Applications to the North Dakota Public Service Commission for Waiver of Procedures and Time Schedules and a Consolidated Certificate of Corridor Compatibility and Route Permit

Volume I

Case No: PU-11-696

for the

AVS-Neset 345-kV Transmission Project

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

March 2013

Application to the North Dakota Public Service Commission for Waiver of Procedures and Time Schedules

Case No: PU-11-696

for the

AVS-Neset 345-kV Transmission Project

Basin Electric Power Cooperative

March 2013

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF NORTH DAKOTA

Case No. PU-11-696

IN THE MATTER OF THE APPLICATION OF BASIN ELECTRIC POWER COOPERATIVE FOR A CERTIFICATE OF CORRIDOR COMPATIBILITY AND ROUTE PERMIT TO CONSTRUCT THE AVS TO TANDE 345-kV TRANSMISSION LINE PROJECT IN DUNN, MCKENZIE, MERCER, MOUNTRAIL AND WILLIAMS COUNTIES, NORTH DAKOTA.

BASIN ELECTRIC POWER COOPERATIVE'S APPLICATION FOR WAIVER OF PROCEDURES AND TIME SCHEDULES

In connection with its submission of a consolidated application for a Certificate of Corridor Compatibility and Route Permit ("**Application**") for its 345-kV Transmission Line starting from the Beulah area to the Tioga area ("**Project**"), Basin Electric Power Cooperative ("**Basin Electric**") submits to the North Dakota Public Service Commission ("**Commission**") this Application for a Waiver of Procedures and Time Schedules set forth in Chapter 49-22 of the North Dakota Century Code ("**Siting Act**") and Article 69-06 of the North Dakota Administrative Rule ("**Siting Rules**").

In accordance with Section 49-22-07.2 of the North Dakota Century Code and Chapter 69-06-06 of the North Dakota Administrative Code, Basin Electric requests that the Commission waive the following requirements:

1. That the Commission waive the requirements of Section 49-22-08 and 49-22-08.1 of the North Dakota Century Code insofar as these sections may require the separate filing of Applications for a Corridor Certificate and a Route Permit and insofar as they require separate publications of notices and filing separate applications.

2. That the Commission hold a separate hearing on a waiver request, a Certificate of Corridor Compatibility ("Corridor Certificate") application and a Route Permit application, as may be required by Sections 49-22-07.2, 49-22-08, 49-22-08.1, and 49-22-13 of the North Dakota Century Code and Chapter 69-06-01-02 of the North Dakota Administrative Code. Basin Electric requests that the Commission hold a single consolidated hearing on this waiver request and its Consolidated Application.

3. Section 69-06-04-02 provides as follows: "That the width of a corridor must be at least ten percent of its length, but not less than one mile (1.61 kilometers) or greater than six miles (9.66 kilometers) unless approved by the Commission." Basin Electric requests that the Commission waive or modify the corridor width requirement set forth in Section 69-06-04-02(1)(b) of the North Dakota Administrative Code with respect to the proposed Project. Basin Electric requests that it be allowed to present a 150 foot wide corridor in its application for a Certificate of Corridor Compatibility for the proposed Project.

Consistent with the Commission's Energy and Transmission Facility Guidelines, Basin Electric provides the following information in support of its waiver request:

I. Description of Proposed Project

1. Type: Basin Electric proposes to construct, operate, and maintain approximately 197.1 miles of new 345-kV transmission line, as well as the modification and/or expansion of three existing substations and construction of two new substations.

2. Product: Electrical energy will be transported over the proposed transmission line to the electrical grid system serving the rapidly increasing electrical load requirements in western and northwestern North Dakota and eastern Montana. In addition to voltage level improvements, the proposed Project will also improve the reliability of service into the area.

3. Size and Design: The proposed Project will consist of eight major components:

- **345-kV High Voltage Transmission Line** – The proposed Project will include 197.1 miles of new 345-kV electric transmission line connecting the existing AVS 345-kV Substation to the proposed Tande 345-kV Substation. The proposed 345-kV, single-circuit transmission lines would be constructed using single-pole or H-frame self-supporting structures. All 345-kV segments will be constructed within a 150-foot-wide right-of-way.

- **230-kV Line** – The proposed Project also includes a 1.0-mile 230-kV transmission line connection from the proposed Tande Substation to the existing 230-kV Neset Substation. The single-circuit 230-kV line would be constructed using single-pole, self-supporting structures within a 100-foot right-of-way.

- **AVS 345-kV Substation Addition** – The existing AVS Substation's 345-kV switchyard will require the installation of one 345-kV power circuit breaker and associated transmission bay bus expansion, including disconnect switches, grounding switches, potential transformers, and protection and control equipment. No new land or grading is required at this Substation.

- **Charlie Creek 345-kV Substation Addition** – Upgrades to the existing Charlie Creek 345-kV Substation will require the installation of the necessary bus, circuit breakers, disconnect switches, grounding switches, and protection and control equipment to support the addition of a 345-kV interconnection. No expansion of the substation fence is anticipated.

- **Neset 230-kV Substation Addition**– The existing Neset 230-kV Substation will require the expansion of transmission bus bay and the necessary circuit breakers, disconnect switches, grounding switches, and protection control equipment to support the addition of the 230-kV connection. No expansion of the substation fence is anticipated.

- **345/115-kV Double Circuit Transmission Line** - Approximately 31 miles of the 345-kV line between the proposed Judson and Tande Substations would be double-circuited with a Mountrail Williams Electric Cooperative (MWEC) 115-kV line associated with other regional improvement projects. The 345/115-kV, double circuit transmission line segment would be constructed of single-pole self-supporting structures.

- **Tande Substation** – The proposed 12 acre Tande 345-kV Substation will require the installation of a 345-kV/230-kV transformer, and the necessary bus, disconnect switches, circuit breakers, grounding switches, and protection and control equipment to support the 345-kV connection and the connection to the nearby existing Neset 230-kV Substation.

- **Judson 345-kV Substation** – The proposed Judson 345-kV near Williston will be approximately 12 acres in size and will require the installation of a 345-kV/230-kV transformer, and the necessary bus, circuit breakers, disconnect switches, grounding switches, and protection and control equipment to support the 345-kV interconnection and the addition of the 230-kV interconnect to Western's nearby Williston 230-kV Substation.

4. **Location**: The proposed Project will begin at the Antelope Valley Station located near Beulah, North Dakota, will travel west and connect with Basin Electric's Charlie Creek Substation near Grassy Butte, and then turn north and connect with Basin Electric's proposed substation west of Williston, and terminate at Basin Electric's proposed Tande Substation. An additional 230-kV line is required between the new Tande Substation and Basin Electric's existing 230-kV substation near Tioga.

5. **Geographical Service Area**: The overall Project area encompasses parts of Mercer, Dunn, McKenzie, Williams, and Mountrail Counties in North Dakota. The general area to be served by this Project is northwestern North Dakota and eastern Montana.

6. **Time Schedule**: The Project is expected to start construction in 2014. An approximately two-year construction phase is anticipated with in-service expected in 2016. Permitting efforts including the corridor and route selection processes are underway. The Project requires various state, federal, and local permits prior to initiating construction. An overview of the Project schedule is as follows:

Submittal of Application for Certificate of Corridor Compatibility and Route Permit	March 2013
Certificate of Corridor Compatibility and Route Permit	December 2013
Right-of-Way acquisition complete	April 2014
Construction start	April 2014
Construction complete	October 2016
Test operations	November 2016
In-service date	December 2016

7. **Future Plans**: Basin Electric has no immediate plans for future expansion of the proposed transmission facility. However, should future load growth in the area dictate the construction of additional facilities, Basin Electric will report said facilities in its Ten-Year Plan.

