.3 Development of Macro-Corridors

During initial project planning following the agreement with Minnesota Power, Minnkota conducted capacity and service area studies that identified a baseload generation need in the central-eastern portion of North Dakota. The studies identified Project endpoints that would provide increased reliability for customers and enhanced regional reliability, and would support generation outlet capability. Preliminary study corridors were developed between the endpoints.

Initially, preliminary study corridors were also developed to endpoints in Grand Forks and Fargo, North Dakota. Through project development, Fargo was eliminated as an endpoint because system studies indicated that a transmission line to that area did not increase voltage stability within the service areas along the Red River Valley and northwestern Minnesota as well at the Grand Forks endpoint did.

The study moved forward with the western endpoint being the existing Center 345 kV Substation near the Milton R. Young Generation Station, and the eastern endpoint being Minnkota's existing Prairie Substation on the west side of Grand Forks, North Dakota.

Preliminary study corridor boundaries were set at about six-miles-wide to allow consideration of multiple routing options, including several options where the proposed 345 kV transmission line could cross the Missouri, James, and Sheyenne rivers. In addition, the preliminary study corridor width would be large enough to avoid or minimize impacts to constraint areas (as defined by the North Dakota Public Service Commission regulations). Constraint areas include those locations where transmission line development may be restricted because of federal, state, or local regulations, or because of conflicts with existing land use or land features. Some areas may have additional state or federal permit requirements and Minnkota would prefer to avoid these areas, where feasible.

Minnkota focused on several overarching objectives to identify the preliminary study corridors (Figure 4), including:

- Using parallel existing rights-of-way (transmission lines, pipelines, railway, or roads), survey lines, property and field lines, and natural division lines
- Avoiding populated areas
- Avoiding major natural features (Lake Ashtabula, Jamestown Reservoir, national wildlife refuges (NWRs), WMAs, wildlife development areas (WDAs), and waterfowl production areas (WPAs)
- Crossing major rivers at existing transmission lines crossings and avoiding wooded areas
- Avoiding known public and private airports/airstrips

- Complying with North American Electric Reliability Corporation (NERC) electrical system planning standards to maximize transmission system reliability (e.g. maintain maximum distance from existing system lines)
- Minimizing length

Figure 4 identifies the preliminary study corridors, which include portions of Burleigh, Eddy, Foster, Grand Forks, Griggs, Kidder, McLean, Morton, Nelson, Sheridan, Steele, Traill, and Wells counties. Figure 4 also highlights corridor constraints identified in developing the preliminary study corridors.

Federal agencies managing lands in the area include USFWS, United States Bureau of Reclamation (USBOR), and USACE. USFWS manages the NWRs, WDAs, and WPAs. USBOR operates the McClusky Canal and associated recreation areas.

State agencies that manage lands in the area include NDGFD and NDPRD. These areas include WMAs, state parks, and recreation areas. Also, one non-government organization, The Nature Conservancy, manages the Cross Ranch Preserve adjacent to the Missouri River in the western portion of the Project area.

Figures 5.1 to 5.4 show the federal and state agency managed lands in central-eastern North Dakota, as well as other managed land.

After additional data collection, including field reconnaissance and stakeholder input, the preliminary study corridors were modified into macro-corridors (Figure 1). The macro-corridors varied in width throughout the preliminary study corridors, to allow for identification and consideration of potential routes that may meet the Project's purpose and need. The macro-corridors were developed based on an analysis of available land use/land cover data, existing infrastructure, and environmental and engineering constraints. The initial focus of the analysis was to avoid or minimize impacts to constraint areas and to locate areas the corridors might share with existing linear features and/or field lines. Constraints and limitations criteria for the macro-corridors are listed in Table 3-1.

In finalizing the macro-corridors, Minnkota identified opportunities and constraints for potential sections within the macro-corridors. A resource review provided information about land use and environmental resources that provide a compatible land use or that might constrain the construction of a new transmission line. Please see the macro-corridors resource review in Section 5.0.

Table 3-1. Macro-Corridor Constraints and Limitations

Constraints	Limitations
Cultural Resources	Tribal preservation areas, archaeological sites, historic structures
Surface Waters	River and lake crossings, floodplains
Wetlands	Sensitive species habitat, unique resource
Federal and State Lands	NWRs, WPAs, WMAs, parks and recreation areas
Native Prairie and Woodlands	Riparian woodlands, sensitive species habitat
Sensitive Natural Resources	Federally designated species and habitat, state sensitive species and communities
Human Environment	Cities, landowner concerns, schools, churches, hospitals and health care facilities, municipal water facilities, airports, wind energy developments
Agriculture	Center pivot irrigation lands, agricultural production lands, drainage systems

3.4 Descriptions of Macro-Corridors

The macro-corridors were divided into three distinct sections: 1) Center to Mercer (CM), 2) Mercer to the Sheyenne River (MS), and 3) Sheyenne River to the Prairie Substation (SP) (Figure 1). The Center to Mercer section begins at the Center 345 kV Substation and proceeds east across the Missouri River, then north towards the city of Mercer, North Dakota. Minnkota is assessing at least three potential Missouri River crossing corridors within this section.

The second section, Mercer to the Sheyenne River, has two distinct corridors (a north and south) plus a crossover between them. At Mercer, the section turns to the east and divides into a north and south corridor. Generally, the south corridor follows Highway 200 to the Sheyenne River, while the north corridor traverses the middle portions of Sheridan and Wells counties, the south portion of Eddy County, the north portion of Foster County, then goes through Griggs County to the Sheyenne River. The north corridor crossover segment is located north of the city of Bowdon, North Dakota.

The third section, Sheyenne River to the Prairie Substation, crosses the Sheyenne River and contains three distinct corridors. The first proceeds north to Aneta, then east towards Northwood, and north to the Prairie Substation. The second potential corridor continues diagonally northeast-southwest along an existing Western Area Power Administration 230 kV transmission line. The third potential corridor advances east to about the city of Hillsboro, then proceeds north to the Prairie Substation.

Recently, Minnkota has received several interconnection requests from wind farm developers in North Dakota. Minnkota is evaluating the impacts of these requests on the existing transmission system and the proposed Project. Preliminary analysis shows that an additional connection from the Finley, North Dakota, area to the Fargo, North Dakota, area may be required to fulfill these requests. An amended MCS would be submitted if this alternative is required.

Minnkota developed the macro-corridors with the intention that multiple route options could be developed that pass a limited number of residences, minimize environmental impacts, cross the rivers near existing linear infrastructure, and avoid conflicting land uses. Route options would be determined by the federal NEPA and the North Dakota PSC application processes.

4.0 Engineering Opportunities and Constraints

4.1 Engineering Constraints

Engineering factors also need to be considered when selecting a route. Such factors include topography (discussed below), span limitations, ROW limitations, and the presence of existing infrastructure or other development (Table 4-1).

Span limitations need to be examined where there are large wetland complexes and lakes (Photo 2 – Appendix D). Span limitations are driven by the type and height of the transmission pole structure, climate (wind speed, potential for ice loading, etc.) and the size/weight of the transmission conductor.

Transmission lines also require a certain amount of ROW to ensure safe and reliable operation. Key factors in determining ROW widths include structure span spacing, structure configuration, conductor weight, sag, operating voltage, and elevation (RUS 1994). Areas where sufficient ROW is not available need to be identified and avoided during transmission line routing.

Dense development can also limit transmission line routing options. Where insufficient space is available to meet setback requirements, or where existing development is incompatible with the construction and operation of a transmission line, alternate routes may need to be identified.

One area that would need to be examined in further detail is east and south of the Prairie Substation. This area contains many newer residential developments, lands plotted for development, and business parks. The presence of these developments may limit available ROW and the ability to meet setback requirements. The analysis for route selection would include a more detailed look at opportunities to develop routes through this area.

The Missouri and Sheyenne river crossings (Photo 3 and 4 – Appendix D) are two other areas that may require further examination. Both areas are constrained by topography, span distance, residences, woodlands, and existing infrastructure. Topography and span distance may limit the crossing locations and ability to meet setback requirements. The analysis for route selection would include a more detailed look at opportunities to develop routes through this area.

Table 4-1. Engineering Constraints and Limitations

Constraints	Limitations
Line Length	Points-of-inflection, line sag, material procurement, structure type
Span Distance	Line sag, pole height, ice loading, wind/weather, structure type, elevation
Topography	Line sag, pole location, structure type
Soils, Rock, and Shallow Bedrock	Pole foundation, span distance, geologically unstable areas
Pole Spacing	Pole height, water bodies, residences, structure type
Residences	Cities
Existing Transmission Lines	System reliability, maintain necessary spacing, maintain safe distance, ROW constraint
Existing Public Infrastructure	Wind projects, maintain safe distances from roads, railways, pipelines, ROW

4.2 Use of Existing Linear Corridors

Existing corridors can provide an opportunity for transmission line routing. These corridors have already disturbed the surrounding environment, and generally have preserved a ROW corridor that can be considered for a transmission line route. Constraints for the sharing of existing utility corridors depend on the type of utility present. As indicated previously, the opportunity for ROW sharing cannot take place where safety, maintenance, and clearance requirements demand that utilities be kept separate. Also, the sharing of some transmission line corridors would not be desirable if the purpose of the existing line is similar to the proposed line. For example, generation outlets from the same plant are generally separated as much as possible to ensure reliability in the event of a weather induced outage.

4.3 Topographic Constraints

Major topographic features in macro-corridors can limit options for transmission line routing and construction. Issues associated with extreme topography include accessibility for construction, soil/rock suitability, span distance, and potential height of the poles, among others.

4.4 Engineering Cost Analysis

The proposed Center to Grand Forks 345 kV transmission line project has two major cost components. The transmission line portion of the project is estimated on a cost-per-mile basis and the substation portion is estimated on a facilities improvement cost basis.

The current study corridors provide for several line-routing options. Route lengths through the study corridor are estimated to be between 248 and 284 miles. The average length of 10 possible routes reviewed that met the minimum impact avoidance area criteria is 260 miles. These preliminary routes are based on the project's principle of following section lines and quarter section lines, as cross country construction through tillable farm land is generally not accepted by the landowners. The ultimate line length cannot be established until the route has been selected 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 4-2 below provides the current total project cost estimate (2009 dollars) for three line-length options.

Table 4-2. Center to Grand Forks Transmission Project Options Cost Estimates

Option	Line Length (miles)	Line Cost	Project Total
Center to Prairie Shortest Case	248	$272,800,000	$309,800,000
Center to Prairie Typical Case	260	$286,000,000	$323,000,000
Center to Prairie Longest Case	284	$312,400,000	$349,400,000

Note: All options are based on 795 ACSR conductor, mono-pole structures, an assumed line cost of $1.1 million per mile, and an estimated cost of $37 million for substations

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 400 MVA power transformers.

The estimate for modifications to the Prairie 230 kV substation is $22 million, of which $11 million is for improvements and additions and $11 million is for two new transformers, equivalent to the Center units.

4.5 Selection of Alternative Routes

Minnkota plans to submit a Consolidated Certificate of Corridor Compatibility and a Route Permit Application to the North Dakota PSC, identifying a proposed route which lies within the macro-corridors. The Application is anticipated to be submitted in September 2010.

The route selection may include:

- Evaluation of opportunities and constraints
- Evaluation of constraint areas
- Identification of feasible routes
- Provision for public and agency comment
- Route refinement and the beginning of detailed environmental review

Selection of a final route would be made by governing agencies at the appropriate time following the planning and environmental review process. This process would include additional opportunities for public and agency input as well as detailed analysis of environmental conditions.

5.0 Macro-Corridor Resources

The following information is intended to summarize the resources within the macro-corridors identified in Section 3.3. Table 3-1 provides a summary of the macro-corridor constraints and associated limitation criteria. No specific impacts are known at this point since final routes and ROW requirements have not been determined. Site-specific environmental data and impacts will be incorporated as the routing progresses and as part of the NEPA and state permitting processes.

5.1 Land Use/Land Cover

The macro-corridors include portions of 12 counties in central and eastern North Dakota that are made up of mostly agricultural lands, i.e. pasture or cropland. Other land covers include wooded areas, prairie and grassland, and urban development. With the exception of Carrington, Cooperstown, and Grand Forks, the majority of the communities within the macro-corridors are small, farmed-based towns.

Land use and land cover data were gathered from North Dakota Gap Analysis Program (GAP) data (Figures 6.1 to 6.4). The land coverage percentages are broken down by the macro-corridor sections in Table 5-1.

The general land cover within the macro-corridors 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 Project moves east, with approximately 60 percent cropland in the Center to Mercer Section, to nearly 90 percent cropland in the Sheyenne River to Prairie Substation Section. The top cultivated crops include wheat, soybeans, and corn. Center pivot irrigation units are commonly found within the macro-corridors. Cattle lead livestock production in North Dakota.

In the western sections of the macro-corridors, toward the Missouri River, prairies and wetlands become more prevalent. Historically, North Dakota was mostly prairie land cover. In the western portions of the macro-corridors, prairie covers about 24 percent within the

Center to Mercer Section and decreases to nearly 2 percent in the Sheyenne River to Prairie Substation Section. Wetlands occur throughout the macro-corridors as the 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 Mercer to Sheyenne River Section, which is the highest of the three sections, and then decrease to about 5 percent in the Sheyenne River to Prairie Substation Section 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.

Table 5-1. GAP Land Cover Data by Macro-Corridor Section

	GAP Land Cover (% of Total Section Area)		
Land Cover Category	Center to Mercer	Mercer to Sheyenne River	Sheyenne River to Prairie Substation
Barren Land/ Sparse Vegetation	0.6	0.0	0.0
Agriculture	59.2	72.8	89.2
Developed	0.6	0.4	0.5
Prairie	23.7	10.8	2.4
Shrubland	5.8	3.3	1.5
Wetland	7.9	11.6	4.8
Woodland	2.2	1.1	1.6
Total	**100.0**	**100.0**	**100.0**

Wind farm development is increasing in North Dakota (Photo 5 – Appendix D). There are approximately three wind farm developments within the macro-corridors. Most wind farm development is located in the western region of the macro-corridors due to availability of land and transmission lines. The exact size and location of future wind farm development areas are unknown, although according to landowners, wind development companies are actively discussing projects with them. Minnkota would work with wind developers in routing the transmission line to minimize construction and operation impacts.

Land cover classes evaluated as opportunities include existing disturbed corridors that are compatible with the construction and operation of a new transmission line, such as linear ROW (transmission lines, pipelines, railway, or roads). Opportunity areas are also located along property and field lines associated with cultivated crops and pasture land.

Land cover classes evaluated as constraints may have current land uses that conflict with the construction and operation of a new transmission line, including developed areas, woodlands, water crossings, large wetland complexes, and extreme terrain.

5.1.1 Residences and Buildings

Residences and buildings within the macro-corridors were identified using field surveys and aerial photographs. Avoiding occupied residences and farmsteads was one of the main routing criteria used when developing macro-corridors. According to North Dakota PSC regulations, the final route centerline must be at least 500 feet from all occupied residences unless otherwise stated by the landowner. Areas of dense population were avoided, where possible. The number of occupied residences increases as the Project moves east toward Grand Forks, North Dakota.

No structures may be permitted within the 150-foot-wide ROW required for the construction and operation of the new transmission line. If any buildings or structures are located within the proposed Project ROW, they would be removed or relocated. Large businesses and facilities were avoided when developing the macro-corridors, when possible.

The location of structures (homes, barns, and businesses) in relation to the final route would be assessed during route development.

5.1.2 Soils/Groundwater

Soils within the macro-corridors range from black loam in the Red River Valley to a more porous, sandy soil in the west. Loam is ideal for agricultural because it retains nutrients and allows easy water flow. This soil type is commonly considered prime farmland, and covers the majority of the eastern portions of the macro-corridors. The sandy soil in the west is typically non-tillable farmland and is primarily used as pasture land.

5.1.3 Topography

Topography can be a routing opportunity or constraint depending on the degree of slope. Routing opportunities may be associated with flat terrain or areas with a gradual slope, while routing constraints occur in areas with steep terrain. Extreme terrain may increase the complexity of the engineering, may cause environmental impacts, and may be difficult to access during construction and maintenance. Except for terrain along the Missouri River and in the west part of the northern portion of the Mercer to Sheyenne River Section, the majority of the land within the macro-corridors is generally flat terrain. Areas of steep terrain would be assessed during the route development.

5.1.4 Airports

Airports are potential routing constraints for a new transmission line depending on the height of the transmission structures and their proximity to the airport. The permissible height of a structure located near a public airport is determined by the height of the proposed structure in relation to the airport facility, the classification of the airport facility, and the regulated airport imaginary surfaces. The Federal Aviation Administration (FAA) defines and regulates the imaginary surfaces. Federal regulations only apply to public airports. However, each state has regulations applicable to public and private airports.

There are several public airports within or near the macro-corridors (Figures 7.1 to 7.4): McClusky Municipal, Fessenden Municipal, Carrington Municipal, Cooperstown Municipal, Northwood Municipal – Vince Field, and Mayville Municipal Airports. Private airports are more prevalent in North Dakota due to crop spraying, with several occurring within or near the macro-corridors, including Soderquist, Westerlind, R Leep Strip, Morten, Berg Field, Gensrich, Knutson, Central Valley Aviation, and Erickson, along with a few unnamed private airstrips.

A Long Range Radar facility is located northwest of Finely in Section 26 of T14N and R57W. This facility, identified in Figures 7.1 to 7.4, is owned and operated by the FAA. Minnkota will work with the FAA to avoid impacts to the facility.

5.1.5 Federal Communication Commission Towers

Communication towers would be avoided where feasible to prevent operational issues. Several communication towers are located within the macro-corridors (Figures 7.1 to 7.4): three communication towers are located within the Center to Mercer Section, 18 communication towers are located within the Mercer to Sheyenne River Section, and 15 communication towers are located within the Sheyenne River to Prairie Substation Section. The majority of the towers are located near or within municipal areas. Other towers are located along roadways and may be avoided by routing the transmission line on the opposite side of the road.

5.1.6 Pipelines

The macro-corridors do not follow existing pipeline ROW as the pipelines run in a northwest to southeast direction, perpendicular to the macro-corridors. Thus, a few pipelines would be spanned by the macro-corridors (Figures 7.1 to 7.4). The Keystone Pipeline that is currently under construction bisects the macro-corridors from north to south just east of Cooperstown in the Sheyenne River to Prairie Substation Section (Figures 7.1 to 7.4). Construction of the Keystone Pipeline would be completed prior to construction of the new transmission line.

USBOR and the Garrison Diversion Conservancy District have proposed a 60-inch-diameter water pipeline—the Red River Valley Water Supply Project—with a preferred alternative titled Garrison Diversion Unit Import (GDU) to the Sheyenne River. The GDU Alternative would transport water through the McClusky Canal, and then use a buried pipeline from a biota treatment facility to the Sheyenne River north of Lake Ashtabula. This proposed alternative would parallel the southern portion of the Mercer to Sheyenne River Section of the macro-corridors, north of Highway 200 from McClusky, North Dakota, to Denhoff, North Dakota. For more information, please see the water supply project website at <http://www.rrvwsp.com>.

5.1.7 Roadways

There are a few opportunities for the macro-corridors to parallel existing road ROW. The following U.S. and state highways are located within the macro-corridors and may provide an opportunity for parallel corridors: State Hwy 15, State Hwy 45, State Hwy 65, State Hwy 20, State Hwy 200, State Hwy 41, US Hwy 52, US Hwy 83, State Hwy 3, and State Hwy 25 (Figures 7.1 to 7.4).

5.1.8 Railroads

The Burlington Northern Sante Fe Railroad; Dakota, Missouri Valley and Western Railroad; and Canadian Pacific Railway all have tracks within the macro-corridors (Figures 7.1 to 7.4). There is an abandoned railway parallel to Highway 200 that may provide an opportunity for parallel corridors. The existing railways travel in a northwest to southeast direction and may provide some opportunity for parallel corridors.

5.2 Managed Resource Lands

As discussed above, constraint areas include those locations where transmission line development may be restricted because of federal, state, or local regulations, or constrained because of conflicts with existing land use or land features. This section describes federally and state-managed resource lands within the macro-corridors (Figures 5.1 to 5.4). An analysis of potential impacts would be included in the federal/state environmental review process.

No federally or state-designated scenic byways are located within the macro-corridors. State-designated Sakakawea Scenic Byway is located about six miles north of the macro-corridors in the City of Washburn, North Dakota. There are no federally or state-designated wild or scenic rivers within North Dakota.

The Cross Ranch Preserve, managed by The Nature Conservancy (TNC), is located within the macro-corridors (Center to Mercer Section). The Cross Ranch Preserve was established in 1982 as TNC's first project in North Dakota. The focus of their efforts is to preserve the temperate grassland and provide habitat to threatened plant and animal species. TNC partners with local farmers, ranchers, private landowners, and North Dakota Parks and Recreation to achieve their goals.