II. **Need for Facility.**

1. **Analysis of Need**: Refer to Section 2.1 of the Application for Certificate of Corridor Compatibility and Route Permit for the AVS-Neset 345-kV Transmission Project.

2. **Alternative Methods**: Refer to Section 2.2 of the Application for Consolidated Certificate of Corridor Compatibility and Route Permit for the AVS-Neset 345-kV Transmission Project.

III. **Deviation from Ten-Year Plan**:

The description of the proposed Project corresponds with information provided in the most recent Ten-Year Plan, which was submitted to the PSC by Basin Electric on July 27, 2012. There are no deviations between the planned Project described in the Ten-Year Plan and the proposed Project describe in this Application.

IV. **Cost**.

Basin Electric estimates that it will cost $300 million to develop the AVS-Neset 345-kV Transmission Project.

V. **Waiver Request**.

Basin Electric requests that the Commission grant the waivers requested herein because said waivers are needed to prevent potentially significant delays to the Project. As noted above, the Project is needed to provide a reliable supply of electricity. Without the waivers of time schedules and procedures requested, completion of the Project will be delayed and Basin Electric will not be able to meet the needs of its members.

Section 49-22-07.2 of the North Dakota Century Code provides that the Commission may waive procedures and time schedules upon a finding that "the proposed facility is of such length, design, location, or purpose that it will produce minimal adverse effects." Based upon

the investigation and analysis set forth in Basin Electric's Consolidated Application, granting the waivers requested are appropriate because the proposed Project will produce minimal adverse effects through its design, location and purpose.

In determining whether the proposed Project will result in adverse impacts on the environment, Basin Electric evaluated the Project using the criteria set forth in the Siting Act, the Siting Rules and the Commission's Guidelines. More specifically, Basin Electric evaluated the impacts of the Project considering the siting criteria set forth in Section 69-06-08-02 of the North Dakota Administrative Code and the factors set forth in Section 49-22-09 of the North Dakota Century Code. Impacts associated with the Project, and mitigation measures that will be taken with respect to said impacts, are summarized in Section B of the Consolidated Application. Based upon Basin Electric's siting criteria evaluation, the Siting Act, Siting Rules and the factors set forth in the Guidelines, the Project will have minimal adverse effects.

In connection with obtaining funding for the proposed Project from the Rural Utilities Service ("**RUS**"), Basin Electric has been and continues to be involved in a federal review process to determine the proposed Project's compliance with the National Environmental Policy Act ("**NEPA**"). The extensive corridor analysis conducted by Basin Electric prior to and during the RUS review process supports granting Basin Electric's corridor waiver request and allowing Basin Electric to propose a 150 foot wide corridor in its application for a Certificate of Corridor Compatibility and Route Permit.

As the first step in preparing the NEPA documents, Basin Electric initially identified two six-mile wide preliminary study corridors, which were selected to allow for consideration of multiple corridor routing options. Basin Electric then sought public input from residents in and near the preliminary study corridors, as well as a host of federal, state, and local agencies and governmental representatives, to assist Basin Electric in identifying the most appropriate macro-corridors within the preliminary study corridors.

A network of 46 individual,1000-foot-wide route corridors segments were initially developed within the 6-mile wide–macro-corridors to avoid constraints and take advantages of opportunity areas while simultaneously taking public and agency comments under consideration. Of those 46 segments, one 1,000 foot corridor was selected and identified in the Draft Environmental Impact Statement. Within that 1,000 corridor, Basin Electric identified a 150-foot-wide which will be assessed in RUS's final action. Considering the in-depth environmental review of potential corridors provided during the RUS process, allowing Basin Electric to present its application for Certificate of Corridor Compatibility on one of the 150 foot wide corridors identified as a result of the RUS process will ensure that the proposed Project is designed and located in a manner that will minimize any potential adverse effects, as well as avoid confusion for landowners, agencies, governmental representatives, and tribal representatives. Thus, under the circumstances presented, granting the requested waiver is appropriate.

Accordingly, Basin Electric respectfully requests that the Commission grant the requested waivers.

Dated this 7th day of March, 2013.

BASIN ELECTRIC POWER COOPERATIVE

By: _____

Casey J. Jacobson, Attorney
Basin Electric Power Cooperative
1717 East Interstate Avenue
Bismarck, ND 58503
Phone (701) 557-5413
cjacobson@bepc.com

STATE OF NORTH DAKOTA)
)ss.
COUNTY OF BURLEIGH)

CASEY J. JACOBSON, of lawful age, being first duly sworn, on oath deposes and says:

That she is the duly elected and qualified attorney for Applicant in the foregoing application; that she executed the foregoing application for and on behalf of said Applicant and as its said attorney that she has read said application and knows the contents thereof, and that the statements made and contained therein are, to the best of my knowledge and belief, true and correct.

CASEY J. JACOBSON

Subscribed and sworn to before me this 7 day of March, 2013.

(SEAL) DARLENE STEFFAN
Notary Public
State of North Dakota
My Commission Expires April 15, 2014

Notary Public
My Commission Expires: 4-15-14

Application to the North Dakota Public Service Commission for Consolidated Certificate of Corridor Compatibility and Route Permit

Case No: PU-11-696

for the

AVS-Neset 345-kV Transmission Project

Basin Electric Power Cooperative

March 2013

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

TABLE OF CONTENTS

Page No.

VOLUME I: APPLICATION

VOLUME III: APPENDICES

* * * * *

LIST OF TABLES

Table No. **Page No.**

* * * * *

LIST OF FIGURES

Figure No. **Page No.**

* * * * *

1.0 INTRODUCTION

Basin Electric Power Cooperative (Basin Electric) submits this application for a Consolidated Certificate of Corridor Compatibility and Route Permit for the AVS to Neset 345-kilovolt (kV) Transmission Project (Project) (PU-11-696).

Basin Electric is a regional wholesale electric generation and transmission cooperative owned and controlled by the member cooperatives it serves. It was created in May 1961 as a result of regional efforts by electric distribution cooperatives and the Rural Electrification Administration, now the Rural Utilities Service (RUS). Basin Electric serves approximately 2.8 million customers in 540,000 square miles covering portions of nine states: Colorado, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota, and Wyoming.

Within the Basin Electric service area, northwestern North Dakota is experiencing a rapid increase in development as a result of the activities associated with the extraction of oil from the Bakken shale. In North Dakota, development of Bakken oil shale extraction activities is currently concentrated in McKenzie, Mountrail and Williams Counties. The level of development that has occurred and is planned for the future will require numerous increases in infrastructure throughout the region, including an increase in electrical transmission capacity and reliability. Through studies of power supply for the region and the upper Midwest (IS, 2011), it was determined that a new 345-kilovolt (kV) transmission line and associated substation upgrades are needed by 2016 in order to serve the needs of northwestern North Dakota.

Basin Electric proposes to construct, operate, and maintain approximately 197 miles of new 345-kV transmission line, two new 345-kV substations (Judson Substation west of Williston and Tande Substation southeast of Tioga), and 1 mile of additional 230-kV transmission line to connect the 345-kV line into the existing system. Starting from the AVS electric generation facility located near Beulah, North Dakota, the new 345-kV transmission line will extend west and connect with Basin Electric's existing Charlie Creek Substation near Grassy Butte, turn north add connect with Basin Electric's proposed Judson Substation west of Williston, and terminate at Basin Electric's proposed Tande Substation. An additional 230-kV line is required between the new Tande Substation and Basin Electric's existing Neset 230-kV Substation near Tioga. The new 345-kV and 230-kV transmission lines will include new construction in new right-of-way (ROW). Basin Electric's member system Mountrail-Williams Electric Cooperative's (MWEC) 115-kV Stateline Project was incorporated into approximately

31 miles of the Project in order to share common right-of way to minimize impacts to the existing environment. The overall Project area encompasses parts of Mercer, Dunn, McKenzie, Williams, and Mountrail Counties in North Dakota.

The Project will require upgrades to Basin Electric's existing facilities at the AVS 345-kV Substation, Charlie Creek 345-kV Substation, and Neset 230-kV Substation. These upgrades are all within the existing substations' fence lines. No expansion of physical area is required.

1.1 COMPLIANCE WITH THE ENERGY CONVERSION AND TRANSMISSION FACILITY SITING ACT

The North Dakota Energy Conversion and Transmission Facility Siting Act (Act) requires an application for a Certificate of Corridor Compatibility and a Route Permit to meet the criteria set forth in the North Dakota Century Code (NDCC Chapter 49-22). Within this application, Basin Electric presents the information required by the Act. In addition, Basin Electric discusses in this application its consideration of the exclusion areas, the avoidance areas, the selection criteria, and the policy criteria set forth in North Dakota Administrative Code (NDAC) Section 69-06-08-02.

1.1.1 Rural Utilities Service and Western Area Power Administration and U.S. Forest Service Planning Documents

The RUS electric program provides capital loans to electric cooperatives for the upgrade, expansion, maintenance, and replacement of the electric infrastructure in rural areas. Basin Electric is requesting financing assistance from RUS for the proposed 345-kV transmission Project in Mercer, Dunn, McKenzie, Williams, and Mountrail Counties. Prior to providing financing assistance, RUS must comply with the National Environmental Policy Act (NEPA) and is preparing an Environmental Impact Statement (EIS).

The Western Area Power Administration's (Western) role as the administrator of the Western/Basin Electric Power Cooperative/Heartland Consumers Power District Integrated System (IS) requires that Western coordinate with the IS partners to operate and maintain a reliable transmission system that serves the needs of its network customers, including unplanned network load growth. Transmission system planning studies identified the need for a 345-kV transmission line.

In North Dakota Public Service Commission Docket PU-11-692, the Commission approved the 345/115 kV double circuit line with an interconnection to Western's Williston Substation. Pursuant to its

obligations under Federal Power Act (FPA), Western must consider and respond to Basin Electric's proposal for interconnection with the Williston Substation/Transmission Line. Western must consider the interconnection in accordance with Western's General Requirements for Interconnection. Western evaluates the interconnection and whether it meets the reasonable needs of the entity proposing the interconnection to its system. Western generally assumes responsibility to operate and maintain transmission facilities interconnected to its transmission system pursuant to the terms of an Interconnection Agreement or associated contracts. Prior to implementing the interconnection, Western must comply with NEPA and is participating in the RUS EIS as a cooperating agency.

A Macro-Corridor and Alternatives Report was prepared as part of the NEPA process to define the proposed Project and conduct scoping for the proposed Project (Appendix A). This document, reviewed by RUS, contained an Alternatives Evaluation Study (AES) and a Macro-Corridor Study (MCS). The AES was used to determine which system alternative(s) will be appropriate for serving the purpose and need for the proposed Project. The Macro-Corridor Study defined the proposed Project study area, identified project-related opportunities and constraints within the study area, and developed macro-corridors suitable for the routing of a transmission line within the study area.

Following public and agency review of the Macro-Corridor and Alternatives Report, RUS held public and agency scoping meetings to gain input on opportunities and constraints within the Project study area, and particularly within the identified macro-corridors. Public scoping meetings were held at two locations within the Project area to provide the public with information regarding the proposed Project, and to identify concerns regarding potential impacts from the proposed Project. The agency scoping meeting was held in Bismarck to provide federal, state, and local agencies with information about the proposed Project, and to identify compliance, permitting, and other issues related to the proposed Project.

Public and agency scoping meetings provided the attendees the opportunity to ask questions about the Project and learn about the Federal review process and provide feedback on the resources potentially affected by the proposed Project. Maps of the project area and macro-corridor alternatives were also available for agency and public review and comment. Preliminary potential route alignments were presented on maps to provide agencies and the public an idea of the possible location of Project alignment alternatives within the macro-corridors.

A Scoping Report for the proposed Project was developed (Appendix B). This report summarized the scoping process and agency consultation regarding the macro-corridors for the Project. Based upon the scoping process, the Scoping Report identified relevant issues to be evaluated in the EIS.

RUS issued a Draft Environmental Impact Statement (DEIS) in December 2012 for the Project (Appendix C). As noted earlier, Western requested to serve as a cooperating agency for the NEPA environmental review of the proposed Project. Because the proposed Project crosses U.S. Forest Service (USFS) land, the USFS also requested to be a cooperating agency. The USFS Supervisor of the Dakota Prairie Grasslands will issue a Special Use Permit with terms and conditions to ensure the Project is compatible with current USFS land management plans for the Little Missouri National Grasslands. The DEIS evaluated a 1,000-foot corridor route and addressed the impacts associated with 150-foot Project alignment related to construction, operation, and maintenance of the proposed Project and included a detailed evaluation and comparison of two alternative routes and a no action alternative. The Final EIS will evaluate the route that will be considered by the Commission in their State Siting Process.

1.1.2 Letter of Intent

On December 6, 2011, Basin Electric filed a Letter of Intent (LOI) with the Commission to construct the AVS to Neset 345-kV Transmission Project, and the LOI was accepted by the Commission. See Appendix D for copies of this correspondence.

1.1.3 Certificate of Corridor Compatibility

Table 1.1-1 outlines the information required to fulfill the requirements to obtain a Certificate of Corridor Compatibility from the Commission using the Commission's Guidelines and identifying where these requirements are addressed in this application.

Table 1.1-1: Certificate of Corridor Compatibility Completion Checklist

State Authority	Description	Section
Chapter 49-22	**Commission Guidelines: Energy Conversion and Transmission Facility Siting**	**1.1**
Section A	**Description**	**1.2, 4.2**
1.	Type: Describe the type of transmission facility addressed in this application. The description shall include the purpose of the facility and the technology to be employed.	1.0, 1.2, 2.1, 4.2.1
2.	Product: Describe the type, source, and final destination of the product to be transmitted by the proposed facility.	1.2.2
3.	Size and Design:	4.0
3.a.	Provide a description of the size and design of the Electrical facility including, but not limited to, the following:	4.2.1, 4.2.2, 4.2.3
3.a.1.	Width of right of way;	4.2.1
3.a.2.	Estimated span lengths;	4.2.1
3.a.3.	Anticipated type of structure;	4.2.1
3.a.4.	Approximate length of facility	1.0, 1.2, 4.1
3.a.5.	Voltage; and	4.2.1
3.a.6.	The requirement for a general location of any new associated facilities.	4.2.2
3.b.	Provide a description of the size and design of the pipeline facility including, but not limited to, the following:	N/A
4.	Time Schedule: Provide the anticipated time schedule for the accomplishment of the following events:	1.3
4.a.	Certificate of Corridor Compatibility;	1.3
4.b.	Route Application;	1.3
4.c.	Route Permit;	1.3
4.d.	Construction start date;	1.3
4.e.	Construction complete; and	1.3
4.f.	In-service date.	1.3
Section B	**Studies**	
	Provide a copy of any evaluative studies or assessments of the environmental impact of the proposed facility submitted to any federal, regional, state or local agency.	Appendices