5.2.1 Federal Managed Lands

Portions of The Chain of Lakes Recreation Area and McClusky Canal, managed by the USBOR, are located within the Center to Mercer Section of the macro-corridors (Figures 5.1 to 5.4). This area is used for various outdoor activities including camping, fishing, boating, and wildlife viewing. The Chain of Lakes Recreation Area is divided by Highway 41 and is located in McLean, Burleigh, and Sheridan counties.

In addition, the National Parks Service (NPS) manages the North Country National Scenic Trail located on the New Rockford and McClusky canals in Sheridan, Burleigh, and McLean counties, as lands managed by USBOR (Figures 5.1 to 5.4).

USFWS manages NWRs, WPAs, and WDAs located within the macro-corridors (Table 5-2 and Figures 5.1 to 5.4). The NWRs, WPAs, and WDAs, are typically used for outdoor recreation, hunting, and wildlife observation. The Center to Mercer Section contains one WPA and three WDAs; within the Mercer to Sheyenne River Section are one NWR, 32 WPAs, and three WDAs; and within the Sheyenne River to Prairie Substation Section are two WPAs.

5.2.2 Federal Conservation Easement Lands

Within the macro-corridors there are four types of federal land conservation easements: USFWS wetland, grassland, and conservation easements; and U.S. Department of Agriculture conservation reserve program (CRP) easements.

- Wetland easements are legal agreements with private landowners that permanently protect wetland basins from being drained, burned, leveled, or filled.
- Grassland easements are legal agreements with landowners that permanently protect grassland vegetation, primarily native prairie, from being destroyed or developed.
- Conservation easements are legal agreements voluntarily entered into by a property owner and a qualified conservation organization such as a land trust or government agency. The easement contains permanent restrictions on the use or development of land in order to protect its conservation values.

These easement restrictions vary greatly for each agency or organization. The four types of easements are scattered throughout the macro-corridors, with a higher density in the Mercer to Sheyenne River Section (Figure 8). As indicated on maps provided in the USFWS response letter dated June 5, 2009, about 10 percent of the Center to Mercer Section is in easements, about 35 percent of the Mercer to Sheyenne River Section is held in easements, and about 5 percent of the Sheyenne River to Prairie Substation Section is in easements.

The CRP is a long-term federal agricultural land conservation easement program that provides valuable grassland habitat for many birds and terrestrial species and provides riparian buffers to improve water quality of streams and rivers. The CRP is a provision included in the farm bill that pays farmers to leave lands that were previously farmed fallow for 10 to 15 years.

5.2.3 State Owned Lands

State-designated public lands within the macro-corridors include a state park and state nature preserve managed by the NDPRD, and WMAs managed by the NDGFD (Table 5-2 and Figures 5.1 to 5.4). State parks and nature preserves are used for outdoor recreation and wildlife observation. WMAs would be used for outdoor recreation, hunting, and wildlife observation (Photo 6 – Appendix D). The Center to Mercer Section contains one state park, one state nature preserve, and three WMAs; within the Mercer to Sheyenne River Section are four WMAs; there are no state lands within the Sheyenne River to Prairie Substation Section.

5.2.4 State Easement Lands

Public Lands Open to Sportsmen (PLOTS) are state-paid easements that allow the public to hunt on private lands. There are approximately seven different kinds of PLOTS. Some PLOTS have a federal-easement associated, such as CRP lands. PLOTS are scattered across the state and the macro-corridors.

Table 5-2. Federal and State Owned Lands

Type of Public Land	Managing Agency	Name of Public Land	Macro-Corridor Section*
Federal			
National Scenic Trail	NPS	North Country National Scenic Trail	CM, MS
Recreation Area	USBOR	Chain of Lakes/McClusky Canal	CM
National Wildlife Refuge	USFWS	Sibley Lake	MS
Waterfowl Production Area	USFWS	Gaub	CM
		Kreiter	MS
		Moldenhauer	MS
		Weckerly	MS
		Radtke	MS
		Fritchie	MS
		Bull Moose	MS
		Harris	MS
		Kindschi	MS
		Weber	MS
		Crystal Lake	MS
		Faul	MS
		Ehni	MS

Type of Public Land	Managing Agency	Name of Public Land	Macro-Corridor Section*
		Schindler	MS
		Hoornaert	MS
		Heeren	MS
		Chaseley	MS
		Bibow	MS
		Monk	MS
		Barlow	MS
		Blue Cloud Lake	MS
		Topp	MS
		Bauers	MS
		Midgley	MS
		Swan Lake	MS
		Larson	MS
		Johnson	MS
		Delfs	MS
		Evers	MS
		Helland	MS
		Lake Addie	MS
		Zimprich	MS
		Ronningen	MS
		Fritz	SP
		Gerhart	SP
Wildlife Development Area	USFWS	Koenig	CM
		East Park Lake	CM
		Hecker's Lake	CM
		Goodrich	MS
		Kindschi	MS
		Indian Hills	MS
State			
State Nature Preserve	NDPRD	Cross Ranch	CM
State Park	NDPRD	Cross Ranch	CM
Wildlife Management Area	NDGFD	Wilbur Boldt	CM
		Smith Grove	CM
		Wilton Mine	CM
		Wells County	MS
		Robert L. Morgan	MS
		Rusten Slough	MS
		Sibley Lake	MS

** Center to Mercer (CM), Mercer to Sheyenne River (MS), and Sheyenne River to Prairie Substation (SP)*

5.3 Biological Resources

5.3.1 Surface Water Resources

There are numerous surface water resources (lakes, rivers, and streams) within the macro-corridors (Figures 9.1 to 9.4). Lakes and perennial waterways would be avoided to prevent construction-related disturbance, such as erosion, sedimentation, and potential water quality impacts. During route selection, transmission line structures would be located to avoid water bodies or located to span surface waters.

The Center to Mercer Section of the macro-corridors crosses the Missouri River, which is considered an important biological, cultural, recreational, and visual resource. The river, its sand bars, and adjacent wooded riparian zones provide habitat for sensitive species. In order to meet USFWS and USACE concerns, the macro-corridors contain two existing high-voltage transmission line crossings as potential parallel corridors to minimize new impacts associated with a new transmission line crossing of the Missouri River.

As the macro-corridors within the Center to Mercer Section head north toward Mercer, they enter the Prairie Pothole Region and cross the McClusky Canal and associated lakes, the largest being Hecker's Lake.

The Mercer to Sheyenne River Section of macro-corridors spans the Prairie Pothole Region of North Dakota that contains many shallow, depressional wetlands. Some of these large open wetlands may be considered lakes. Notable lakes from west to east include Kindschi Lake, Lake Ontario, Duck Lake, Cottonwood Lake, Lake Claire, Juanita Lake, Storm Lake, Sibley Lake, Lake Jessie, and Lake Addie. Notable water courses include the McClusky Canal, Rocky Run and its tributaries, the James River and its tributaries, Pipestem Creek, Baldhill Creek and its tributaries, and the Sheyenne River and its tributaries. The Sheyenne River is an important biological, cultural, recreational, and visual resource. The river and associated riparian habitat contain sensitive species.

The Sheyenne River to Prairie Substation Section departs the Prairie Pothole Region into the Red River Valley where there is a reduction in small open water depressions, but an increase in small streams and drainageways. The notable lakes are North Golden Lake, Golden Lake, Golden Rush Lake, and Lake Tobiason. The Goose River and associated branches would be the dominant surface water resource within these macro-corridors.

5.3.2 Wetland

The macro-corridors span the Prairie Pothole Region from the Missouri River in the west to the Sheyenne River in the east. The Prairie Pothole Region is characterized by many pockmarked, freshwater, depressional wetlands. Some wetlands are temporary and others are permanent. Snowmelt and spring rains are the main hydrology sources. 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 as such are regulated by USACE.

Wetland locations were obtained from the National Wetland Inventory (NWI) (Figures 9.1 to 9.4). Wetlands are located throughout the macro-corridors; the various types are shown in Table 5-3. Wetland impacts may be avoided or minimized through the careful routing of the transmission line. If construction activities impact wetlands regulated by USACE, Minnkota would notify USACE and initiate the permit process.

Table 5-3. Wetland Types within the Macro-Corridors by Section

Macro-Corridor Section	Wetland Type	Acres	Percent of Wetland Type within Section	Percent Area within Section
Center to Mercer	Freshwater Emergent	7,520	68	4
	Freshwater Forested/Shrub	172	2	0.1
	Open Water	1,194	11	1
	Riverine	2,112	19	1
Total NWI Area		**10,998**	**100**	**6.1**
Mercer to Sheyenne River	Freshwater Emergent	74,227	92	8
	Freshwater Forested/Shrub	318	0	0
	Open Water	5,260	7	1
	Riverine	1,198	1	1
Total NWI Area		**81,003**	**100**	**9**
Sheyenne River to Prairie Substation	Freshwater Emergent	14,763	84	2.7
	Freshwater Forested/Shrub	502	3	0.1
	Open Water	2,267	13	0.4
	Riverine	40	0	0.01
Total NWI Area		**17,572**	**100**	**3.2**

5.3.3 Native Prairie

Native prairie once covered almost a quarter of the lower 48 states, including nearly all of North Dakota, and today is considered one of the most endangered habitats in the world. In the late 1800s, the landscape changed due to a number of factors, including increased settlement, agriculture, and grazing, along with the introduction of invasive species and altered hydrology, which reduced and fragmented native prairie. In North Dakota, the remaining native prairie is found in the arid, western part of the state.

With the decline of prairie habitat, prairie species continue to decline and some are becoming rare. Native prairies provide genetic diversity with a variety of plants, animals, and insects. Prairies play a critical role in soil and water conservation and also provide recreational opportunities including hunting, hiking, and bird watching.

In North Dakota today, native prairies are mostly found in preserved federal or state lands, railroad ROW, ditches, old cemeteries, and hillside pastures in the west and central portions of the state. According to Table 5-1, GAP Land Cover Data by Macro-Corridor Section, the Center to Mercer Section is nearly 25 percent prairie compared to the 2 percent of prairie cover in the Sheyenne River to Prairie Substation Section. Prairie impacts may be avoided or minimized through careful routing of the transmission line. If native prairies are present, they would be avoided, when feasible.

5.3.4 Sensitive Natural Resources

Sensitive natural resources include those plant and animal species that have populations considered at risk. Federal and state agencies have identified candidate species and species of concern.

Since areas within the macro-corridors may have been surveyed to varying degrees of completeness, the designated species represented by this data best serves as a snapshot of the potential presence of sensitive species, and does not necessarily represent a comprehensive list of all sensitive species located within the macro-corridors. Hence, when assessing species records it may be important to consider the similarity of habitats when interpreting the available data.

In general, most sensitive natural resources are associated with high quality rare or unique habitats and landscape features. In the macro-corridors, most sensitive species observations and communities occur along the Missouri and Sheyenne rivers (Figures 10.1 to 10.4). Other species location observances not associated with a major river would be associated with unique habitat, like remnant native prairie, riparian woodlands, wetland complexes, or rock outcroppings.

Table 5-4 provides the number of sensitive species or unique communities within the macro-corridors with State Special Concern Species and Impaired or Vulnerable listed Communities, and lists the state's resources with a heritage rank of S1, S2, or S3, as outlined below:

- S1 Critically Imperiled – Critically imperiled in the state because of extreme rarity or because of some factor of its biology making it especially vulnerable to extirpation from the state. Typically five or fewer occurrences or very few remaining individuals (<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 six 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.]

Table 5-4. Sensitive Natural Resources within the Macro-Corridors by Section

Macro-Corridor Section	Category	Observance Count
Center to Mercer	Federal Threatened or Endangered	15
	State Special Concern Species (S1), Federal Candidate Species, and Federal Delisted Species	7
	State Impaired (S2) or Vulnerable Terrestrial Community (S3)	35
	Lek	0
	Raptor Nest and Rookery	1
Mercer to Sheyenne River	State Special Concern Species (S1), Federal Candidate Species, and Federal Delisted Species	11
	State Impaired (S2) or Vulnerable Terrestrial Community(S3)	26
	Lek	28
	Raptor Nest and Rookery	6
Sheyenne River to Prairie Substation	State Special Concern Species (S1), Federal Candidate Species, and Federal Delisted Species	6
	Lek	1
	Raptor Nest and Rookery	1

5.3.4.1 Federally Designated Species

The Endangered Species Act (ESA) of 1973, as amended (Pub. L. 93-205), 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.

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. The following federally designated species may occur within the macro-corridors:

Endangered Species

- Interior least tern (*Sterna antillarum*): Nests along midstream sandbars of the Missouri and Yellowstone rivers.
- Whooping crane (*Grus Americana*): 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).
- Pallid sturgeon (*Scaphirhynchus albus*): Known only from the Missouri and Yellowstone rivers. No reproduction has been documented in 15 years.
- Gray wolf (*Canis lupus*): Occasional visitor in North Dakota. Most frequently observed in the Turtle Mountains area of northern North Dakota.

- Black-footed ferret (*Mustela nigripes*): Exclusively associated with prairie dog towns. No records of occurrence in recent years, although there is potential for reintroduction in the future.

Threatened Species

Piping plover (*Charadrius melodus*): Nests on midstream sandbars of the Missouri and Yellowstone rivers and along shorelines of saline wetlands.

Candidate Species

Dakota skipper (*Hesperia dacotae*): 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.

Designated Critical Habitat

Piping plover (*Charadrius melodus*): 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.

Delisted Species

The bald eagle (*Haliaeetus leucocephalus*): Has been documented as nesting and using habitat along the Missouri River within the macro-corridors. 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.

5.3.4.2 State Species of Concern

State sensitive natural resource data was obtained from the NDPRD, who provided Natural Heritage Inventory data, and the NDGFD, who provided location data on raptor nests (including the bald eagle), colonial waterbird rookeries, sharptail grouse and prairie chicken leks, and non-game reptile occurrences.

NDPRD maintains the state's Natural Heritage Inventory. According to the NDPRD, "The main purpose of the Inventory is to identify North Dakota's natural features and establish priorities for their protection. Information from the Heritage Inventory has been used to identify high quality natural areas and potential nature preserves."

According to their Website, the NDGFD maintains: "North Dakota's Wildlife Action Plan or Comprehensive Wildlife Conservation Strategy (CWCS) that focuses on 100 species who are considered Species of Conservation Priority. Information relating to the distribution, abundance, habitat requirements, threats, management goals, and monitoring techniques for each of these species is included in our CWCS."

The full CWCS list can be obtained from <http://gf.nd.gov/conservation/levels-list.html>. Appendix C provides a list of state species of concern that may be present within the macro-corridors.

5.4 Cultural and Historic Resources

Historic districts and historic sites that are registered with the National Park Service's National Register of Historic Places (NRHP) include landmarks, districts, archeological sites, and monuments. Data on cultural and historic resources in the macro-corridors were obtained from an online search of the NRHP in June 2009. Avoidance of the listed resources would be preferred during route development. However, during the scoping process, if a new corridor is developed that contains large historic districts or sites, appropriate steps would be taken to address concerns regarding potential effects on historic properties and values.

According to the National Park Service's Website, <http://nrhp.focus.nps.gov>, there are two historic districts and 17 historic properties located within the macro-corridors (Table 5-5 and Figure 11). The two historic districts include the Ellingson Farm District and the Cross Ranch Archeological District, which both contain very high concentrations of recorded Native American Indian heritage sites. The Cross Ranch Archeological District is located along the Missouri River within the Center to Mercer Section. The Ellington Farm District is located within the Sheyenne River to Prairie Substation Section, north and west of the town of Hillsboro. The farm dates from 1882 and consists of a number of structures including a residence and outbuildings.

Historic properties consist of a variety of properties including Native American archeological sites, bridges, homes, courthouses, farms, cemeteries, government buildings, and commercial buildings. One property is located within the Center to Mercer Section (McLean County); 11 properties are located within the Mercer to Sheyenne River Section (six properties are located in Foster County, three in Griggs County, one in Sheridan County, one in Foster County); and five properties are located within Sheyenne River to Prairie Substation Section (two in Steele County and three in Traill County) (Table 5-5 and Figure 11). At the request of the NPS, some exact site locations are not shown on the figure.

Given that recorded prehistoric and historic resources occur within the macro-corridors, it can be assumed that there are also additional unrecorded properties and sites. Listed properties are most commonly found within communities that have had a formal inventory of structures. Most of the land within the macro-corridors has not been surveyed for archeological or historic properties. It is expected that information coming through tribal consultation (Section 106) and more extensive file and literature searches would add to the number of cultural resources within the broad contexts of the macro-corridors and would influence final route design.

Table 5-5. NRHP Sites within the Macro-Corridors

NRHP Site Name	Macro-Corridor Section	County
Cross Ranch Archeological District	Center to Mercer	Oliver
Zion Lutheran Cemetery, Wrought-Iron Cross Site	Center to Mercer	McLean
Foster County Courthouse	Mercer to Sheyenne River	Foster
Grace City Bridge	Mercer to Sheyenne River	Foster
Griggs County Courthouse	Mercer to Sheyenne River	Griggs
Lincoln Building	Mercer to Sheyenne River	Foster
Marriage, Sylvanus, Octagonal Barn	Mercer to Sheyenne River	Eddy
McHenry Railroad Loop	Mercer to Sheyenne River	Foster
Northern Lights Masonic Lodge	Mercer to Sheyenne River	Griggs
Putnam, Thomas Nichols, House	Mercer to Sheyenne River	Foster
Romness Bridge	Mercer to Sheyenne River	Griggs
Sheridan County Courthouse	Mercer to Sheyenne River	Sheridan
US Post Office--Carrington	Mercer to Sheyenne River	Foster
Beaver Creek Bridge	Sheyenne River to Prairie Substation	Steele
Eielson, Carl Ben, House	Sheyenne River to Prairie Substation	Traill
Ellingson Farm District	Sheyenne River to Prairie Substation	Traill
Ness, Andres O., House	Sheyenne River to Prairie Substation	Traill
Norway Bridge	Sheyenne River to Prairie Substation	Traill
Steele County Courthouse	Sheyenne River to Prairie Substation	Steele

5.5 Socioeconomic Resources

The macro-corridors include portions of 12 counties in North Dakota and several farm-based communities. The largest cities wholly or partially located within the macro-corridors include Grand Forks (pop. 49,321), Carrington (pop. 2,268), Cooperstown (pop. 1,053), and Northwood (pop. 959). According to the US Census Bureau, the racial characteristics within the macro-corridors are primarily white, with small American Indian populations. The Spirit Lake Nation lands are located north of McHenry, North Dakota, with no macro-corridors through them. Communities were not avoided while developing the macro-corridors, however, the corridors are wide enough to avoid impacts within them when the final Project route is determined. There is limited potential to impact minority or disadvantaged populations with the construction and operation of a new transmission line within the identified macro-corridors.

5.6 Constraints Summary

Specific constraint areas include those where transmission line development is prohibited because of federal, state, or local regulations, or where development is undesirable because of conflicts with existing land use/development or land features. These areas are described in detail in Section 5.0. The following resources would be avoided where possible in the routing phase. Where the following resources cannot be avoided, impact minimization and/or mitigation would be necessary:

- Recreational resource areas – State park, NWR, WPAs, WMAs
- Conservation easement areas
- Irrigated lands – center pivot irrigation
- Clusters of homes/populated areas
- Airports

At this preliminary level of review, not all resources have been identified to the extent required for final route selection. Additional agency and stakeholder input, field surveys, and analysis will be conducted as part of the federal and state environmental review processes, which will result in an informed decision regarding the final transmission line route.

6.0 Conclusion

This document was prepared in accordance with RUS Bulletin 1794A-603 and supplemented in response to agency and stakeholder requests. Specifically, this document has:

- Defined endpoints for Minnkota's proposed 345 kV transmission line as the Center 345 kV and Prairie substations
- Identified macro-corridors that strive to minimize environmental, cultural resource, and engineering impacts and that could contain a number of potentially viable route alternatives
- Evaluated the natural and developed environments of the macro-corridors
- Considered the use of existing ROW for transmission routes throughout the macro-corridors

The final macro-corridors are shown in Figure 1, color-coded by section. A more detailed analysis of the macro-corridors and the possible identification of other options will be considered during the NEPA process, with RUS as the lead federal agency. The NEPA EA scoping process would define the scope of the EA for this Project. The scope may include a number of feasible route options identified by interested parties as part of the scoping process. The North Dakota PSC route permitting process will consider the route that is identified during the NEPA scoping process. These federal and state processes would include additional opportunities for public and agency input as well as detailed analysis of environmental conditions. Selection of a final route would be made by governing agencies at the appropriate time following the planning and environmental review process.

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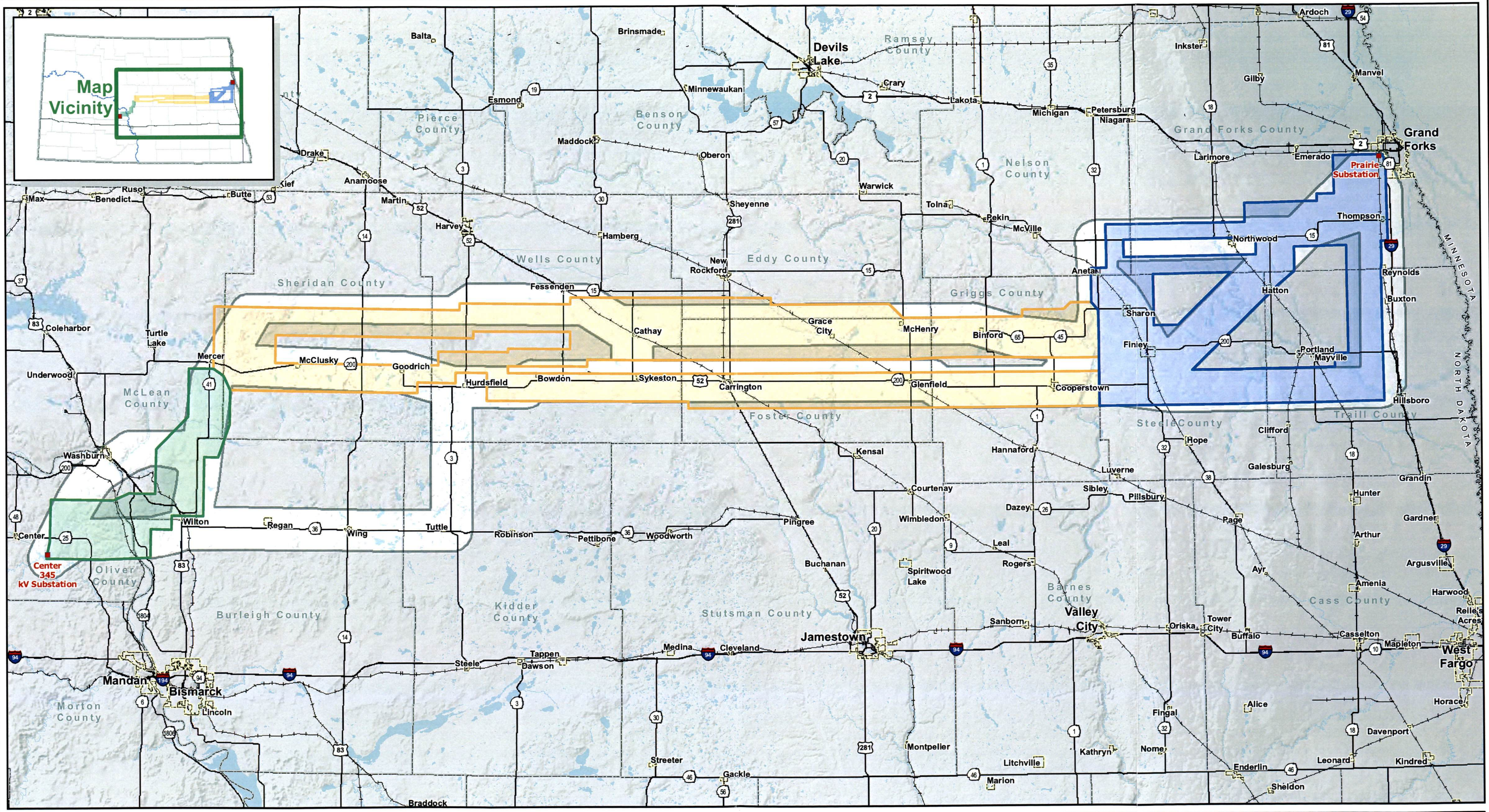
Figures



Center to Grand Forks Project

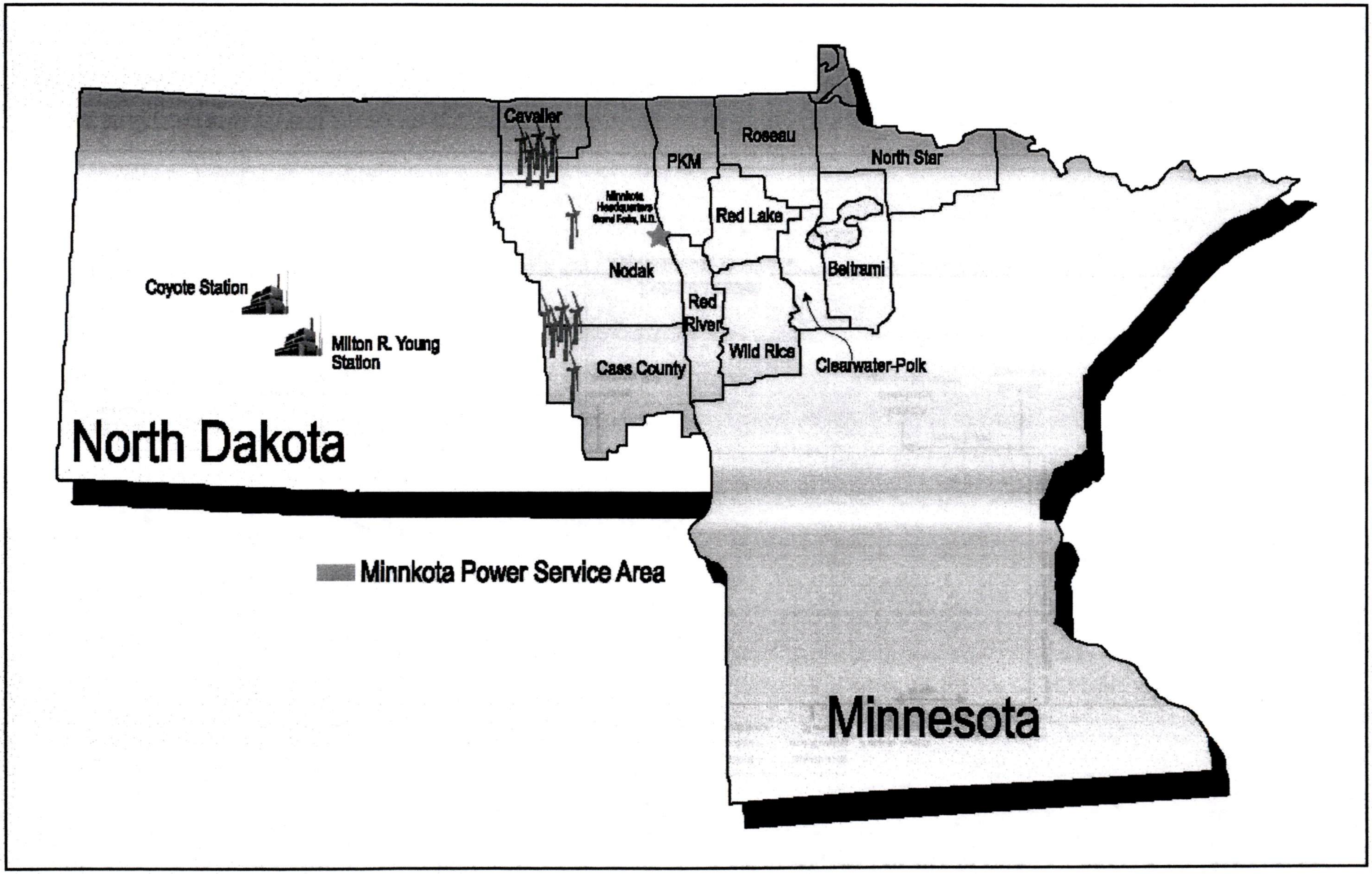
Minnkota Power Cooperative, Inc.

0 10 20 Miles

- Preliminary Study Corridors
- **Macro-Corridor Sections**
  - Center to Mercer
  - Mercer to Sheyenne River
  - Sheyenne River to Prairie Substation
- Project Substation
- Highway
- In-Use Railroad
- Incorporated Area
- County Boundary

Figure 1
Project Location and Macro-Corridors
Center to Grand Forks Project
Macro-Corridor Study

Data Sources: NDDOT, NDSWC, USBC.



Center to Grand Forks Project

Minnkota Power Cooperative, Inc.

0 50 100 Miles

N

Figure 2
Minnkota Power Service Area
Center to Grand Forks Project
Macro-Corridor Study

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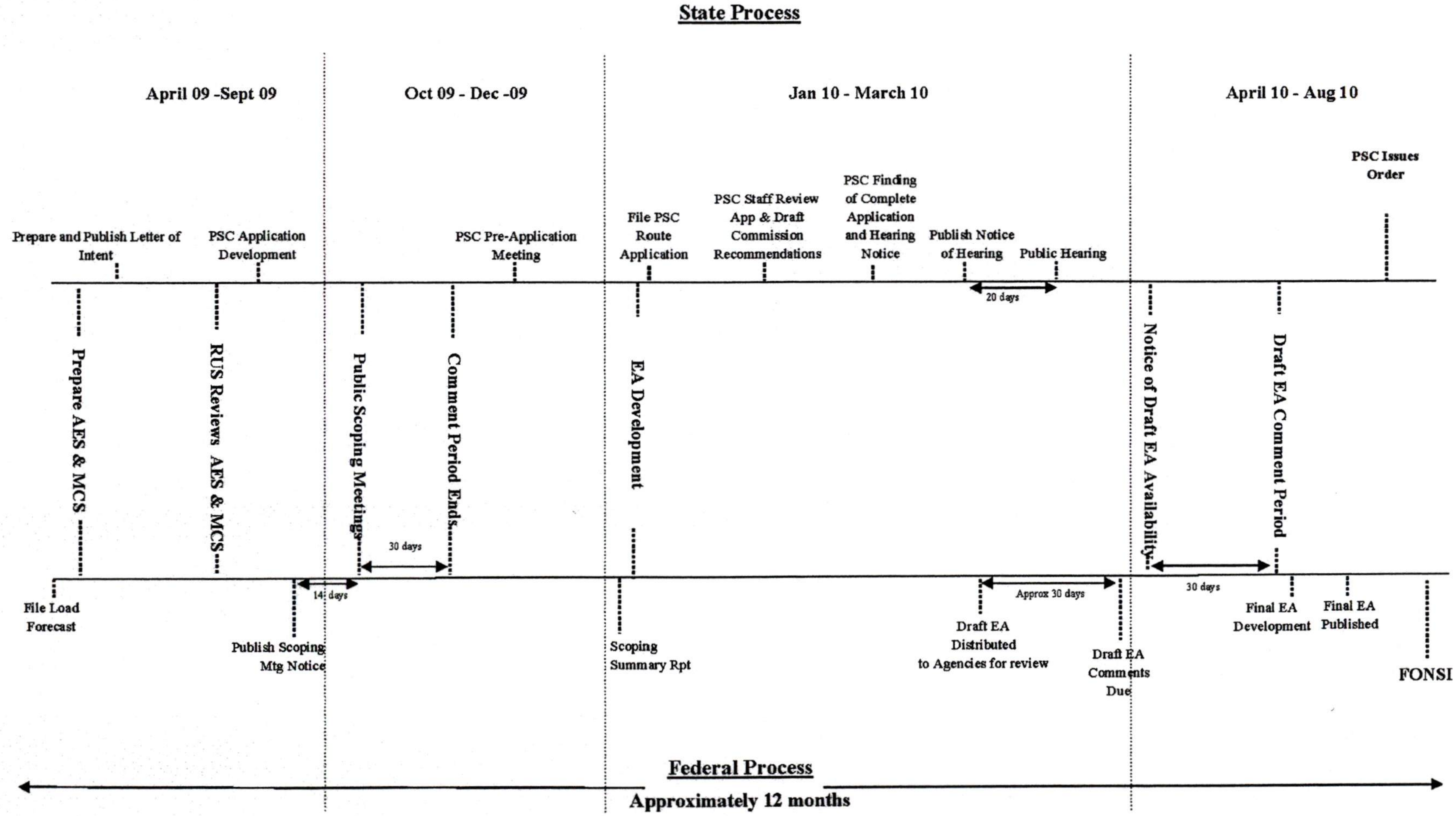
Data Source: MPC.

State and Federal
Proposed Timeline for Environmental Assessment with Scoping



Version 4/8/2009

Center to Grand Forks Project

Minnkota Power Cooperative, Inc.

Figure 3
RUS NEPA Process
Center to Grand Forks Project
Macro-Corridor Study

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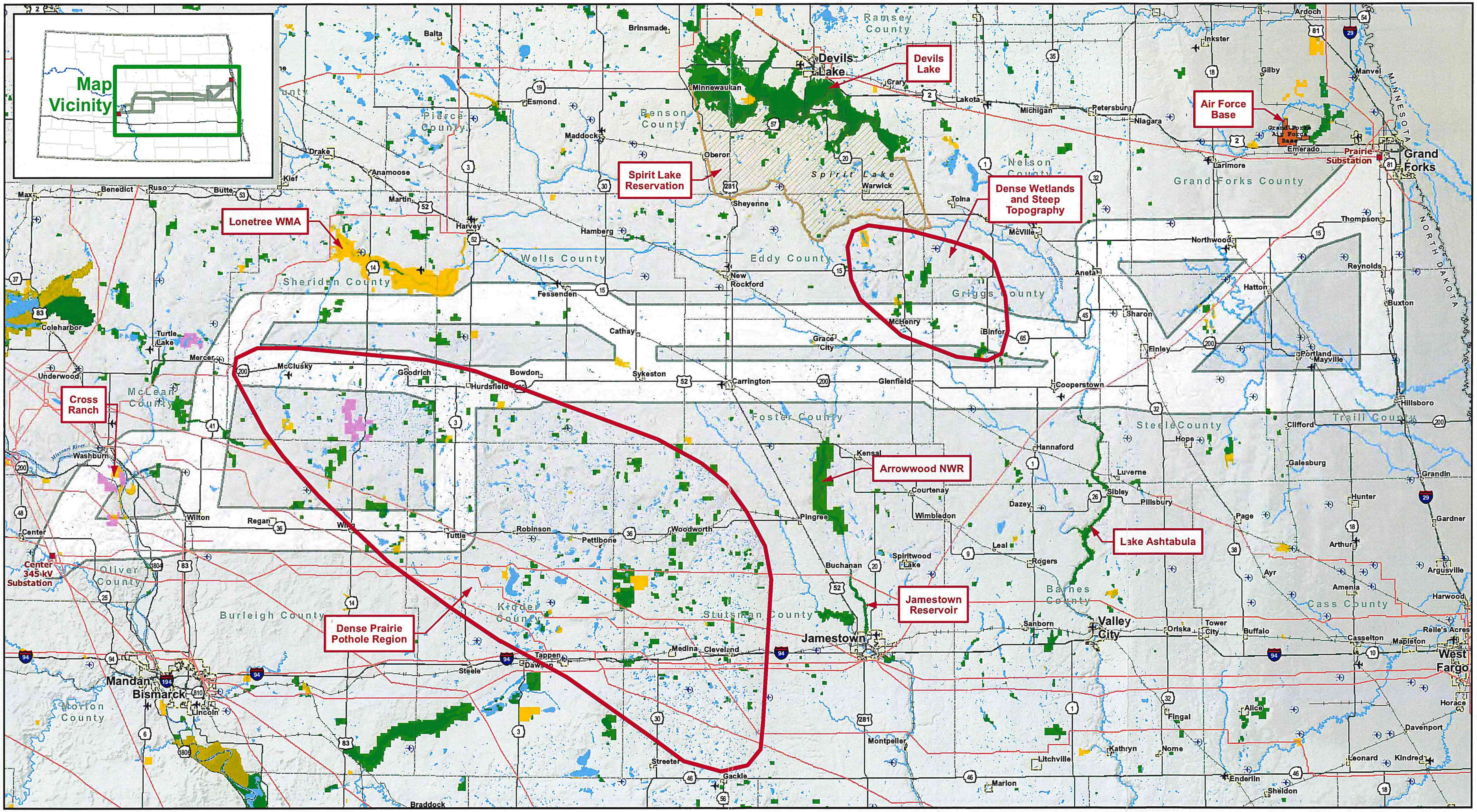


Center to Grand Forks Project

Minnkota Power Cooperative, Inc.

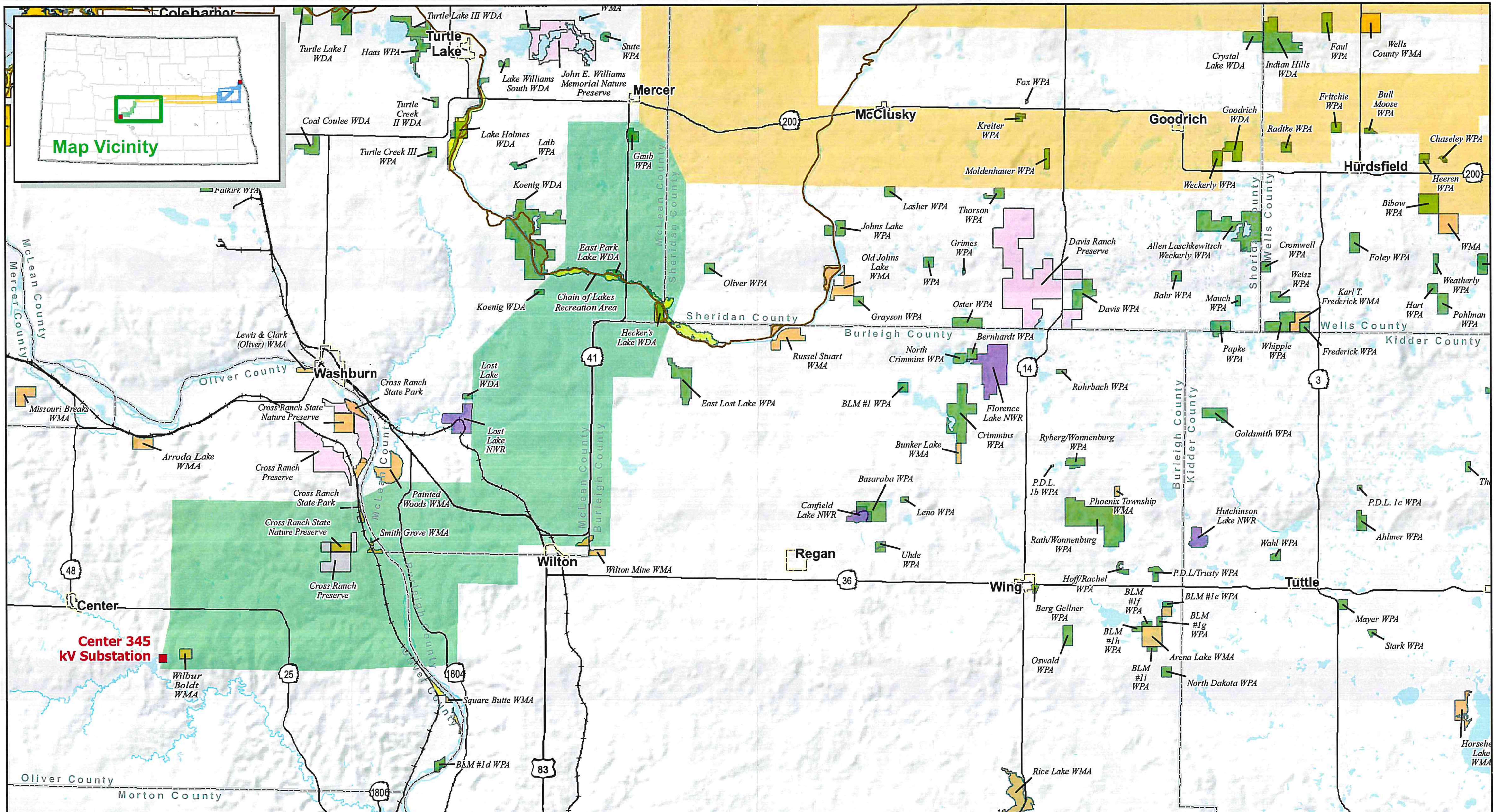
0 10 20 Miles

- Preliminary Study Corridors
- Project Substation
- **Existing Transmission Lines**
- 230 kV or more
- Federal Protected Lands
- State Protected Lands
- The Nature Conservancy Lands
- Tribal Lands
- Public Airport
- Private Airport
- Highway
- In-Use Railroad
- Incorporated Area
- County Boundary
- River, Stream or Canal
- Lake or Pond

Red map comments are corridor constraints.

Figure 4
Preliminary Study Corridors
Center to Grand Forks Project
Macro-Corridor Study

Data Sources: FAA, GRE, NDDOT, NDGFD, NDSWC, TNC, USACOE, USFWS, USBC.



Center to Grand Forks Project

Minnkota Power COOPERATIVE, INC.

0 4 8 Miles

Macro-Corridor Sections

- Center to Mercer
- Mercer to Sheyenne River
- Sheyenne River to Prairie Substation
- Project Substation

- Highway
- In-Use Railroad
- Incorporated Area
- County Boundary

- North Country National Scenic Trail
- State Park, Recreation Area, or WMA
- USFWS WPA or WDA
- USFWS NWR

- USBOR or USACE Land
- TNC Preserve

Figure 5.1
Managed Resource Lands
Center to Grand Forks Project
Macro-Corridor Study

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Data Sources: NDDOT, NDGFD, NDSWC, NPS, TNC, USACOE, USFWS, USBC.