State Authority	Description	Section
Section C	**Need for Facility**	**2.0**
1.	An analysis of the need for the proposed facility based on present and projected demand for the product to be transmitted by the facility, including the most recent system studies supporting the analysis of the need.	2.1
2.	A description of any feasible alternative methods of serving the need.	2.2
3.	A statement justifying any deviations from the most recent Ten-Year Plan which the proposed facility may present.	2.3
Section D	**Location**	**Figures, 4.1**
1.	Select a study area, which includes the proposed corridor, of sufficient width to enable the Commission to evaluate the factors addressed in Section 49-22-09, NDCC	1.2.1
2.	Identify and map the criteria that led to the proposed corridor location within the study area.	Figures, 1.2.1, 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6 Volume II
3.	Discuss the relative value of each criteria and how the proposed corridor location was selected giving consideration to all criteria.	1.2.1, 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6
4.	The criteria to be evaluated shall include at a minimum all of the following which are within the study area:	3.0
4.a.	Exclusion areas;	3.1
4.b.	Avoidance areas;	3.2
4.c.	Selection criteria;	3.3
4.d.	Policy criteria;	3.4
4.e.	Design and construction limitations; and	3.5
4.f.	Economic considerations.	3.6
5.	Discuss the general mitigative measures that will be taken to minimize adverse impacts which result from a route location in the proposed corridor.	5.1.3, 5.2.3, 5.3.3, 5.4.3, 5.5.3, 5.6.3, 5.7.3, 5.8.3, 5.9.3, 5.10.3, 5.11.3, 5.12.3, 5.13.3
6.	List the qualifications of the people in the various disciplines that contributed to the corridor location study	9.0
7.	Maps	Figures and Volume II

State Authority	Description	Section
7.a.	Map the criteria within the study area showing the proposed corridor. Several different criteria may be shown on each map, depending on the map scale and the density and nature of the criteria. Minimum map scale shall be ½ inch = 1 mile. All maps shall be at the same scale unless otherwise specified.	Volume II
7.b.	Furnish one set of Mylar maps, separate from the application, of the same scale as the criteria maps and showing the same basic features as the criteria maps, including the study area, but not the proposed facility location.	Figures. GIS-based maps are included with this Application in lieu of Mylar maps.
Chapter 49-22-09	**Factors to be considered in evaluating applications and designation of sites, corridors, and routes.**	**8.0**
1.	Available research and investigations relating to the effects of the location, construction, and operation of the proposed facility on public health and welfare, natural resources, and the environment.	8.1
2.	The effects of new energy conversion and transmission technologies and systems designated to minimize adverse environmental effects.	8.2
3.	The potential for beneficial uses of waste energy from a proposed energy conversion facility.	8.3
4.	Adverse direct and indirect environmental effects which cannot be avoided should the proposed site or route be designated.	8.4
5.	Alternatives to the proposed site, corridor, or route which are developed during the hearing process and which minimize adverse effects.	8.5
6.	Irreversible and irretrievable commitments of natural resources should the proposed site, corridor, or route be designated.	8.6
7.	The direct and indirect economic impacts of the proposed facility.	8.7
8.	Existing plans of the state, local government, and private entities for other developments at or in the vicinity of the proposed site, corridor, or route.	8.8
9.	The effect of the proposed site or route on existing scenic areas, historic sites and structures, and paleontological or archaeological sites.	8.9

State Authority	Description	Section
10.	The effect of the proposed site or route on areas which are unique because of biological wealth or because they are habitats for rare and endangered species.	8.10
11.	Problems raised by federal agencies, other state agencies, and local entities.	8.11

1.1.4 Route Permit

Table 1.1-2 outlines the information required to fulfill the requirements to obtain a Route Permit from the Commission using the Commission's Guidelines for Energy Conversion and Transmission Facility Siting (November 1979) and identifying where these requirements are addressed in this application.

Table 1.1-2: Route Permit Completion Checklist

State Authority	Description	Section
Chapter 49-22	**Commission Guidelines: Energy Conversion and Transmission Facility Siting**	**1.1**
Section A	**Description**	**1.2, 4.2**
1.	Type: Describe the type of transmission facility proposed.	1.0, 1.2, 4.2
2.	Product: Describe the product or products to be transmitted.	1.2.2
3.	Size and Design: Provide a general description of the proposed size and design, and any alternate size or design, which was considered. Provide one (1) copy of the design data report, separate from the application, for the proposed facility and any associated facilities.	4.0, Appendix E
4.	Time Schedule: Provide the anticipated time schedule for the accomplishment of major events including, at a minimum, the following:	1.3
4.a.	Route Permit;	1.3
4.b.	Right-of-way acquisition complete;	1.3
4.c.	Construction start date;	1.3
4.d.	Construction complete;	1.3
4.e.	Test operations; and	1.3
4.f.	In-service date.	1.3

State Authority	Description	Section
Section B	**Location**	Figures, 4.0
1.	Discuss the utility's policies and commitments to limit the environmental impacts of its facilities, including copies of board resolutions and management directives.	3.4
2.	Discuss the factors listed in Section 49-22-09, NDCC to aid the Commission's evaluation of the proposed route.	8.0
2.a.	Available research and investigations relating to the effects of the location, construction, and operation of the proposed facility on public health and welfare, natural resources, and the environment.	8.1
2.b.	The effects of new energy conversion and transmission technologies and systems designated to minimize adverse environmental effects.	8.2
2.c.	The potential for beneficial uses of waste energy from a proposed energy conversion facility.	8.3
2.d.	Adverse direct and indirect environmental effects which cannot be avoided should the proposed site or route be designated.	8.4
2.e.	Alternatives to the proposed site, corridor, or route which are developed during the hearing process and which minimize adverse effects.	8.5
2.f.	Irreversible and irretrievable commitments of natural resources should the proposed site, corridor, or route be designated.	8.6
2.g.	The direct and indirect economic impacts of the proposed facility.	8.7
2.h.	Existing plans of the state, local government, and private entities for other developments at or in the vicinity of the proposed site, corridor, or route.	8.8
2.i.	The effect of the proposed site or route on existing scenic areas, historic sites and structures, and paleontological or archaeological sites.	8.9
2.j.	The effect of the proposed site or route on areas which are unique because of biological wealth or because they are habitats for rare and endangered species.	8.10
2.k.	Problems raised by federal agencies, other state agencies, and local entities.	8.11

State Authority	Description	Section
3.	Identify and map the criteria that led to the proposed route location within the designated corridor.	Figures, 1.2.1, 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, Volume II
4.	Discuss in detail the relative value of each criteria and how the location, construction, and operation of the facility will affect each criteria.	1.2.1, 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6
5.	The criteria to be evaluated shall include at a minimum all of the following which are within the designated corridor:	3.0
5.a.	Exclusion areas;	3.1
5.b.	Avoidance areas;	3.2
5.c.	Selection criteria;	3.3
5.d.	Policy criteria;	3.4
5.e.	Design and construction limitations; and	3.5
5.f.	Economic considerations.	3.6
6.	Discuss the mitigative measures that will be taken to minimize adverse impacts which result from the location, construction, and operation of the facility.	5.1.3, 5.2.3, 5.3.3, 5.4.3, 5.5.3, 5.6.3, 5.7.3, 5.8.3, 5.9.3, 5.10.3, 5.11.3, 5.12.3, 5.13.3
7.	List the qualifications of the people in the various disciplines that contributed to the facility route location study	9.0
8.	Maps	Figures
8.a.	Map the criteria within the designated corridor showing the proposed route and location of any new associated facilities. Several different criteria may be shown on each map, depending on the map scale and the density and nature of the criteria. Minimum map scale shall be ½ inch = 1 mile. All maps shall be at the same scale unless otherwise specified.	Volume II
8.b.	Furnish one (1) set of Mylar maps, separate from the application, of the same scale as the criteria maps and showing the same basic features as the criteria maps, including the designated corridor, but not the proposed route or location of any new associated facilities.	Figures. GIS-based maps are included with this Application in lieu of Mylar maps
8.c.	Furnish one (1) set of uncontrolled 9x9 inch stereo-pair aerial photographs, separate from the application, with acceptable resolution showing the designated corridor, proposed route and location of any new associated facilities, and Section, Township and Range numbers, at a scale	Figures. GIS-based maps are included with this Application.

State Authority	Description	Section
	of 1 inch = 2000 feet, together with a flight map at a scale of ½ inch = 1 mile showing each flight line and the beginning and ending photo number of each flight line. Photo mosaic strip maps will also be acceptable. If the applicant can demonstrate that because of the limited size and scope of the project, aerial photographs will not be practical, this requirement may be waived.	

1.2 PROJECT SUMMARY

The Project consists of 197 miles of new 345-kV electric transmission line connecting the existing AVS 345-kV Substation to the proposed Tande 345-kV Substation, with a connection to the existing Charlie Creek 345-kV Substation and proposed Judson 345-kV Substation along the route (Figure 1.2-1). The Project also includes a 1-mile 230-kV transmission line connection from the proposed Tande Substation to the existing 230-kV Neset Substation. An approximately 31-mile portion of the 345-kV line between the proposed Judson and Tande Substations will be double-circuited with a Mountrail Williams Electric Cooperative (MWEC) 115-kV line associated with other regional improvement projects. The remaining portions of the 345-kV line will be single-circuit. New ROW will be required for the 197 miles of new 345-kV line from the AVS to Tande Substations and the 1 mile of new 230-kV line from the Tande to Neset Substations.

The proposed 345-kV, single-circuit transmission lines will be constructed using single-pole or H-frame self-supporting structures. The 345/115-kV, double circuit transmission line segment will be constructed of single-pole self-supporting structures. All 345-kV segments will be constructed within a 150-foot-wide ROW. The single-circuit 230-kV line will be constructed using single-pole, self-supporting structures within a 100-foot ROW. The Project will require construction of two new substations (Judson and Tande) and upgrades to the existing substations (AVS, Charlie Creek, and Neset).

1.2.1 Study Area, Project Corridor, and Route Development Summary

During the initial route development process in the development of the DEIS, two potential Project alternatives were identified that could provide a transmission line from the AVS Substation to Judson Substation to Neset Substation, with a Williston Substation and Charlie Creek Substation connection.

NORTH

0 11.5
Miles

Neset
Tande
Judson
Williston
Williams
Mountrail
Renville
McHenry
Ward
McKenzie
Fort Berthold
McLean
Dunn
Antelope Valley
Mercer
Oliver
Golden Valley
Billings
Charlie Creek

CANADA
Montana
North Dakota
South Dakota

LEGEND

- Project Route
- Existing Substation
- Proposed Substation
- Army Corps of Engineers
- National or State Park
- National Wildlife Refuge
- National Grassland
- Tribal Lands
- BLM Lands
- State Boundary
- County Boundary
- Municipal Areas
- Railroad
- DGC Pipeline
- Scenic Byway

Existing Transmission Lines

- 345-kV
- 230-kV and Below

Burns & McDonnell SINCE 1898

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

Figure 1.2-1
Basin Electric Power Cooperative
Antelope Valley Station to Neset
345-kV Transmission Project
Overall Proposed Project Area and
Proposed Corridor/Route

Source: North Dakota GIS; Esri; Basin Electric; Burns & McDonnell.

Revised January 03, 2013

\\espsrv\data\Projects\Basin\61495_AVS_345\GIS\DataFiles\ArcDocs\PSC- Chapter 1 Figures\1-2-1 Overall Project Area and Proposed Project Route.mxd 1/3/2013

One project alternative involved a transmission line extending from the AVS Substation directly to the Charlie Creek Substation, then on to the proposed Judson Substation, with an interconnection to the Williston Substation, then on to the proposed Tande Substation with an interconnection to the Neset Substation. The other Project alternative involved a transmission line extending from the AVS Substation to a new Killdeer Switchyard, with an interconnection from the new Killdeer Switchyard to the Charlie Creek Substation, and then on to the Judson Substation with an interconnection to the Williston Substation, and then to the Tande Substation, with an interconnection to the Neset Substation. A study area suitable for development of several corridors was established for the Project that encompassed parts of Mercer, Dunn, McKenzie, Williams, and Mountrail Counties in North Dakota. Macro-corridors, approximately six miles wide, were developed within the study area that:

- Provided an area to investigate route corridors to connect the above-mentioned Project endpoints.
- Provided flexibility to identify multiple route corridors for a transmission line within the macro-corridors.
- Minimized impacts to important natural and human resource attributes identified within the macro-corridors.

An investigation of the human and natural attributes within the study area was conducted to identify resources that will present issues or concerns for either Project alternative. Human attributes include municipal and other populated areas, public lands, roads, transmission lines, railroads, and other utilities. Natural attributes include wildlife, vegetation, wetlands, special status species, topography, and cultural resources. The initial macro-corridors were evaluated with consideration of the following constraints present within the study area that were used as a high level screening tool for areas to avoid placing transmission lines and substations:

- Communities and other developed areas within the study area
- Lake Sakakawea
- Missouri River
- Theodore Roosevelt National Park (TRNP)
- Little Missouri National Grasslands (LMNG)
- Little Missouri River
- Areas of rough and steep terrain around the Missouri River and Little Missouri River

Potential route corridors were developed within the six-mile-wide macro-corridors identified for the proposed Project. Route corridors consisted of approximately 1,000-foot wide corridor segments that

could be combined to connect the Project end points. The objective was to identify potential route corridors that minimize impacts on natural and human resources and provided cost-effective project options. Routing principles used to develop the route corridors included:

- Minimize length
- Minimize angles
- Follow existing rights-of-way and land divisions (electric lines, roads, property boundaries, fence rows, field borders) as appropriate
- Minimize visual contrast with natural landscape
- Minimize conflict with current and planned uses of land
- Minimize impacts to natural resources such as wetlands, woodlands, and wildlife
- Minimize impacts to human resources such as residences and cultural resources
- Avoid densely populated residential areas and maintain as much distance as practicable from individual homes and public facilities (i.e. churches, schools, etc.)
- Avoid crossing back and forth across waterways and roads
- Maximize distance from airports, landing strips and other aviation facilities
- Avoid crossing major roads in the vicinity of intersections and interchanges

A network of 46 individual 1,000-foot route corridor segments was initially developed within the six-mile wide macro-corridors to avoid constraints and take advantage of opportunity areas while considering public and agency comments (Figure 1.2-2). The alternative route segments were evaluated based on social and natural resources present within the macro-corridors, engineering and constructability consideration, and concerns expressed by federal, state, and local agencies and the public. Following the development of route segments, a screening process was used to identify those segments that provided the best opportunity for the routing of a transmission line while avoiding areas of constraint and minimizing impacts on the natural and human resources within the macro-corridor.

Basin Electric identified two route corridor alternatives using 31 of the 46 route segments, with the remaining 15 segments included as alternate corridor segments to the identified route corridor alternatives. Within each 1,000-foot-wide route corridor alternative, a representative 150-foot route alignment ROW was created using the centerline for evaluation of potential impacts of constructing and operating the Project.