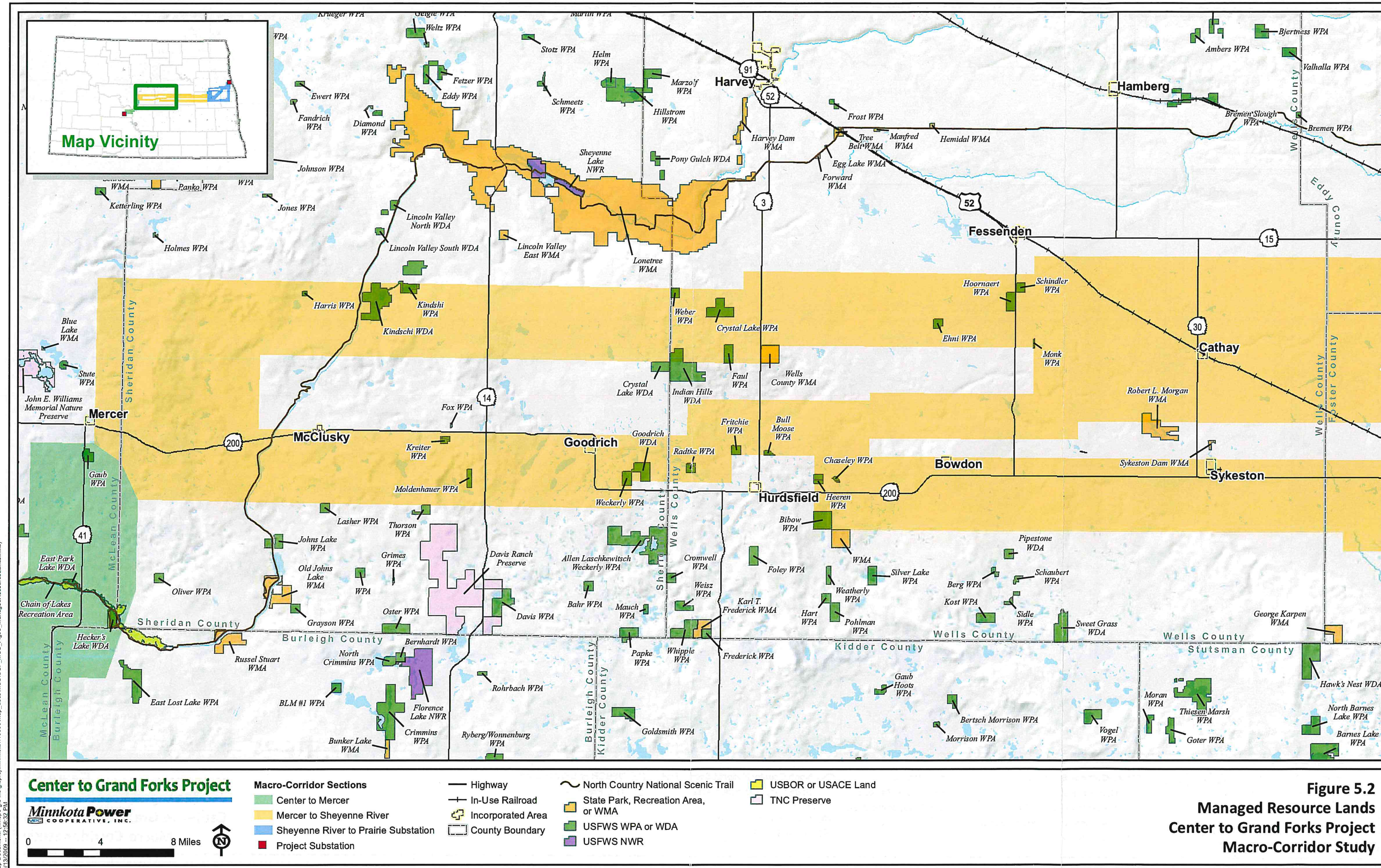

Figure 5.2
Managed Resource Lands
Center to Grand Forks Project
Macro-Corridor Study

Data Sources: NDDOT, NDGFD, NDSWC, NPS, TNC, USACOE, USFWS, USBC.

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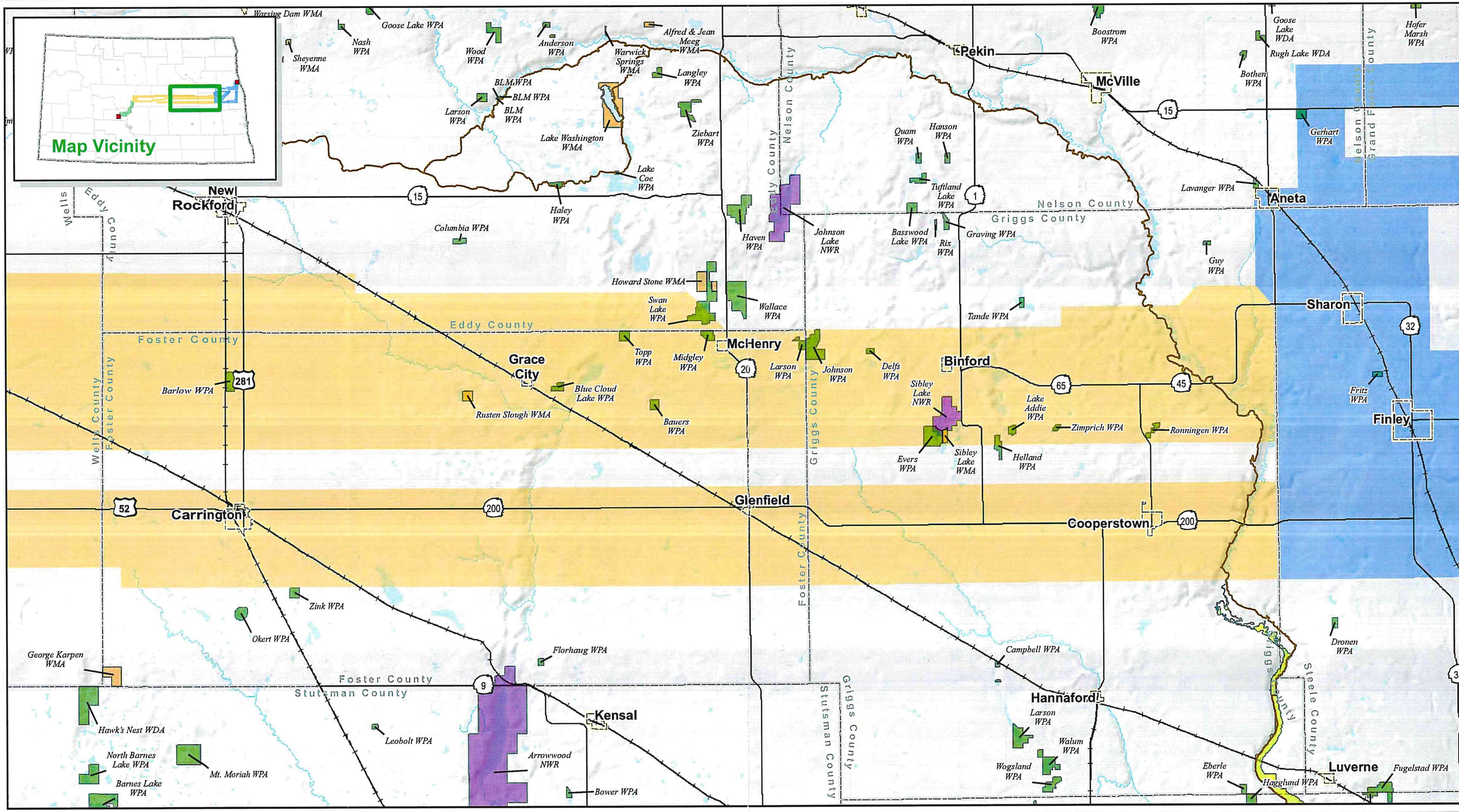

Center to Grand Forks Project

Minnkota Power COOPERATIVE, INC.

0 4 8 Miles

Macro-Corridor Sections

- Center to Mercer
- Mercer to Sheyenne River
- Sheyenne River to Prairie Substation
- Project Substation

- Highway
- In-Use Railroad
- Incorporated Area
- County Boundary

- North Country National Scenic Trail
- State Park, Recreation Area, or WMA
- USFWS WPA or WDA
- USFWS NWR

- USBOR or USACE Land
- TNC Preserve

Figure 5.3
Managed Resource Lands
Center to Grand Forks Project
Macro-Corridor Study

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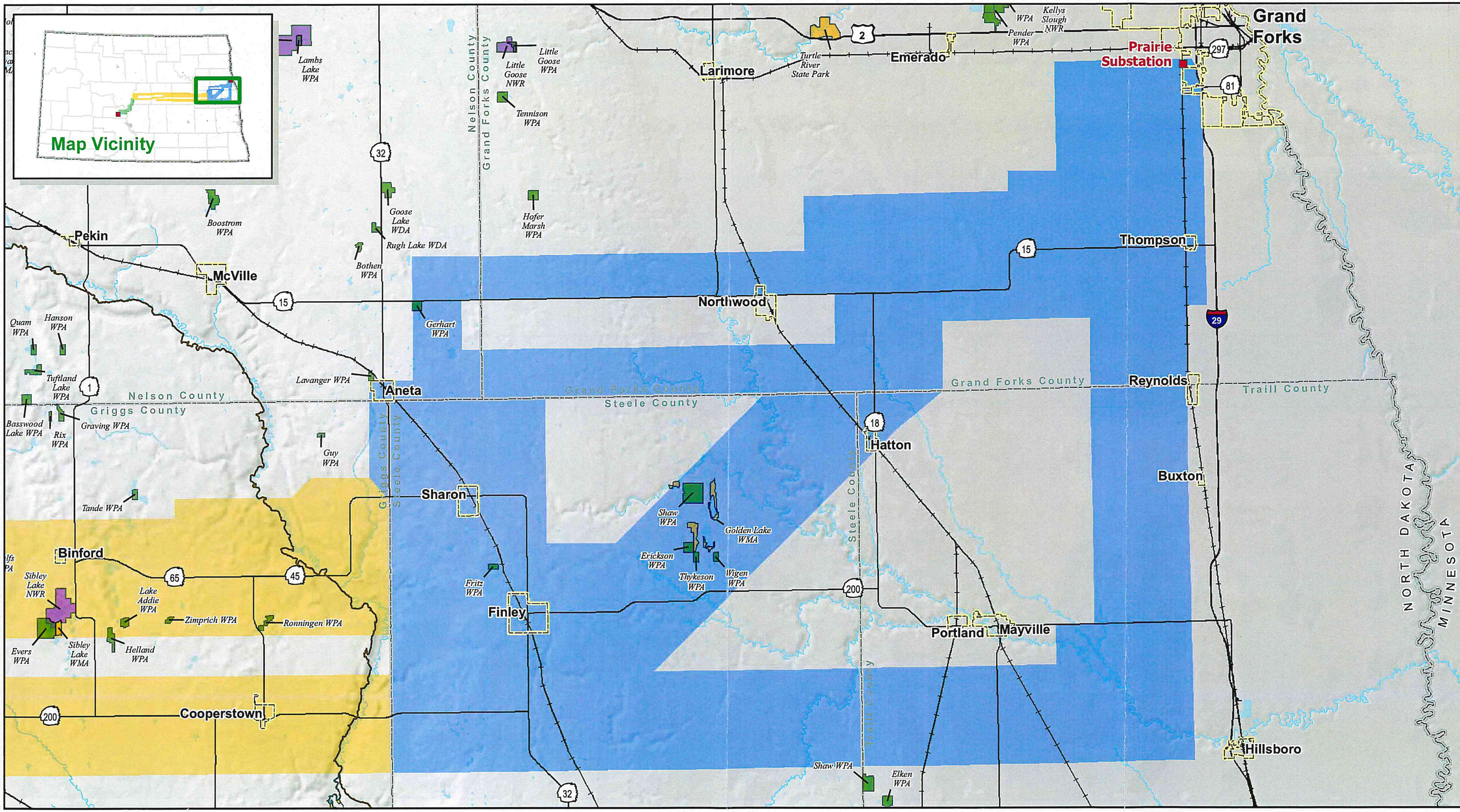

Center to Grand Forks Project

Minnkota Power Cooperative, Inc.

0 4 8 Miles

Macro-Corridor Sections

- Center to Mercer
- Mercer to Sheyenne River
- Sheyenne River to Prairie Substation
- Project Substation
- Highway
- In-Use Railroad
- Incorporated Area
- County Boundary
- North Country National Scenic Trail
- State Park, Recreation Area, or WMA
- USFWS WPA or WDA
- USFWS NWR
- USBOR or USACE Land
- TNC Preserve

Figure 5.4
Managed Resource Lands
Center to Grand Forks Project
Macro-Corridor Study

Map Document: (\\Mspe-gis-file\gisprojMinnkota\110900\map_docs\MCS\CGF_MCS_Fig05_ManagedResourceLands.mxd)
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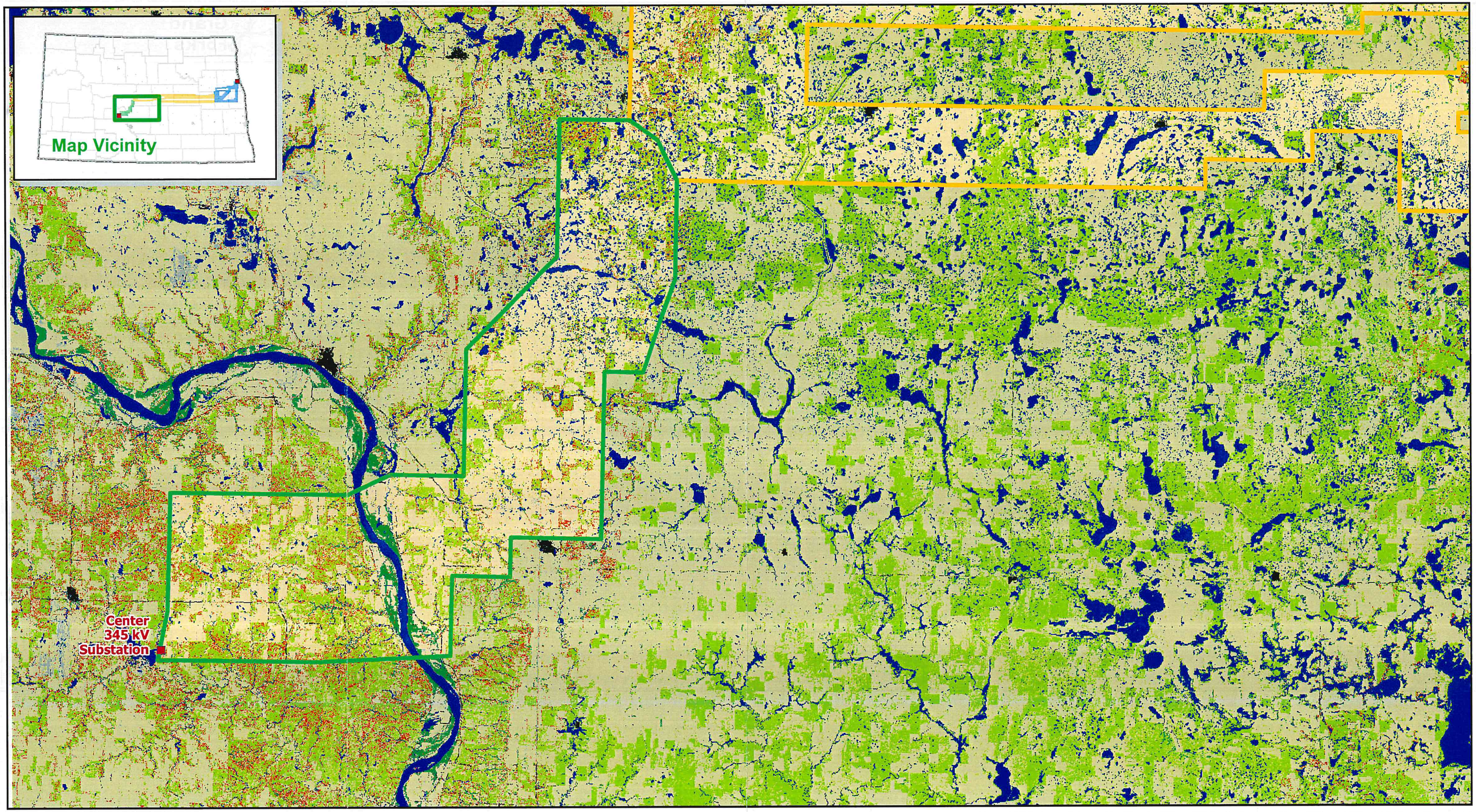
Data Sources: NDDOT, NDGFD, NDSWC, NPS, TNC, USACOE, USFWS, USBC.



Center to Grand Forks Project

Minnkota Power COOPERATIVE, INC.

0 4 8 Miles

N

Macro-Corridor Sections

- Center to Mercer
- Mercer to Sheyenne River
- Sheyenne River to Prairie Substation
- Project Substation

2004 GAP Land Cover

- Barren/Sparse Vegetation
- Agriculture
- Developed
- Prairie
- Shrubland
- Wetland
- Woodland

Figure 6.1
Land Cover
Center to Grand Forks Project
Macro-Corridor Study

Map Document: (\\Mspe-gis-file\gisproj\Minnkota\110900\map_docs\MCS\CGF_MCS_Fig06_LandCover.mxd)
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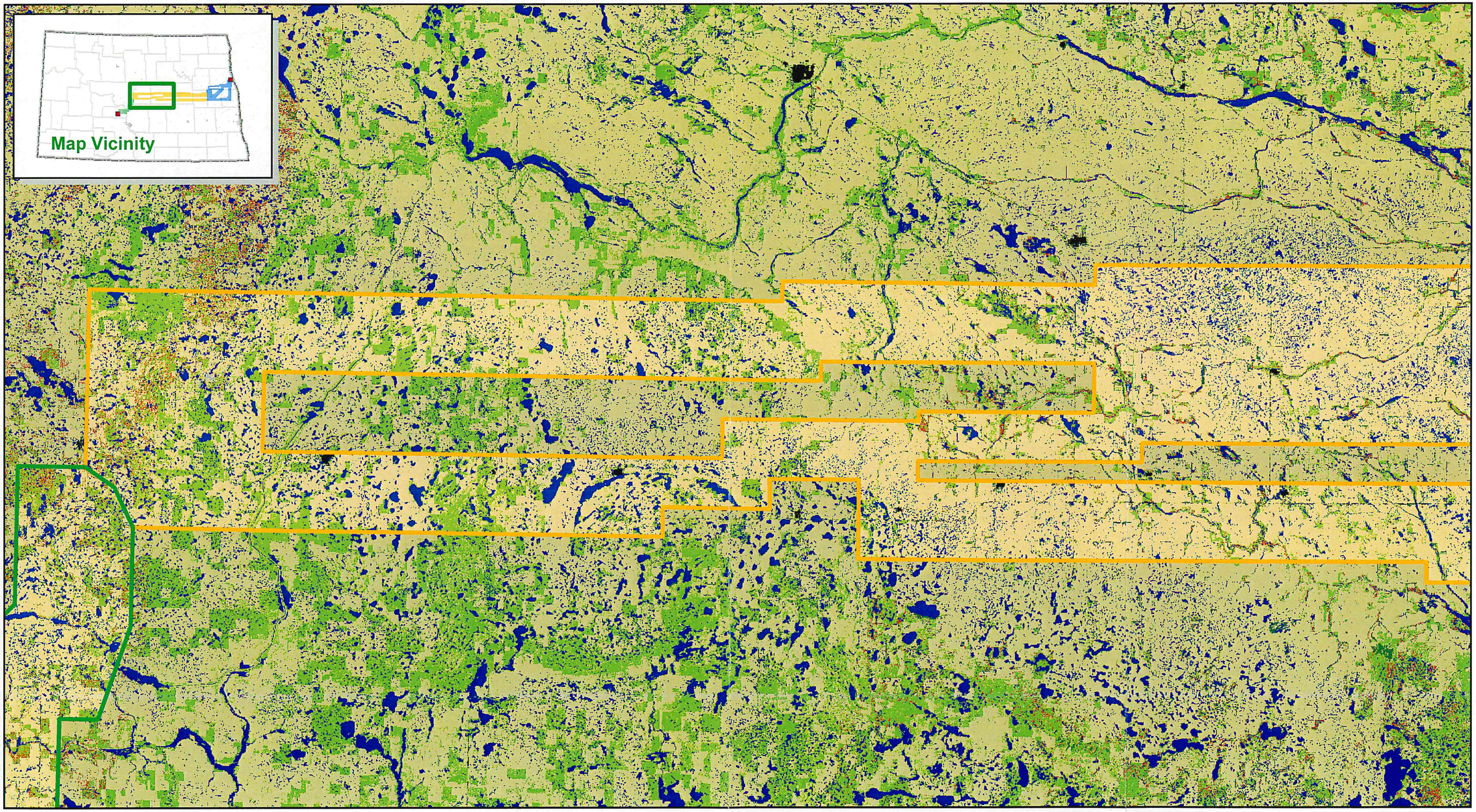
Data Sources: NDDOT, USBC, USGS.