NORTH

0 11.5

Miles

Neset

Proposed Tande 345-kV Substation

Proposed Judson 345-kV Substation

Williston

Williams

Mountrail

Ward

Renville

McLean

McKenzie

Dunn

Golden Valley

Mercer

Charlie Creek

Antelope Valley Station

JN-1 JN-2 JN-3 JN-4 JN-5 JN-6 JN-7 JN-8 JN-9 JN-10

AJ-1 AJ-2 AJ-3 AJ-4 AJ-5 AJ-6 AJ-7 AJ-8 AJ-9 AJ-10 AJ-11 AJ-12 AJ-13 AJ-14 AJ-15 AJ-16 AJ-17 AJ-18 AJ-19 AJ-20 AJ-22 AJ-23 AJ-24 AJ-25 AJ-26 AJ-27 AJ-28 AJ-29 AJ-30 AJ-31 AJ-32 AJ-33 AJ-34 AJ-35 AJ-36

LEGEND

- Existing Substation
- Proposed Substation
- State Boundary
- County Boundary
- Municipal Areas
- Route Corridor Segment Network
- Macro-Corridor

Burns & McDonnell SINCE 1898

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

Figure 1.2-2
Basin Electric Power Cooperative
Antelope Valley Station to Neset
345-kV Transmission Project
Route Corridor Segment Network

Source: North Dakota GIS; Esri; Basin Electric; Burns & McDonnell.

Revised December 10, 2012

\\espsrv\data\Projects\Basin\61495_AVS_345\GIS\DataFiles\ArcDocs\PSC- Chapter 1 Figures\1-2-2 Route Corridor Segment Network.mxd 12/10/2012

Based on this route analysis and subsequent environmental studies and agency and public input, the Project Corridor/Route presented in this Application was selected as the owner's preferred alternative for a route. The factors addressed in NDCC Section 49-22-09 were considered in identifying the Corridor/Route. All exclusion areas, avoidance areas, selection criteria, and policy criteria set forth in NDAC Section 69-06-08-02 were considered in selecting the Corridor/Route.

The USFS provided input regarding the routing of the line through the LMNG to be consistent with the Land and Resource Management Plan for the Dakota Prairie Grasslands, Northern Region (2001). The Corridor/Route will be located in a utility corridor along U.S. Highway 85 through the LMNG and will not cross any special management areas that have been designated as Roadless Areas within the LMNG. This segment of the Corridor/Route was originally sited further east, within the Lone Butte Management Area, but based on comments received during the scoping process, the route was realigned to move outside of this special management area.

The segment of the Corridor/Route that extends through the Lewis and Clark WMA was realigned based on coordination with the USACE. Based on the input provided by USACE, the Corridor/Route was realigned to parallel U.S. Highway 85 and an existing transmission line through the WMA.

1.2.2 Product

A new 345-kV transmission line from the Beulah area to the 230-kV system in the Williston/Tioga area and the 345-kV system near Grassy Butte will provide an increase in the load-serving capacity to accommodate the projected load growth and maintain acceptable reliability of the regional transmission system.

1.3 PROJECT SCHEDULE

The Project is expected to start construction in 2014. A two-year construction phase is anticipated with in-service expected in late 2015/early 2016. Permitting efforts including the corridor and route selection processes are underway. The Project requires various state, federal, and local permits prior to initiating construction. An overview of the Project schedule is provided in Table 1.3-1.

Table 1.3-1 Project Schedule

Corridor Certificate/Route Permit Application	March 2013
Corridor Certificate/Route Permit	Anticipated 2013
Right-of-Way acquisition complete	April 2014
Construction start date	April 2014
Construction complete	October 2015
Test operations	November 2015
In-service date	December 2015

* * * * *

2.0 NEED FOR FACILITY

2.1 NEEDS ANALYSIS

Basin Electric has identified the need for additional electric transmission capacity in northwestern North Dakota as a result of increased demand and to meet reliability and system stability requirements for the region.

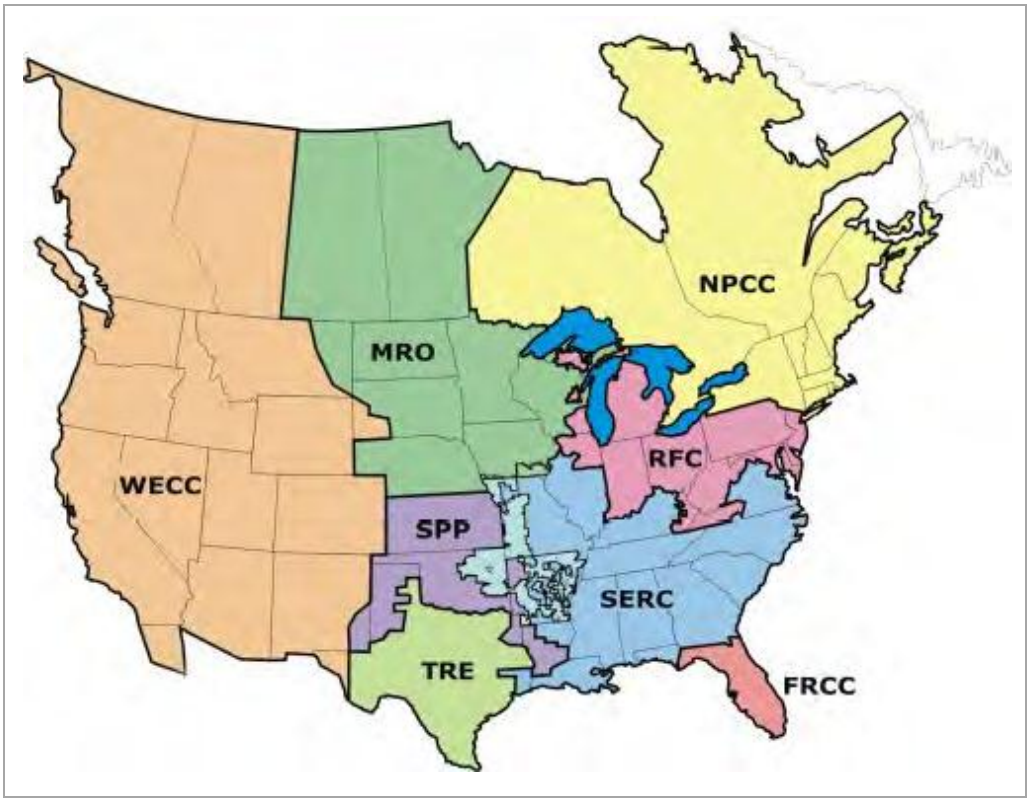
System Reliability Issues. The Department of Energy's (DOE) Federal Energy Regulatory Commission (FERC) has the authority to develop and enforce reliability standards. These standards are in place to ensure system reliability, which is defined by the DOE's Energy Information Administration (EIA) as "a measure of the ability of the system to continue operation while some lines or generators are out of service. Reliability deals with the performance of the system under stress" (EIA 2011). The system as it is used here refers to both generation and transmission components. It does not, however, include the low-voltage distribution lines that deliver electricity to consumers.

The Energy Policy Act of 2005, Section 215, required the creation of an Electric Reliability Organization (ERO) with authority to establish, approve and enforce mandatory electricity reliability standards, subject to review and approval by the FERC. In 2006, the FERC established rules for certification of the ERO and procedures for establishment, approval and enforcement of reliability standards.

In 2006, the North American Electric Reliability Corporation (NERC), a pre-existing voluntary reliability organization, was certified as the ERO in the United States. The authority and certification granted to the NERC also included a provision for the newly-certified ERO to delegate certain authority to regional entities as shown in Figure 2.1-1 for the purpose of proposing and enforcing reliability standards in particular regions of the country (FERC 2006).

NERC reliability standards apply to all owners, users and operators of the bulk power system, which includes the electric generation and transmission system in North America. The reliability standards are developed by NERC and approved by FERC. Among the many reliability standards NERC has developed are sets of standards for transmission operations and transmission planning.

Figure 2.1-1: NERC Reliability Regions



Source: NERC 2010.