Center to Grand Forks Project

Minnkota Power COOPERATIVE, INC.

0 4 8 Miles

Macro-Corridor Sections
- Center to Mercer
- Mercer to Sheyenne River
- Sheyenne River to Prairie Substation
- Project Substation

2004 GAP Land Cover
- Barren/Sparse Vegetation
- Agriculture
- Developed
- Prairie
- Shrubland
- Wetland
- Woodland

Figure 6.2
Land Cover
Center to Grand Forks Project
Macro-Corridor Study

Map Document: (\\Mspe-gis-file\gisproj\Minnkota\110900\map_docs\MCS\CGF_MCS_Fig06_LandCover.mxd)
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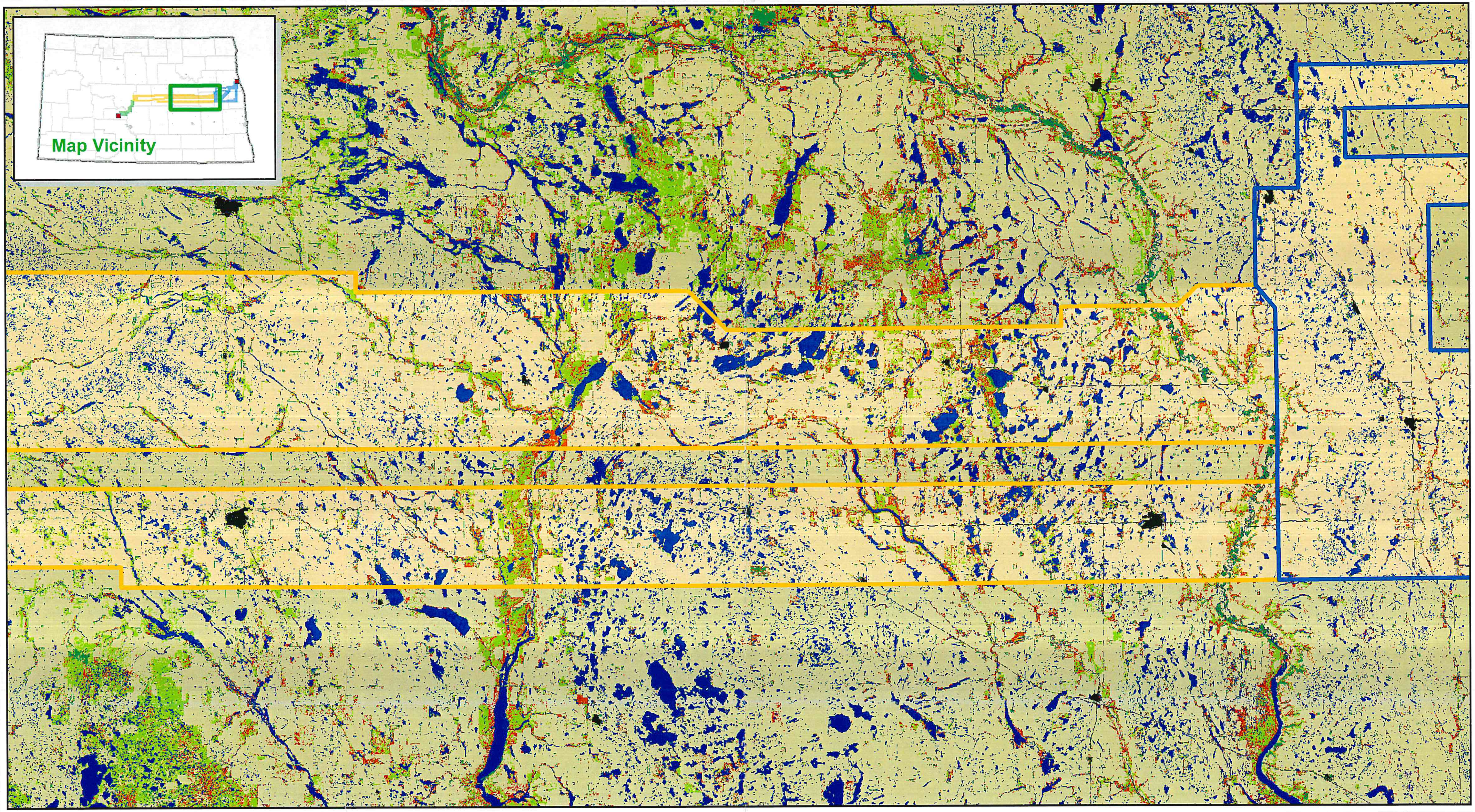
Data Sources: NDDOT, USBC, USGS.



Center to Grand Forks Project

Minnkota Power Cooperative, Inc.

0 4 8 Miles

N

Macro-Corridor Sections

- Center to Mercer
- Mercer to Sheyenne River
- Sheyenne River to Prairie Substation
- Project Substation

2004 GAP Land Cover

- Barren/Sparse Vegetation
- Agriculture
- Developed
- Prairie
- Shrubland
- Wetland
- Woodland

Figure 6.3
Land Cover
Center to Grand Forks Project
Macro-Corridor Study

Map Document: (\\Mspe-gis-file\gisproj\Minnkota\110900\map_docs\MCS\CGF_MCS_Fig06_LandCover.mxd)
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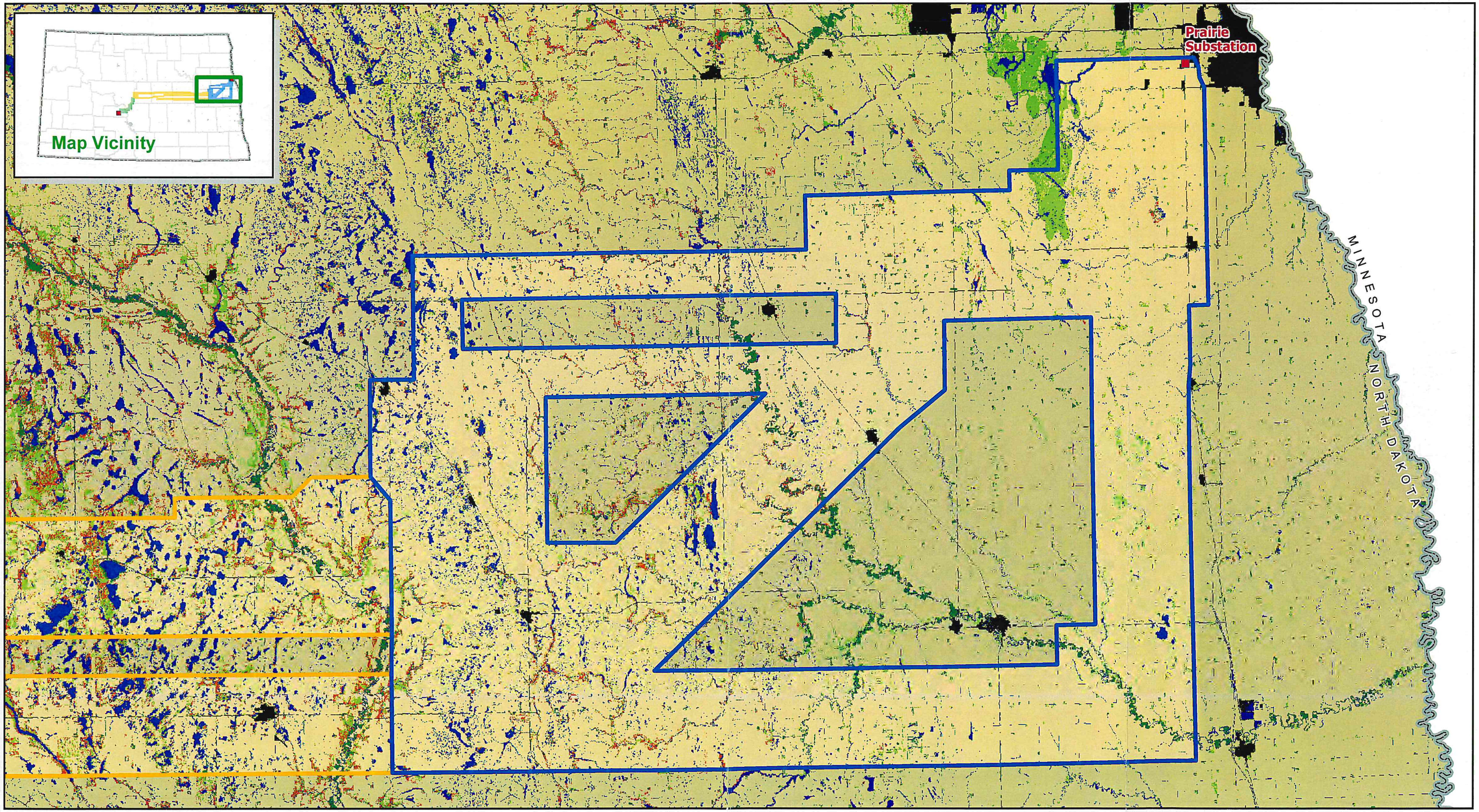
Data Sources: NDDOT, USBC, USGS.



Center to Grand Forks Project

Minnkota Power Cooperative, Inc.

0 4 8 Miles

Macro-Corridor Sections

- Center to Mercer
- Mercer to Sheyenne River
- Sheyenne River to Prairie Substation
- Project Substation

2004 GAP Land Cover

- Barren/Sparse Vegetation
- Agriculture
- Developed
- Prairie
- Shrubland
- Wetland
- Woodland

Figure 6.4
Land Cover
Center to Grand Forks Project
Macro-Corridor Study

Data Sources: NDDOT, USBC, USGS.

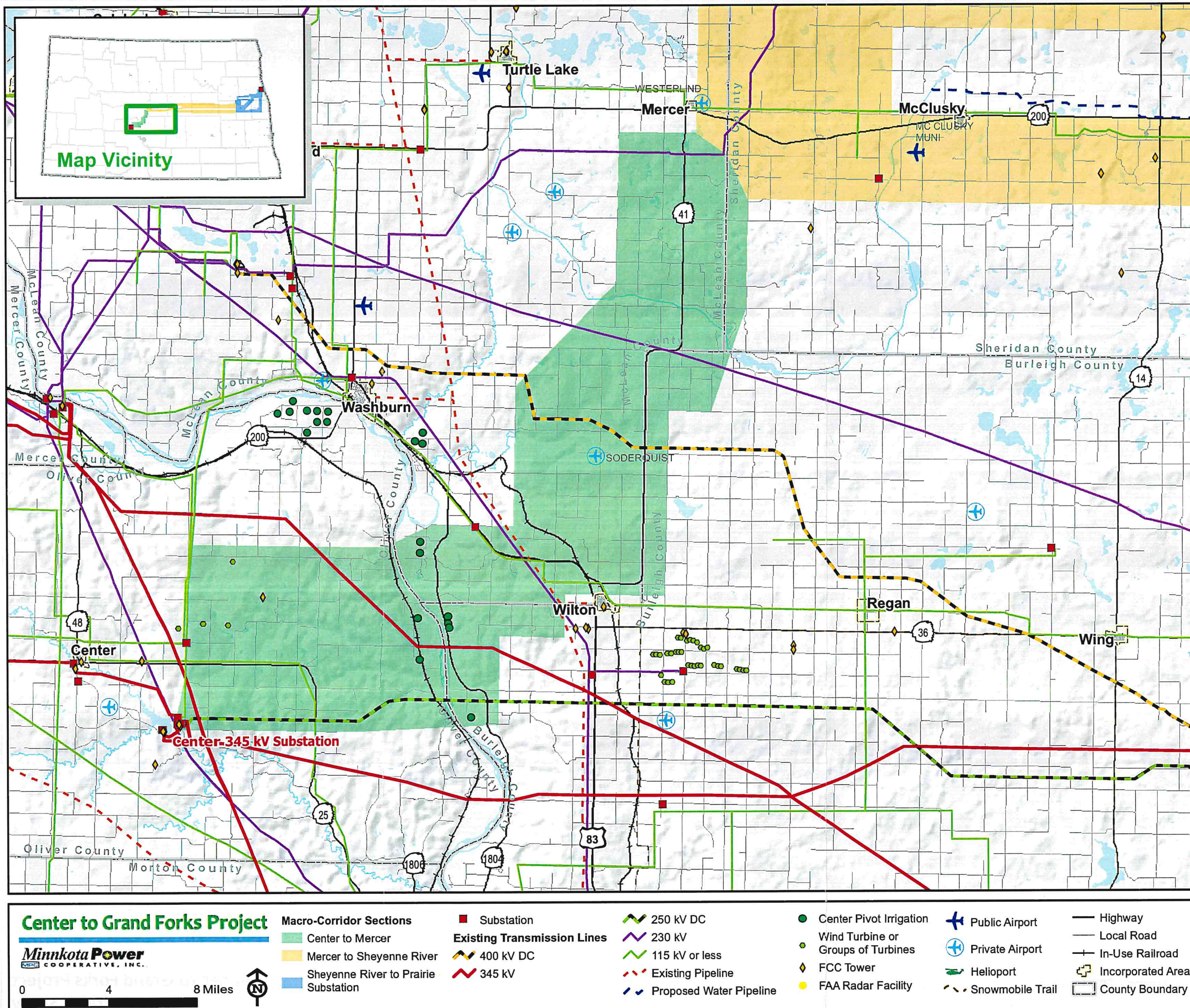


Figure 7.1
Existing Infrastructure
Center to Grand Forks Project
Macro-Corridor Study

Map Document: (\\Mspe-gis-file\gisproj\Minnkota\110900\map_docs\MCS\CGF_MCS_Fig07_ExistingInfrastructure.mxd)
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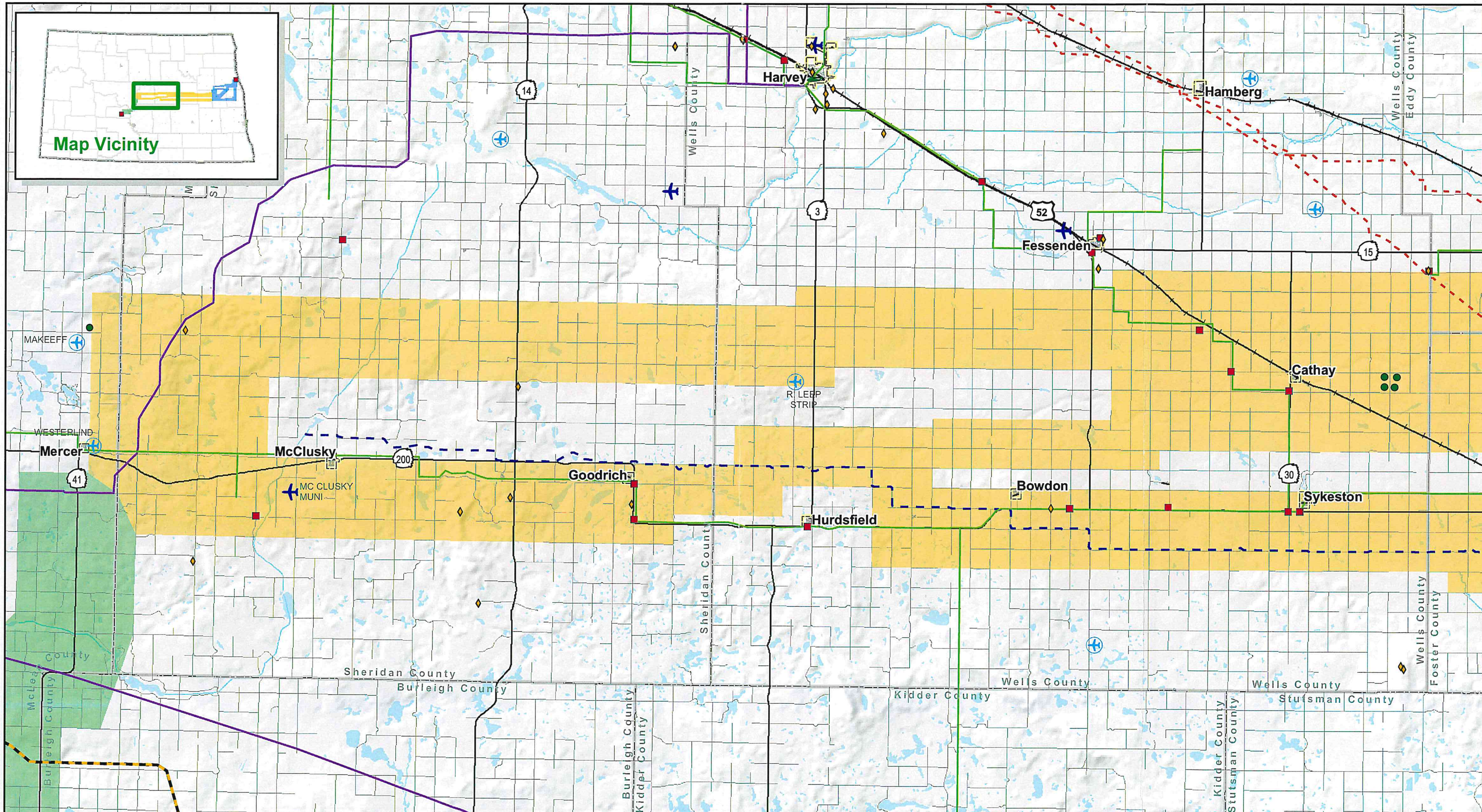
Data Sources: FAA, FCC, GRE, HDR, KLJ, NDDOT, NDPRD, NDSWC, USBC.



Center to Grand Forks Project

Minnkota Power Cooperative, Inc.

0 4 8 Miles

Macro-Corridor Sections
- Center to Mercer
- Mercer to Sheyenne River
- Sheyenne River to Prairie Substation

- Substation

Existing Transmission Lines
- 400 kV DC
- 345 kV
- 250 kV DC
- 230 kV
- 115 kV or less
- Existing Pipeline
- Proposed Water Pipeline

- Center Pivot Irrigation
- Wind Turbine or Groups of Turbines
- FCC Tower
- FAA Radar Facility
- Public Airport
- Private Airport
- Helioport
- Snowmobile Trail
- Highway
- Local Road
- In-Use Railroad
- Incorporated Area
- County Boundary

Figure 7.2
Existing Infrastructure
Center to Grand Forks Project
Macro-Corridor Study

Map Document: (\\Mspe-gis-file\gisproj\Minnkota\110900\map_docs\MCS\CGF_MCS_Fig07_ExistingInfrastructure.mxd) 10/13/2009 -- 1:41:07 PM

Data Sources: FAA, FCC, GRE, HDR, KLJ, NDD DPRD, NDSWC, USBC.

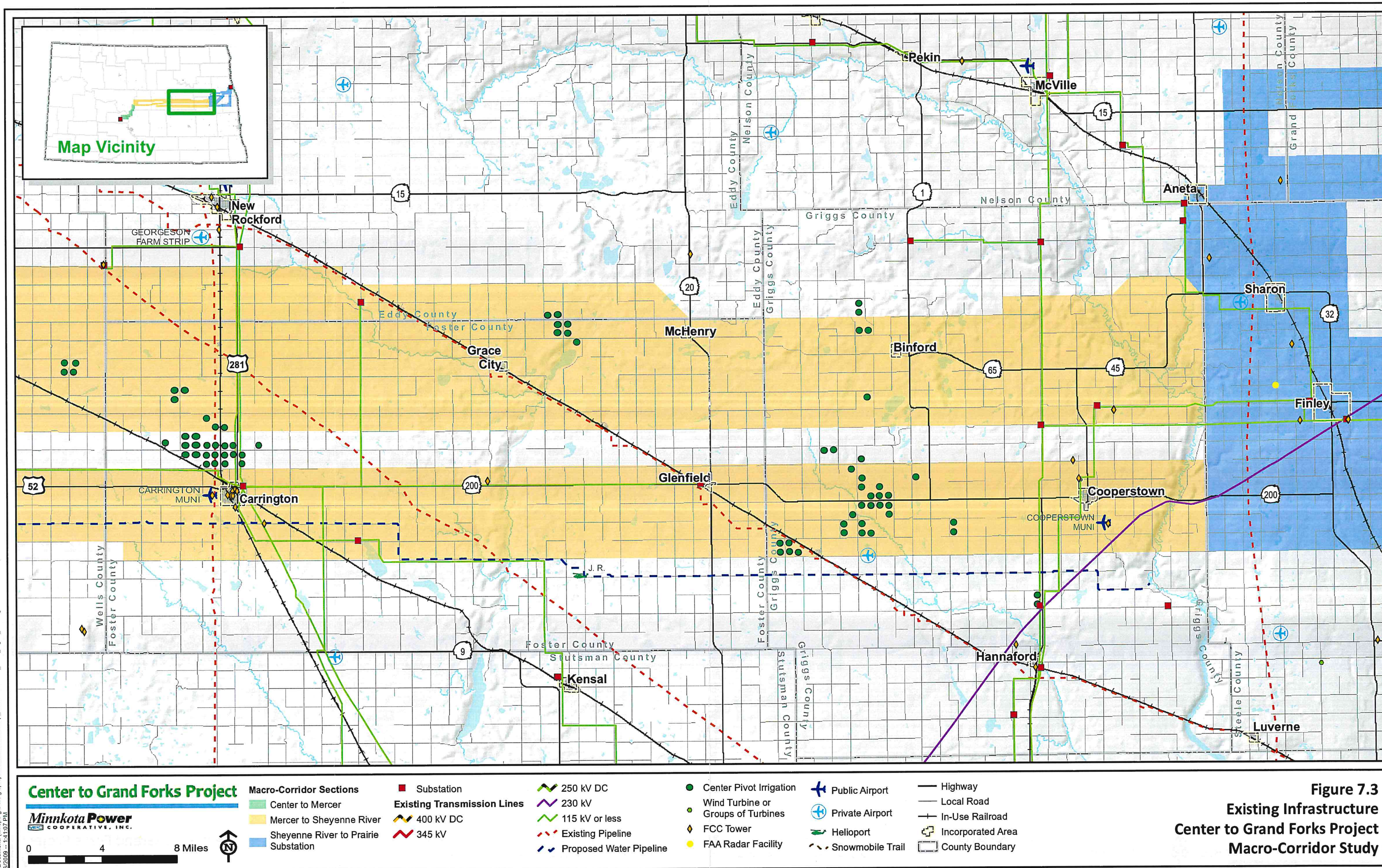
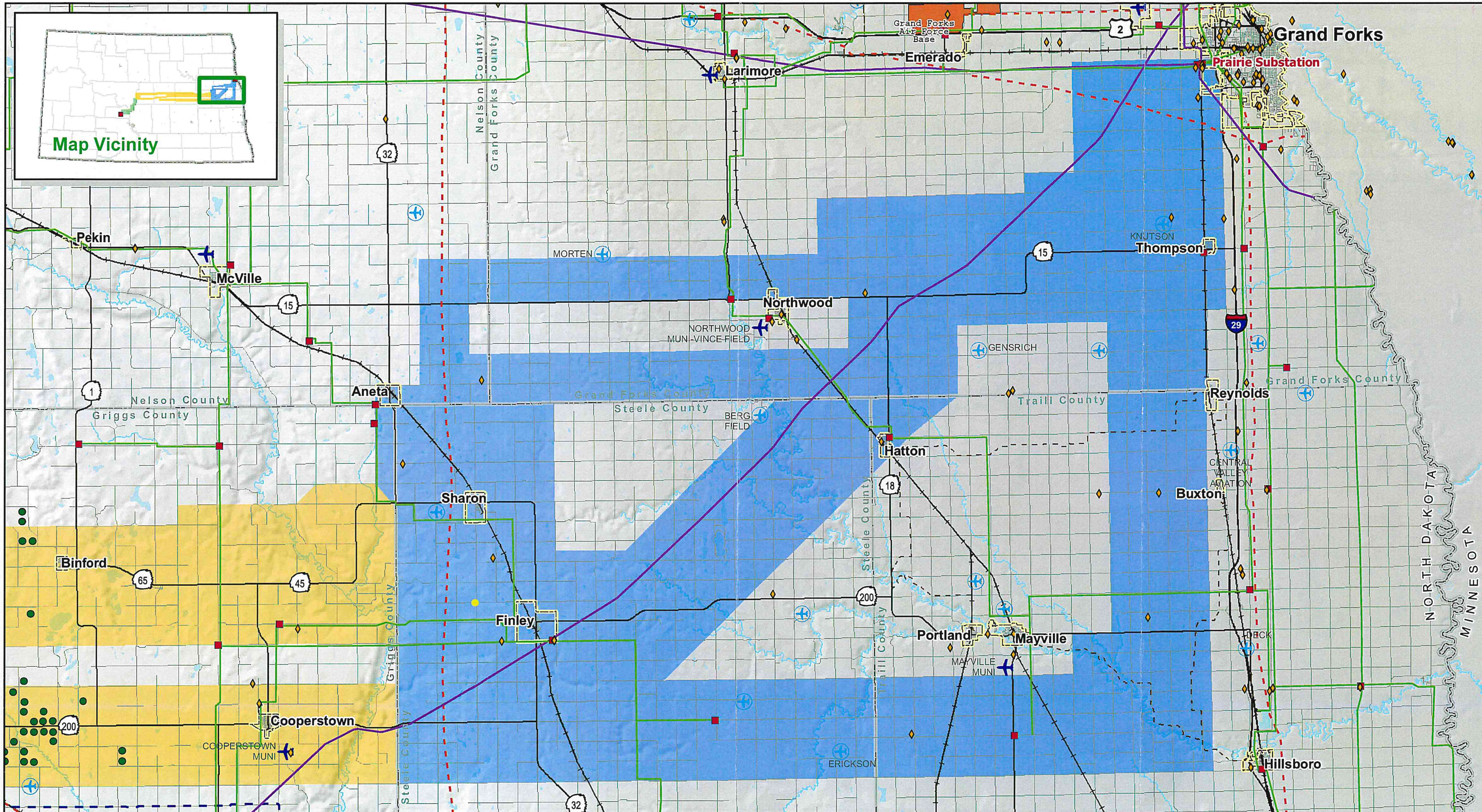


Figure 7.3
Existing Infrastructure
Center to Grand Forks Project
Macro-Corridor Study

Data Sources: FAA, FCC, GRE, HDR, KLJ, NDDOT, NDPRD, NDSWC, USBC.



Center to Grand Forks Project

Minnkota Power Cooperative, Inc.

0 4 8 Miles

Macro-Corridor Sections
- Center to Mercer
- Mercer to Sheyenne River
- Sheyenne River to Prairie Substation

- Substation

Existing Transmission Lines
- 400 kV DC
- 345 kV
- 250 kV DC
- 230 kV
- 115 kV or less
- Existing Pipeline
- Proposed Water Pipeline
- Center Pivot Irrigation
- Wind Turbine or Groups of Turbines
- FCC Tower
- FAA Radar Facility
- Public Airport
- Private Airport
- Heliport
- Snowmobile Trail
- Highway
- Local Road
- In-Use Railroad
- Incorporated Area
- County Boundary

Figure 7.4
Existing Infrastructure
Center to Grand Forks Project
Macro-Corridor Study

Map Document: (\\Mspe-gis-file\gisproj\Minnkota\110900\map_docs\MCS\CGF_MCS_Fig07_ExistingInfrastructure.mxd)
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Data Sources: FAA, FCC, GRE, HDR, KLJ, NDD... DPRD, NDSWC, USBC.

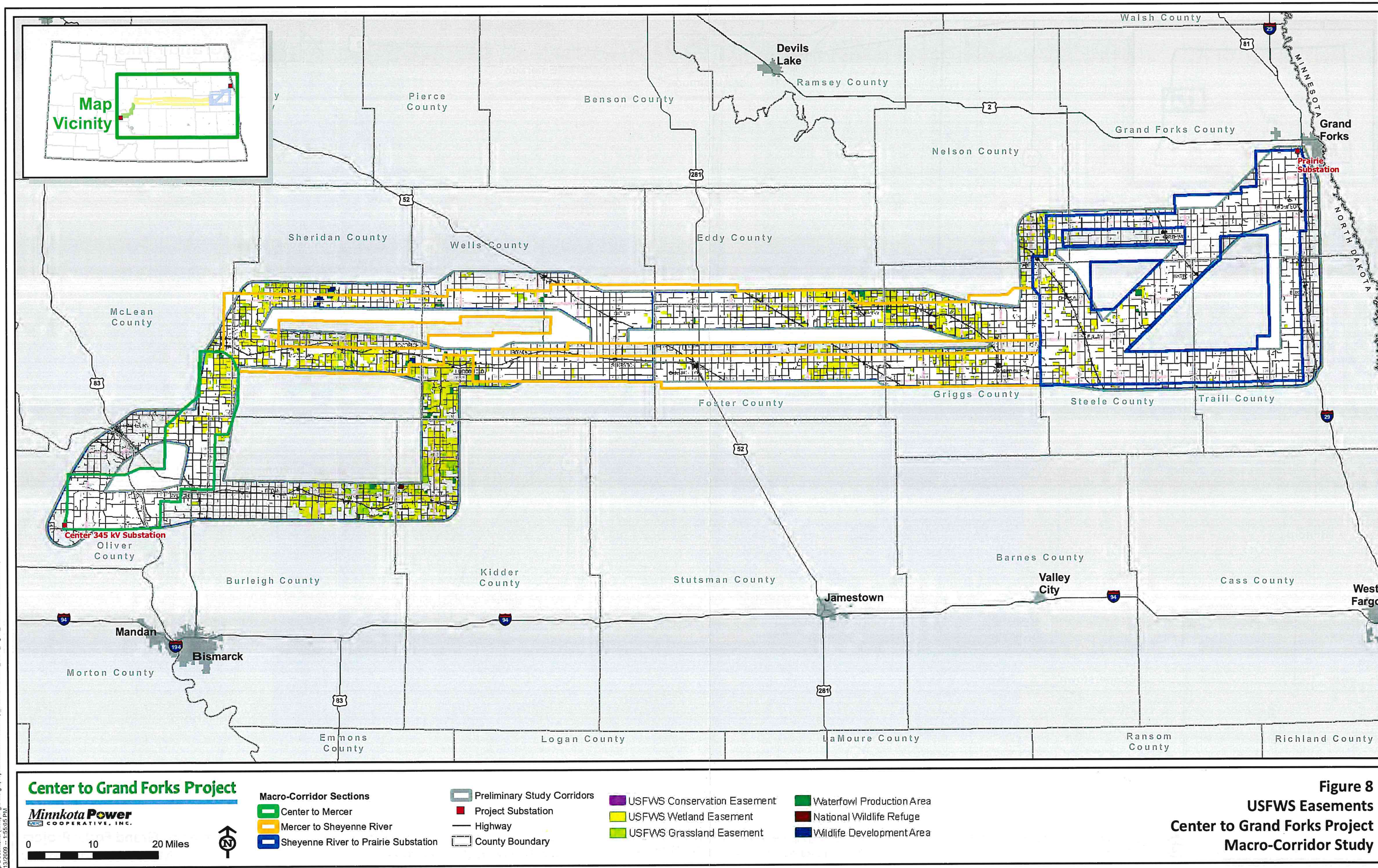
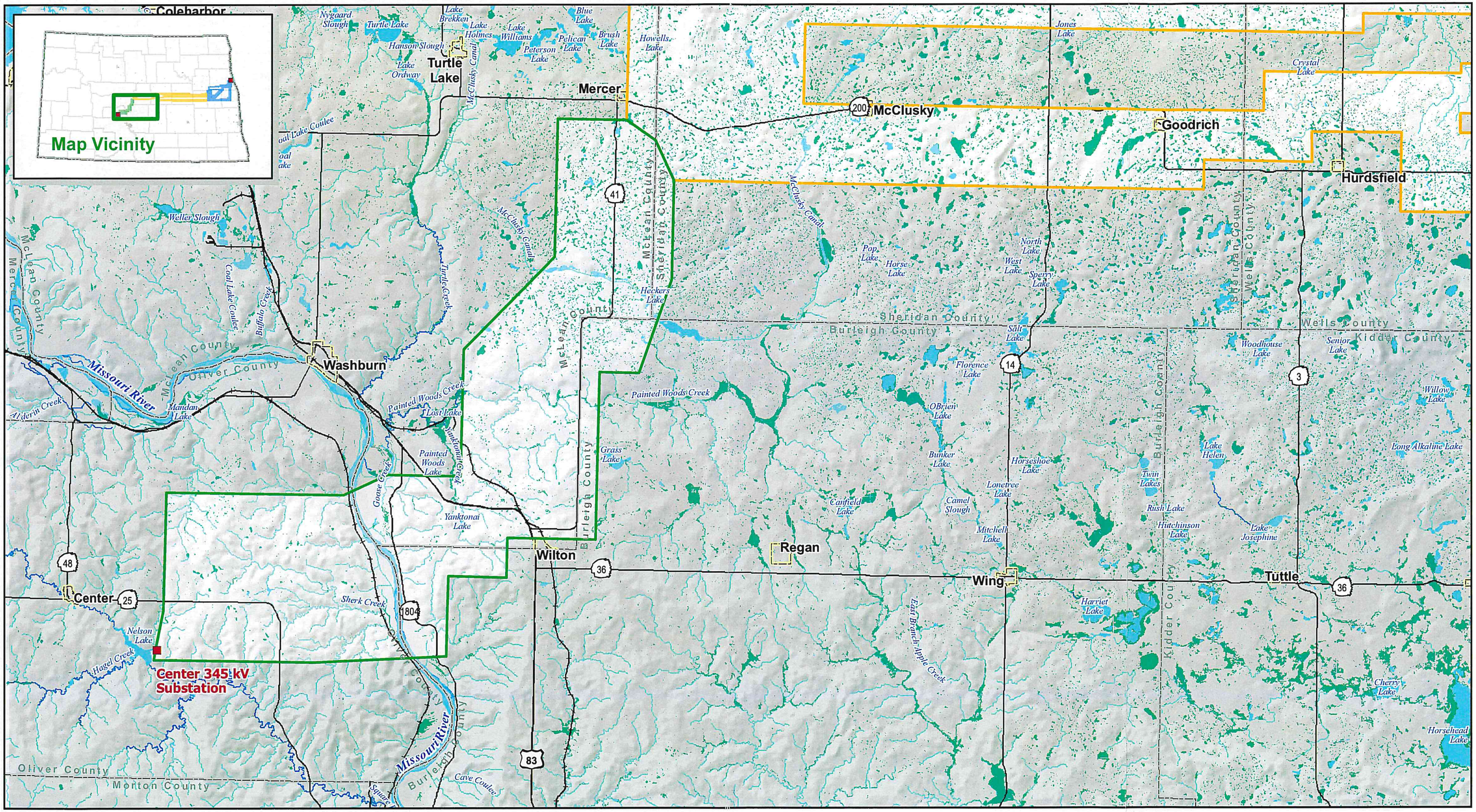


Figure 8
USFWS Easements
Center to Grand Forks Project
Macro-Corridor Study

Data Sources: NDDOT, USBC, USFWS.



Center to Grand Forks Project

Minnkota Power Cooperative, Inc.

0 4 8 Miles

Macro-Corridor Sections

- Center to Mercer
- Mercer to Sheyenne River
- Sheyenne River to Prairie Substation
- Project Substation

- Highway
- In-Use Railroad
- Incorporated Area
- County Boundary

- Lake, Pond, or River
- Wetland
- Perennial River or Stream
- Intermittent Stream or Ditch
- Canal

Figure 9.1
Surface Waters and Wetlands
Center to Grand Forks Project
Macro-Corridor Study

Map Document: (\\Mspe-gis-file\gisproj\Minnkota\110900\map_docs\MCS\CGF_MCS_Fig09_SurfaceWaters.mxd) 10/13/2009 -- 1:55:43 PM

Data Sources: NDDOT, NDSWC, USBC, USGS, USFWS.

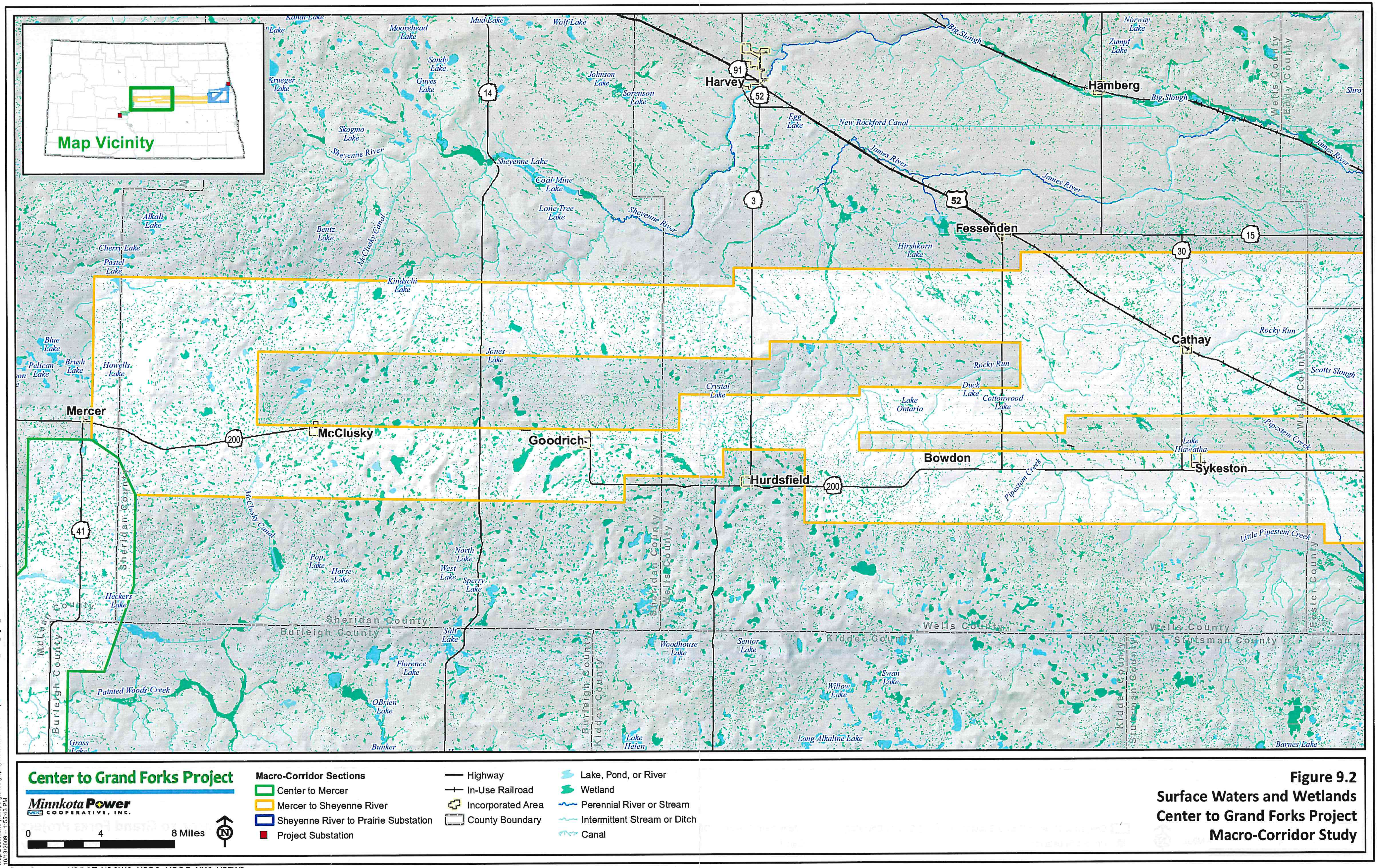


Figure 9.2
Surface Waters and Wetlands
Center to Grand Forks Project
Macro-Corridor Study

Data Sources: NDDOT, NDSWC, USBC, USGS NWI, USFWS.