The Midwest Reliability Organization (MRO). The MRO's current primary function is to monitor and enforce the NERC Reliability Standards. The MRO has delegated much of its transmission reliability responsibility to two Reliability Coordinators (RCs). NERC guidelines require that each regional reliability organization establish one or more RCs to "continuously assess transmission reliability and coordinate emergency operations among the operating entities within the region and across the regional boundaries" (MRO 2010).

For the Basin Electric service area in northwestern North Dakota, the RC is the Integrated System (IS) that consists of Western, Basin Electric, and Heartland Consumers Power District (Heartland). The IS provides the high-voltage transmission system grid in the region of eastern Montana, North Dakota, and South Dakota.

The IS transmission facilities consist of approximately 9,200 miles of interconnected high-voltage transmission lines, of which approximately 1,340 miles are owned by Basin Electric. The IS transmission system provides for delivery of power from federal hydroelectric facilities and thermal generation plants

owned by Basin Electric and Heartland. The IS agreement between Western, Basin Electric and Heartland provides open-access transmission service to customers in the region.

Project Area Reliability Issues. The existing high voltage system in the Williston/Tioga region consists of 230-kV and 115-kV systems that connect to: Saskatchewan, Canada; eastern Montana; central North Dakota; and western North Dakota. Outage of any of these paths could cause low voltage criteria violations and overload adjacent transmission lines in the Williston/Tioga region and therefore be in violation of NERC reliability standards. The IS study focused on the area with the most rapidly changing and increasing demand and the most potential for outage issues in the Eastern Montana and Western North Dakota area, identified as the Williston Pocket Load. In conducting the analysis and in order to maintain consistency, various demand and outage scenarios were utilized that other MRO service providers and reviewing authorities had previously approved. The scenarios included isolated local projects that are in the process of being constructed or planned for construction that will provide minor improvements to reliability over the short term. The results of the IS analysis identified the short-term and long-term serious overload and low voltage NERC criteria violations.

Load Forecast. The demand for electricity creates a stress on existing generation and transmission facilities. The August 2011 Basin Electric load forecast indicates an acceleration of growth in the northwestern North Dakota area that is mainly a result of the development related to the Bakken oil field. Much of the short-term load growth in this area is associated with provision of electrical service to support the rapid expansion of the number of facilities for oil and natural gas production as well as the supporting infrastructure and services. This relatively rapid upswing in development activity in recent years is due to new exploration and extraction technology and the potential for oil recovery from the Bakken Formation. A follow-up Third Party Study was prepared in 2012 that confirmed the load projections in northwestern North Dakota due to the rapidly expanding electrical service in this region (Appendix U).

Infrastructure development related to the expanding oil and gas industry activity in the region includes pipelines, rail, natural gas plants, homes, businesses, roads, and transmission/distribution line development. Pipeline infrastructure is being developed to transport crude oil out of the Bakken to refinery and marketing hubs, such as the U.S. Gulf Coast, as well as to transport natural gas, fracking water, and salt water. Crude oil is being transported by rail out of the Bakken oil field, and expansion of rail infrastructure and associated loading and unloading facilities is under development. Natural gas plants are expanding to process natural gas for consumer use. Local transmission lines for distribution

have recently been constructed or are in development in western North Dakota to support the expanding drilling activity and supporting infrastructure.

In the Williston/Tioga region, the preliminary load forecast for northwestern North Dakota is noted in Table 2.1-1. It is projected that the load is increasing in the regions adjacent to Williston/Tioga in a similar manner.

Table 2.1-1: Basin Electric Member Load Forecast for Transmission Lines in the Williston/Tioga Region

Year	Load (MW*)	% Increase
2011	280	--
2012	390	39
2013	454	16
2014	481	6
2015	509	6
2016	538	6

Source: Basin Electric, 2011
*MW = megawatts

An analysis of transmission line capacity indicates by the year 2016 the load will have increased beyond the load-serving capacity of the existing system for the Williston/Tioga region and a new transmission line is required to provide additional capacity. The closest strong transmission system support is the transmission infrastructure associated with the electrical power generation at the Antelope Valley Station, located near Beulah. This system is operated at 345-kV and 230-kV and extends west, south and east from Beulah across several state boundaries. This IS transmission infrastructure is the inter-tie between the numerous electrical generation facilities and the Federal hydroelectric generation-associated main-stem Missouri River System. A new 345-kV transmission line from the Beulah area to the northwest that connects directly to the 230-kV system in the Williston/Tioga area will provide an increase in the load-serving capacity to accommodate the projected load growth and maintain acceptable reliability of the regional transmission system. If this new 345-kV transmission line is not added, the load growth will be capped at the projected 2015 load level and no new load growth could be accommodated. The transmission system reliability will be severely impacted. This will limit future potential development activities and impact the existing infrastructure in the Bakken oil field and any other load requirements in this service region.

2.2 ALTERNATIVES

A Macro-Corridor and Alternatives Report was prepared as part of the process to define the proposed Project and conduct scoping for the proposed Project (Appendix A). This document, reviewed by RUS, contained an Alternatives Evaluation Study (AES) and a Macro-Corridor Study (MCS). The AES was used to determine which system alternative(s) will be appropriate for serving the purpose and need for the proposed Project. The Macro-Corridor Study defined the proposed Project study area, identified project-related opportunities and constraints within the study area, and developed macro-corridors suitable for the routing of a transmission line within the study area. A summary of the system alternatives considered for the proposed Project is provided below.

2.2.1 System Upgrades

The electrical transmission line network in North Dakota is part of a regional electrical system. The IS is operated and administered by Western. The common use transmission system is in the eastern interconnection of the IS service area. The IS transmission reliability study group performed an evaluation study titled *Eastern Montana/Western North Dakota Load Serving Study Facility Additions Justification-August 2011*(IS 2011). The IS Study 2011 was based on the load forecasts supplied in early 2011. With the rapidly evolving oil development in this region, the load forecast may develop earlier than initially planned. With potential unanticipated load growth, additional system improvements may be required at an accelerated timeline.

Numerous operating scenarios were developed and evaluated for the IS system as well as system facility upgrades which did not include new line construction. These operating scenarios were modeled with different line ratings, line carrying capacities, and system contingencies. Modeling of the facility upgrades included replacement of existing transformers with higher-capacity units and the installation of capacitors at various locations throughout the system. Under all scenarios investigated, system reliability on some lines will be only temporarily improved. However, even with implementation of all investigated upgrades, significant system failures, including considerable voltage drops or even voltage collapse, will result in numerous lines throughout the system exceeding their emergency ratings. These considerable system limitations could occur as early as 2014.

2.2.2 Additional 115-kV Lines

In order to mitigate the system limitations identified, construction of several new alternatives for 115-kV lines were investigated. It was anticipated by the study that these lines will be constructed and made operational by 2014 by Basin Electric and our member distribution cooperatives. Generally, these lines will serve specific loads and will not be operated as part of the overall regional electricity transmission

network. Additional 115-kV lines currently in the planning and evaluation stages or under construction include:

- MWEC 115-kV lines to serve the Tioga and Blaisdell areas
- Central Power 115-kV line between the Minot and Roseglen areas
- MWEC 115-kV line between Watford City and Swenson
- 115-kV line connection between Snake Creek Pumping Station and Parshall with an interconnection at Roseglen
- 115-kV line between Blaisdell and Berthold Substations

Construction and operation by the member cooperatives of these 115-kV facilities was found to mitigate many of the system limitations identified through 2014. However, as early as 2015 many of the current system limitations will again result, even with the proposed upgrades and 115-kV line constructions. Potentially the load forecasts for the IS territory may not be met with the evaluated system improvements. The IS Study was based on predicted load growth. Should the actual load growth be larger than what was predicted, additional system improvements may be required.