Map Document: (\\Mapsis-gis-file\gisproj\Minnkota\110900\map_docs\MCS\CGF_MCS_Fig09_SurfaceWaters.mxd) 10/13/2009 -- 1:55:43 PM

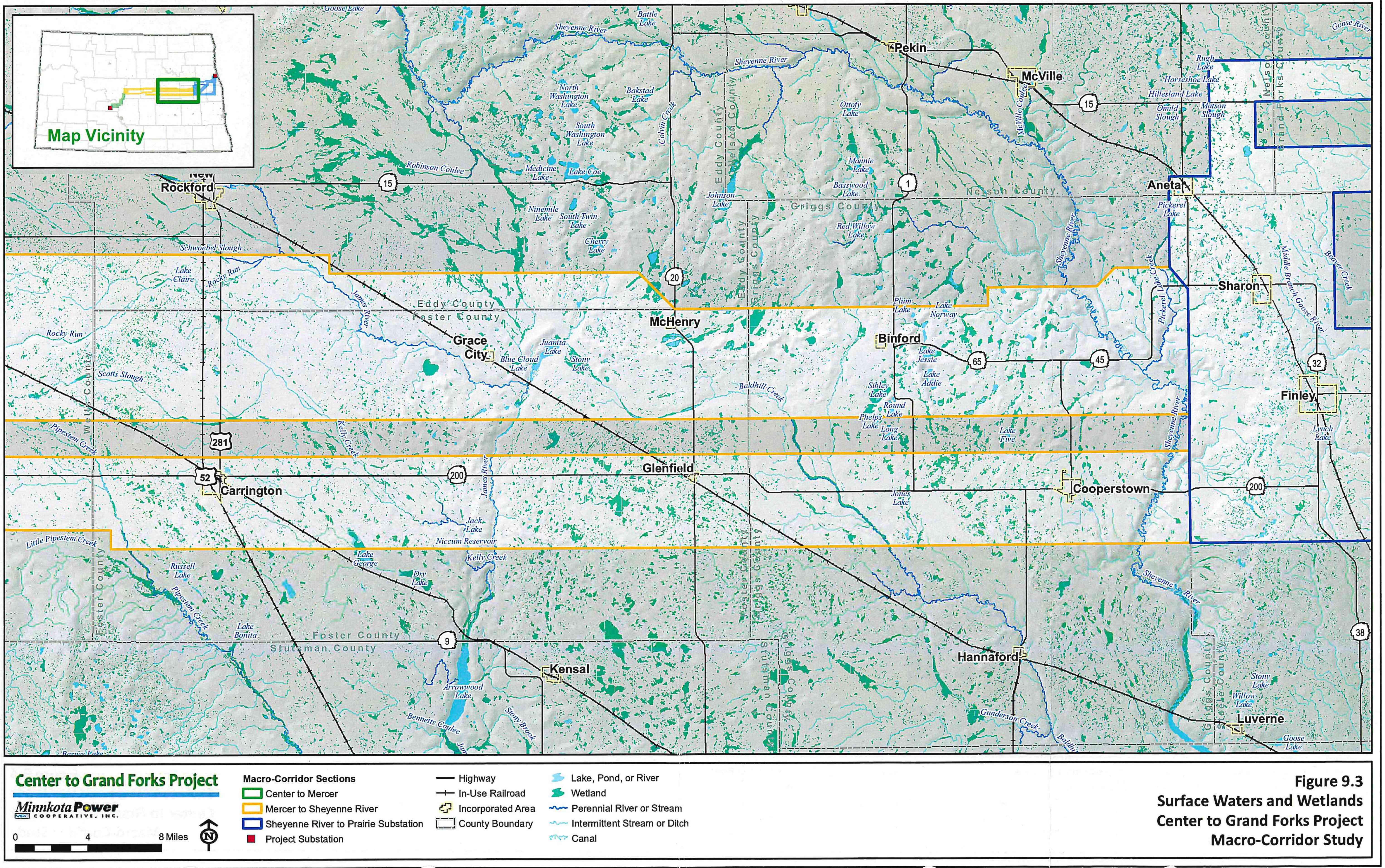
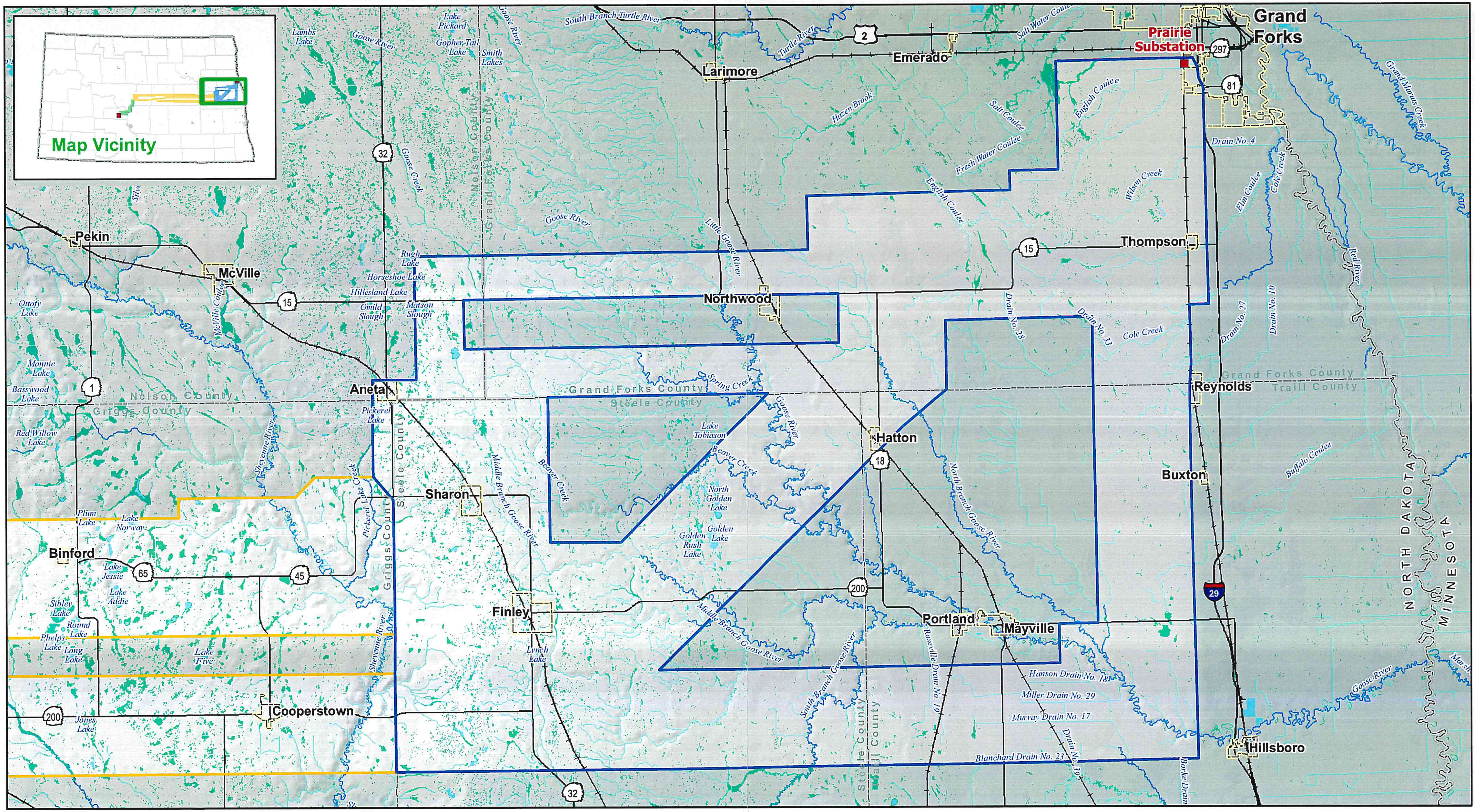


Figure 9.3
Surface Waters and Wetlands
Center to Grand Forks Project
Macro-Corridor Study

Data Sources: NDDOT, NDSWC, USBC, USGS ... USFWS.



Center to Grand Forks Project

Minnkota Power Cooperative, Inc.

0 4 8 Miles

Macro-Corridor Sections

- Center to Mercer
- Mercer to Sheyenne River
- Sheyenne River to Prairie Substation
- Project Substation

- Highway
- In-Use Railroad
- Incorporated Area
- County Boundary

- Lake, Pond, or River
- Wetland
- Perennial River or Stream
- Intermittent Stream or Ditch
- Canal

Figure 9.4
Surface Waters and Wetlands
Center to Grand Forks Project
Macro-Corridor Study

Map Document: (\\Mspe-gis-file\gisproj\Minnkota\110990\map_docs\MCS\CGF_MCS_Fig09_SurfaceWaters.mxd)
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Data Sources: NDDOT, NDSWC, USBC, USGS NWI, USFWS.

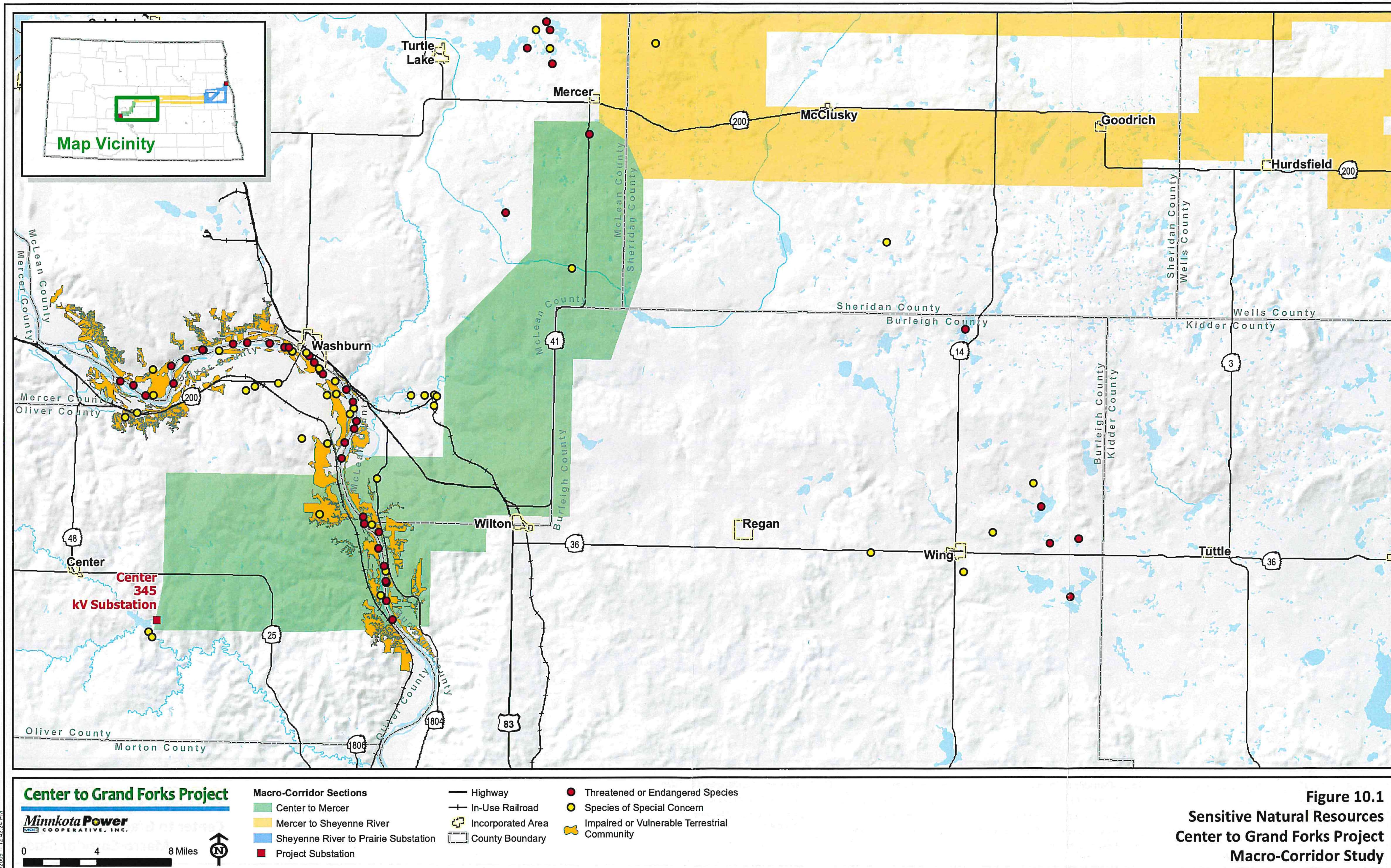

Figure 10.1
Sensitive Natural Resources
Center to Grand Forks Project
Macro-Corridor Study

Map Document: (\\Mspe-gis-file\gisproj\Minnkota\110900\map_docs\MCS\CGF_MCS_Fig10_SensitiveNatRes.mxd)
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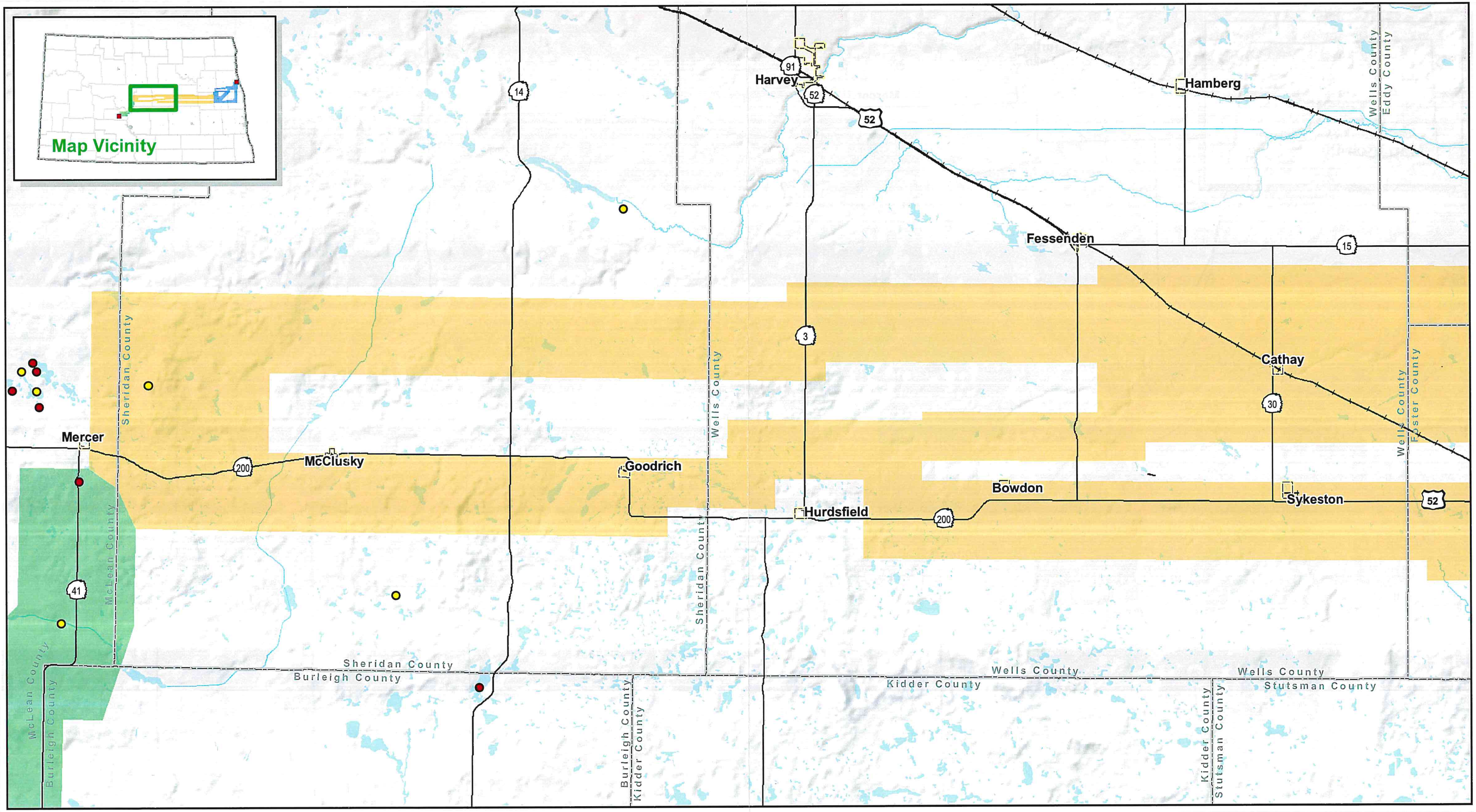
Data Sources: NDDOT, NDPRD, NDSWC, USBC



Center to Grand Forks Project

Minnkota Power Cooperative, Inc.

0 4 8 Miles

Macro-Corridor Sections

- Center to Mercer
- Mercer to Sheyenne River
- Sheyenne River to Prairie Substation
- Project Substation
- Highway
- In-Use Railroad
- Incorporated Area
- County Boundary
- Threatened or Endangered Species
- Species of Special Concern
- Impaired or Vulnerable Terrestrial Community

Figure 10.2
Sensitive Natural Resources
Center to Grand Forks Project
Macro-Corridor Study

Map Document: (\\Mspe-gis-file\gisproj\Minnkota\110900\map_docs\MCS\CGF_MCS_Fig10_SensitiveNatRes.mxd)
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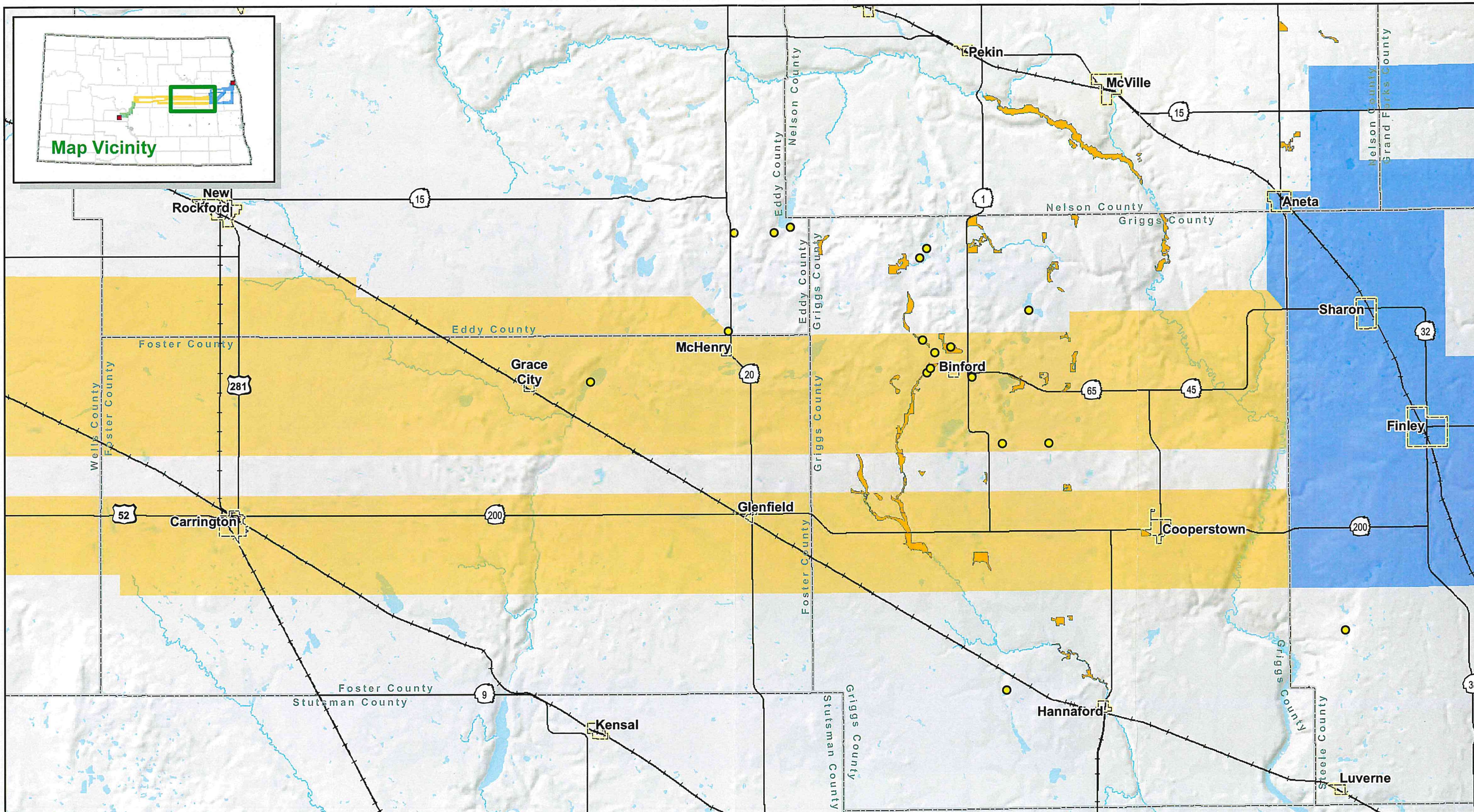
Data Sources: NDDOT, NDPRD, NDSWC, USBC.



Center to Grand Forks Project

Minnkota Power Cooperative, Inc.

0 4 8 Miles

Macro-Corridor Sections

- Center to Mercer
- Mercer to Sheyenne River
- Sheyenne River to Prairie Substation
- Project Substation

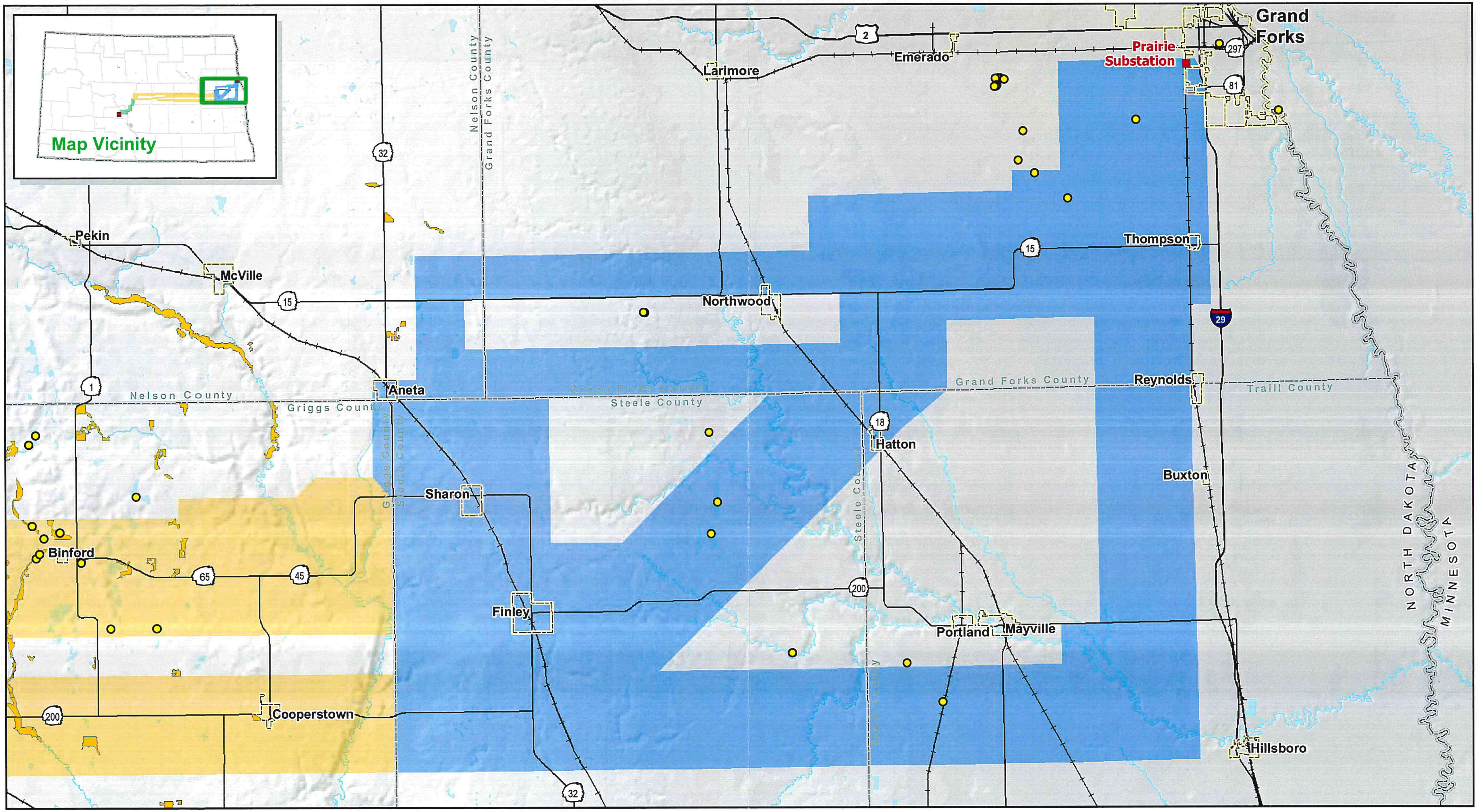
- Highway
- In-Use Railroad
- Incorporated Area
- County Boundary

- Threatened or Endangered Species
- Species of Special Concern
- Impaired or Vulnerable Terrestrial Community

Figure 10.3
Sensitive Natural Resources
Center to Grand Forks Project
Macro-Corridor Study

Map Document: (\\Mspe-gis-file\gisproj\Minnkota\110900\map_docs\MCS\CGF_MCS_Fig10_SensitiveNatRes.mxd)
10/13/2009 -- 12:42:24 PM

Data Sources: NDDOT, NDPRD, NDSWC, USBC



Center to Grand Forks Project

Minnkota Power Cooperative, Inc.

0 4 8 Miles

Macro-Corridor Sections
- Center to Mercer
- Mercer to Sheyenne River
- Sheyenne River to Prairie Substation
- Project Substation

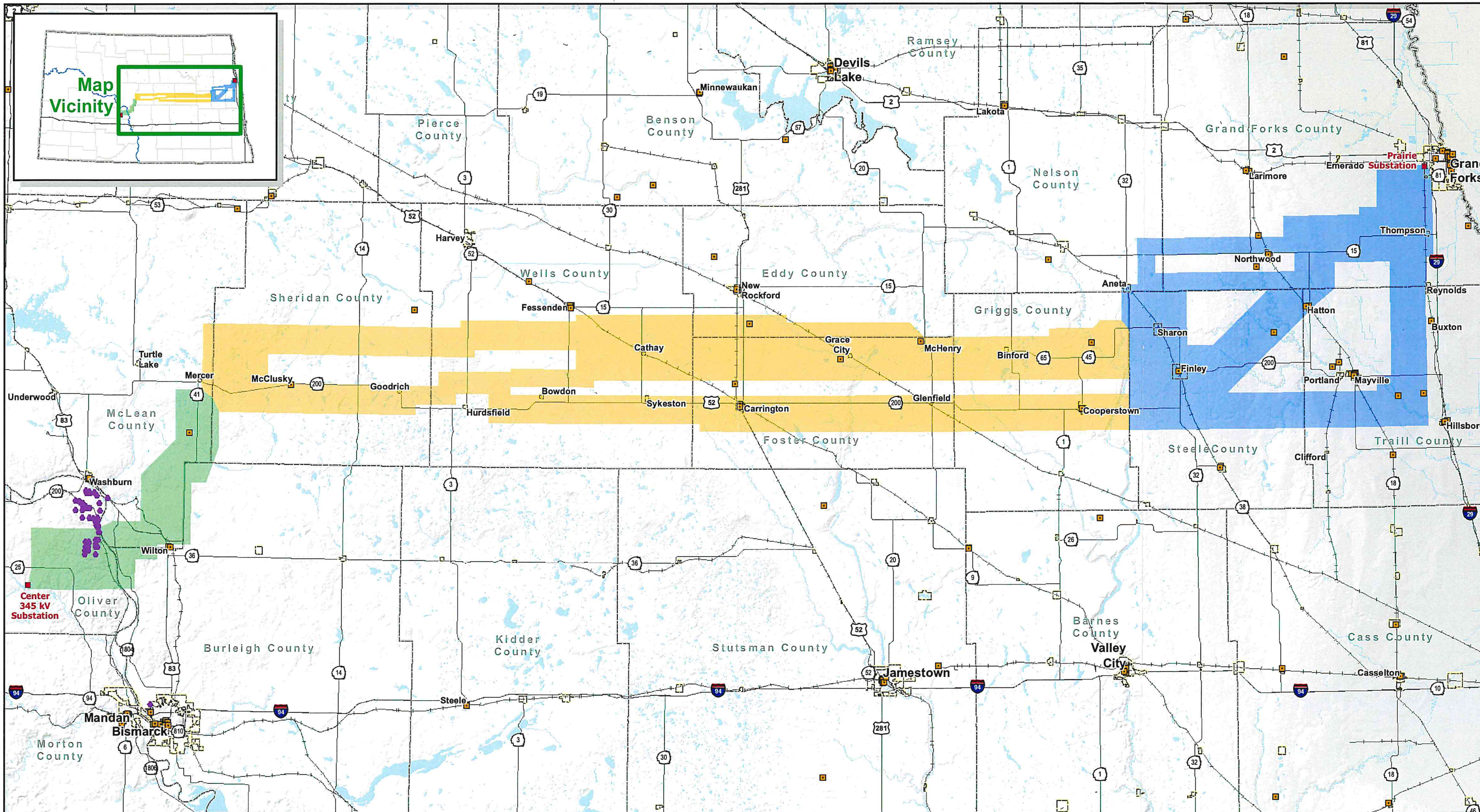
- Highway
- In-Use Railroad
- Incorporated Area
- County Boundary

- Threatened or Endangered Species
- Species of Special Concern
- Impaired or Vulnerable Terrestrial Community

Figure 10.4
Sensitive Natural Resources
Center to Grand Forks Project
Macro-Corridor Study

Map Document: (\\Mspe-gis-file\gispro\Minnkota\110900\map_docs\MCS\CGF_MCS_Fig10_SensitiveNatRes.mxd)
10/13/2009 -- 12:42:24 PM

Data Sources: NDDOT, NDPRD, NDSWC, USBC.



Center to Grand Forks Project

Minnkota Power Cooperative, Inc.

0 10 20 Miles

Macro-Corridor Section

- Center to Mercer
- Mercer to Sheyenne River
- Sheyenne River to Prairie Substation

- Project Substation

NRHP Site

- Historical
- Archaeological

- Highway
- In-Use Railroad
- Incorporated Area
- County Boundary

Figure 11
Cultural Resources
Center to Grand Forks Project
Macro-Corridor Study

Map Document: (\\Mspe-gis-file\gisproj\Minnkota\110900\map_docs\MCS\CGF_MCS_Fig11_CulturalResources.mxd)
10/13/2009 -- 12:01:05 PM

Data Sources: NDDOT, NDSWC, NPS, USBC.

Appendix A

Agency Letters

Agency	Date Mailed	Response	Response Date
Federal			
US Army Corps of Engineers	4/27/2009	Yes – Letter	5/11/2009
US Fish and Wildlife Services	4/27/2009	Yes – Letter	6/2/2009
Bureau of Reclamation	4/27/2009	No	
Federal Highway Administration	4/27/2009	No	
Federal Aviation Administration	4/27/2009	Yes – Letter	6/4/2009
National Parks Service - North Country National Scenic Trail	4/21/2009	Yes – Phone	5/20/2009
State			
North Dakota Department of Agriculture	4/27/2009	Yes – Letter	5/5/2009
North Dakota Game and Fish Department	4/27/2009	Yes - Letter	5/26/2009
North Dakota Indian Affairs Commission	4/27/2009	No	
North Dakota Natural Resources Conservation Service	4/27/2009	No	
North Dakota Parks and Recreation Department	4/27/2009	Yes – Letter	5/26/2009
North Dakota State Water Commission	4/27/2009	No	
State Historical Society of North Dakota	4/27/2009	No	
North Dakota Natural Heritage	4/27/2009	No	
North Dakota Department of Transportation	4/27/2009	Yes - Letter	5/13/2009
State of North Dakota – Office of the State Engineer	4/27/2009	Yes – Letter	5/1/2009
Local			
Cities Administrators – Aneta, Binford, Bowdon, Carrington, Cathay, Fessenden, Finley, Glenfield, Goodrich, Grace City, Grand Forks, Hatton, Hillsboro, Hurdsfield, McClusky, McHenry, Mercer, Northwood, Regan, Reynolds, Sharon, Sykeston, Thompson, Tuttle, Washburn, Wilton	5/5/2009	No	

Agency	Date Mailed	Response	Response Date
County Board of Commissioners - Barnes, Burleigh, Cass, Eddy, Foster, Grand Forks, Griggs, Kidder, McLean, Morton, Nelson, Oliver, Sheridan, Steele, Stutsman, Traill, and Wells	4/22/2009	No	
Tribes			
Leech Lake Band of Ojibwe Indians	5/8/2009	Yes - Letter	5/14/2009
Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation	5/8/2009	No	
Bois Forte Band of Chippewa Indians	5/8/2009	Yes – Letter	6/10/2009
Cheyenne River Sioux Tribe of the Cheyenne River Reservation	5/8/2009	No	
Crow Creek Sioux Tribe of the Crow Creek Reservation	5/8/2009	No	
Flandreau Santee Sioux Tribe	5/8/2009	No	
Fond du Lac Band of Lake Superior Chippewa	5/8/2009	No	
Grand Portage Band of lake Superior Chippewa	5/8/2009	No	
Lower Brule Sioux Tribe of the Lower Brule Reservation	5/8/2009	No	
Lower Sioux Indian Community	5/8/2009	No	
Minnesota Chippewa Tribe	5/8/2009	No	
Mille Lacs Band of Ojibwe Indians	5/8/2009	Yes – Letter	5/15/2009
Oglala Sioux Tribe of the Pine Ridge Reservation	5/8/2009	No	
Prairie Island Indian Community	5/8/2009	No	
Red Lake Band of Chippewa Indians	5/8/2009	No	
Rosebud Sioux Tribe of the Rosebud Indian Reservation	5/8/2009	No	
Santee Sioux Nation	5/8/2009	No	
Spirit Lake Tribe	5/8/2009	No	
Sisseton-Wahpeton Oyate of the Lake	5/8/2009	No	

Agency	Date Mailed	Response	Response Date
Traverse Reservation			
Standing Rock Sioux Tribe	5/8/2009	Yes – Email	6/11/2009
Three Affiliated Tribes of the Fort Berthold Reservation	5/8/2009	No	
Turtle Mountain Band of Chippewa Indians	5/8/2009	No	
Upper Sioux Community	5/8/2009	No	
White Earth Band of Minnesota Chippewa Tribe	5/8/2009	No	

Appendix B

Township Information

Section	County	Civil Township Name	Legal Description
Center to Mercer	Burleigh	Grass Lake	T143N R 79W
		Painted Woods	E1/2 of T142N R81W and W1/2 of T142N R80W
		Wilson	T144N R 79W
	McLean	Mercer	T146N R 79W
		Unorganized Territory	T143N R 80W
		Unorganized Territory	T143N R 81W
		Unorganized Territory	T144N R 80W
		Unorganized Territory	T145N R 79W
		Unorganized Territory	T145N R 80W
	Oliver	Unorganized Territory	T142N R 82W
		Unorganized Territory	T142N R 83W
		Unorganized Territory	T143N R 82W
		Unorganized Territory	T143N R 83W
		Unorganized Territory	W1/2 of T142N R 81W
	Sheridan	Edgemont	T145N R 78W
		Pickard	T146N R 78W
Mercer to Sheyenne River	Eddy	Cherry Lake	T148N R 63W
		Columbia	T148N R 64W
		Paradise	T148N R 62W
		Pleasant Prairie	T148N R 65W
		Rosefield	T148N R 67W
		Superior	T148N R 66W
	Foster	Birtsell	T147N R 67W
		Bordulac	T145N R 65W
		Bucephalia	T145N R 64W
		Carrington	T146N R 66W
		Eastman	T145N R 62W
		Estabrook	T147N R 66W
		Florance	T147N R 63W
		Glenfield	T146N R 62W
		Haven	T146N R 64W
		Larrabee	T147N R 64W
		Longview	T145N R 67W
		McHenry	T147N R 62W
		McKinnon	T145N R 63W
		Melville	T145N R 66W
		Nordmore	T147N R 65W
		Rolling Prairie	T146N R 63W

Section	County	Civil Township Name	Legal Description
		Rose Hill	T146N R 65W
		Wyard	T146N R 67W
	Griggs	Addie	T147N R 60W
		Ball Hill	T145N R 59W
		Bryan	T147N R 61W
		Clearfield	T146N R 60W
		Cooperstown	T146N R 59W
		Helena	T145N R 60W
		Kingsley	T146N R 61W
		Lenora	T148N R 58W
		Mabel	T145N R 61W
		Pilot Mound	T148N R 59W
		Romness	T147N R 58W
		Sverdrup	T145N R 58W
		Tyrol	T147N R 59W
		Washburn	T146N R 58W
	McLean	Medicine Hill	T148N R 79W
		Mercer	T146N R 79W
		Wise	T147N R 79W
	Sheridan	Boone	T147N R 74W
		Denhoff	T146N R 75W
		Fairview	T148N R 74W
		Goodrich	T146N R 74W
		Holmes	T148N R 78W
		Lincoln Dale	T148N R 76W
		McClusky	T146N R 77W
		Pickard	T146N R 78W
		Prophets	T147N R 78W
		Unorganized Territory	T146N R 76W
		Unorganized Territory	T147N R 75W
		Unorganized Territory	T147N R 76W
		Unorganized Territory	T147N R 77W
		Unorganized Territory	T148N R 75W
		Unorganized Territory	T148N R 77W
	Steele	Franklin	T147N R 57W
		Riverside	T145N R 57W
	Wells	Bilodeau	T146N R 68W
		Bull Moose	T146N R 73W
		Cathay	T147N R 69W

Section	County	Civil Township Name	Legal Description
		Chaseley	T146N R 72W
		Crystal Lake	T147N R 73W
		Delger	T147N R 72W
		Fairville	T148N R 68W
		Germantown	T148N R 69W
		Haaland	T146N R 71W
		Oshkosh	T148N R 70W
		Pony Gulch	T148N R 73W
		Rusland	T148N R 72W
		South Cottonwood	T147N R 70W
		Speedwell	T146N R 70W
		St. Anna	T148N R 71W
		Sykeston	T146N R 69W
		West Ontario	T147N R 71W
		Woodward	T147N R 68W
Sheyenne River to Prairie Substation	Grand Forks	Allendale	T150N R 51W
		Americus	T149N R 50W
		Avon	T150N R 54W
		Brenna	T151N R 51W
		Fairfield	T150N R 52W
		Grace	T150N R 55W
		Grand Forks	T151N R 50W
		Lind	T149N R 55W
		Logan Center	T150N R 56W
		Loretta	T149N R 56W
		Michigan	T149N R 51W
		Northwood	T149N R 54W
		Oakville	T151N R 52W
		Pleasant View	T150N R 53W
		Union	T149N R 52W
		Walle	T150N R 50W
		Washington	T149N R 53W
	Griggs	Lenora	T148N R 58W
		Romness	T147N R 58W
		Sverdrup	T145N R 58W
		Washburn	T146N R 58W
	Nelson	Ora	T149N R 57W
		Rugh	T150N R 57W
	Steele	Beaver Creek	T148N R 55W

Section	County	Civil Township Name	Legal Description
		Easton	T146N R 56W
		Edendale	T145N R 54W
		Enger	T147N R 54W
		Finley	T147N R 56W
		Franklin	T147N R 57W
		Golden Lake	T147N R 55W
		Greenview	T146N R 57W
		Hugo	T145N R 55W
		Melrose	T145N R 56W
		Newburgh	T148N R54W
		Primrose	T146N R 54W
		Riverside	T145N R 57W
		Sharon	T148N R 57W
		Sherbrooke	T146N R 55W
		Westfield	T148N R 56W
	Traill	Blanchard	T145N R 52W
		Bloomfield	T145N R 51W
		Buxton	T148N R 51W
		Garfield	T148N R 53W
		Mayville	T146N R 52W
		Norman	T145N R 53W
		Norway	T146N R 51W
		Roseville	T146N R 53W
		Wold	T147N R 51W

Appendix C

State Listed Species of Conservation Priority

Level-I - Species in greatest need of conservation.

Level-II - Species in need of conservation, but that have had support from other wildlife programs.

Level-III - Species in moderate need of conservation, but that are on the edge of their range in North Dakota.

	Level I	Level II	Level III
Birds	Horned Grebe	Northern Pintail	Peregrine Falcon
	American White Pelican	Canvasback	Whooping Crane
	American Bittern	Redhead	
	Swainson's Hawk	Northern Harrier	
	Ferruginous Hawk	Golden Eagle	
	Yellow Rail	Bald Eagle	
	Willet	Prairie Falcon	
	Upland Sandpiper	Sharp-tailed Grouse	
	Long-billed Curlew	Greater Prairie Chicken	
	Marbled Godwit	Piping Plover	
	Wilson's Phalarope	American Avocet	
	Franklin's Gull	Least Tern	
	Black Tern	Burrowing Owl	
	Black-billed Cuckoo	Short-eared Owl	
	Sprague's Pipit	Red-headed Woodpecker	
	Lark Bunting	Loggerhead Shrike	
	Grasshopper Sparrow	Sedge Wren	
	Baird's Sparrow	Le Conte's Sparrow	
	Nelson's Sharp-tailed Sparrow	Dickcissel	
	Chestnut-collared Longspur	Bobolink	
Amphibians and Reptiles	Plains Spadefoot	Common Snapping Turtle	False Map Turtle
	Canadian Toad	Northern Redbelly Snake	Smooth Softshell Turtle
	Western Hognose Snake		Northern Prairie Skink
	Smooth Green Snake		
Mammals	Black-tailed Prairie Dog	Richardson's Ground Squirrel	Arctic Shrew
	Black-footed Ferret	Swift Fox	Pygmy Shrew
		River Otter	Long-eared Myotis
			Long-legged Myotis
			Hispid Pocket Mouse
			Plains Pocket Mouse
			Sagebrush Vole
			Gray Wolf
			Eastern Spotted Skunk
Fish	Pearl Dace	Pallid Sturgeon	Chestnut Lamprey
	Blue Sucker	Paddlefish	Central Stoneroller
		Silver Chub	Hornyhead Chub
		Northern Redbelly Dace	Pugnose Shiner
		Flathead Chub	Blacknose Shiner
		Trout-perch	Rosyface Shiner

	Level I	Level II	Level III
			Flathead Catfish
			Logperch
			River Darter
Freshwater Mussels		Threeridge	Pink Papershell
		Wabash Pigtoe	
		Mapleleaf	
		Black Sandshell	
		Creek Heelsplitter	
		Pink Heelsplitter	

Appendix D

Project Area Photos

Photo 1 – Milton R. Young Station near Center, North Dakota

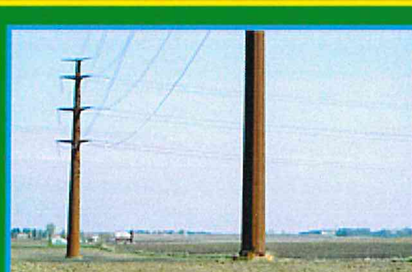
Photo 2 – Typical Prairie Pothole Wetland in Agricultural Field

Photo 3 - Existing Transmission Line Crossing at the Missouri River

Photo 4 – Sheyenne River Crossing

Photo 5 – Existing Wind Farm near Wilton, North Dakota

Photo 6 - Wildlife Management Area



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