2.2.3 Additional 345-kV Lines

The IS study included further long-term analysis to identify potential solutions to address the inability of the system to meet projected load forecasts beyond the 2014-to-2016 time period. These alternatives included construction of various 345-kV lines in addition to the 115-kV lines previously noted. Initial project development efforts identified the region north of the existing Antelope Valley Station (AVS) 345-kV Substation as providing a direct path towards a connection to the existing Neset 230-kV Substation near Tioga. The two big impediments to developing a new transmission line directly from AVS to Tioga are the Fort Berthold Reservation and Lake Sakakawea, both north of the existing AVS 345-kV Substation. Crossing Fort Berthold was not considered a viable alternative because it will involve tribal lands, which could complicate the approval process. Crossing Lake Sakakawea was investigated at a conceptual level and it was determined that the logistics and costs associated with placement of a submarine cable in the lake made the Project infeasible. Furthermore, system planning analysis determined that a connection to the Charlie Creek Substation and a connection to Western's Williston Substation will be needed to satisfy the purpose and need for the Project and the long-term needs of the system. Because of these reasons, the above-mentioned alternatives were not carried forward as alternatives for the proposed Project.

Based on the IS study previously mentioned, two 345-kV transmission line alternatives were recommended for consideration as Project alternatives:

AVS to Charlie Creek Substation to Judson to Tande to Neset with interconnection with Williston alternative. This alternative will include a 65-mile 345-kV line from the AVS to the existing Charlie Creek 345-kV Substation. The existing Charlie Creek 345-kV Substation will be connected by a 70-mile segment to the proposed Judson 345-kV Substation near Williston. The proposed Judson 345-kV Substation would then interconnect with the proposed Tande 345-kV Substation by a 56-mile line segment and a two-mile 230-kV transmission line will interconnect the proposed Judson 345-kV Substation to Western's existing Williston 230-kV Substation. Finally, the proposed Tande 345-kV Substation would interconnect with the existing Neset 230-kV Substation by a 1-mile 230-kV line segment.

AVS to Killdeer to Judson to Tande to Neset 345-kV line with interconnection with Williston and a Killdeer to Charlie Creek Substation interconnection alternative.. This alternative will include construction of approximately 40 miles of 345-kV line from AVS to a proposed 345-kV switchyard near Killdeer. An additional 85-mile 345-kV transmission line will extend from the proposed Killdeer 345-kV Switchyard to the proposed Judson 345-kV Substation and a 25-mile 345-kV line segment would extend from the proposed Killdeer 345-kV Switchyard to the existing Charlie Creek 345-kV Substation, located near Grassy Butte. The proposed Judson 345-kV Substation would then interconnect with the proposed Tande 345-kV Substation by a 56-mile line segment. The Williston Tie Project that was previously approved by the PSC (Case PU 11 692) consists of a 2-mile 230-kV transmission line that will interconnect the proposed Judson 345-kV Substation to Western's nearby existing Williston 230-kV Substation. Finally, the proposed Tande 345-kV Substation will interconnect with the existing Neset 230-kV Substation by a 1-mile 230-kV line segment.

2.2.4 No Action Alternative

Under the No Action Alternative the Project will not be constructed. No land will be used for transmission facilities or substations, with no changes to the existing environment within the study area. Under the No Action Alternative, load growth will increase beyond the load-serving capacity of the existing system for the Williston/Tioga region by 2016, resulting in transmission system reliability issues and exceeding the criteria recommended by NERC for transmission reliability in the region. A No Action Alternative was evaluated in the EIS in accordance with the Council on Environmental Quality NEPA regulations (40 CFR 1502.14) requiring review of a no-action alternative.

2.2.5 Recommended System Alternatives

Based on the IS study, construction of new 345-kV transmission line facilities will be required to meet the projected load for the eastern Montana and western/central North Dakota areas, including the identified Williston Load Pocket. Construction of a 345-kV line from AVS to Charlie Creek, Williston and Tioga areas is the only alternative identified capable of meeting the long-term system load capacity and reliability criteria. There was initial discussion of delivering power to the Judson/Williston/Neset Substations without a Charlie Creek 345-kV Substation connection. Future conditions evaluated with and without a Charlie Creek 345-kV Substation connection were found to maintain system reliability requirements and serve projected load forecasted through 2020. However, the future condition including the Charlie Creek 345-kV Substation connection provided a more robust support of the Western IS system and better supports future planning for growth in western North Dakota. Therefore, it is determined that the construction and operation of the AVS-to-Charlie Creek-to-Judson-to-Tande-to-Neset by a 345-kV transmission line, with associated substation interconnections, will better satisfy the Project's Purpose and Need and was recommended by the IS study (IS, 2011).

2.3 NEW GENERATION

In order to meet the need for voltage support to areas in northwestern North Dakota, Basin Electric is currently constructing two simple-cycle combustion turbine projects. The need for these projects was identified as areas for concern with the current load demands and the existing transmission infrastructure. The two projects are the Pioneer Generating Station (PGS) and the Lonesome Creek Station (LCS).

PGS Phase I is a single LM 6000 PC SPRINT simple-cycle combustion turbine with a nominal output rating of 45 MW with a clutch attached to isolate the combustion turbine from the generator set. With the clutch engaged, the generator acts similar to a synchronous condenser, thus providing much needed voltage support to the local transmission system during times that generation is not required. Construction on the PGS Phase I began on June 4, 2012. PGS's electrical interconnection with the transmission grid is through a short 115-kV line to MWEC's Stateline I Substation. Commercial operation of PGS Phase I is mid-2013.

LCS Phase I is also a single LM 6000 PC SPRINT simple-cycle combustion turbine with a nominal output rating of 45 MW with a clutch attached to isolate the combustion turbine from the generator set. With the clutch engaged, the generator acts similar to a synchronous condenser, thus providing much needed voltage support to the local transmission system during times that generation is not required.

Construction on the LCS Phase I began on July 3, 2012. LCS's electrical interconnection with the transmission grid is through a short 115-kV line to McKenzie Electric Cooperative's (MEC) HayButte Substation. Commercial operation of LCS Phase I is mid-2013.

Both PGS and LCS will undergo a Phase II project where two additional 45-MW simple-cycle combustion turbines will be installed at each facility. PGS Phase II is currently undergoing Siting activity with the Public Service Commission. Commercial operation of PGS Phase II is expected in mid-2014. A Letter of Intent was filed with the Commission in December 2012 for LCS Phase II. Commercial operation of LCS Phase II is expected in mid-2015.

2.4 TEN-YEAR PLAN

Basin Electric filed a Ten-Year Plan with the Commission on June 27, 2012. This Project is consistent with the Ten-Year Plan on file with the Commission.

* * * * *

3.0 TRANSMISSION FACILITY CORRIDOR AND ROUTE CRITERIA

The Project Corridor and Route selection included an inventory and suitability analysis of criteria listed in NDAC Section 69-06-08-02, including exclusion and avoidance area criteria; selection criteria that relate to minimizing potential land use and environmental impacts; policy criteria that relate to maximizing public benefits; and design and construction limitations. Basin Electric also included economic considerations as part of the analysis.

For purposes of this Project, the Corridor/Route is the 150-foot-wide area in which the transmission line facility will be constructed. As the Corridor and the Route are the same alignment, all the criteria evaluation and analysis required for corridors and routes has been applied to the 150-foot right-of-way. Volume II includes detailed maps that illustrate the exclusion, avoidance and selection criteria in relation to the Project Corridor/Route.

3.1 EXCLUSION AREAS

Per Section 69-06-08-02(1), the geographical areas listed in Table 3.1-1 shall be excluded in the consideration of a corridor or route for a transmission facility, and shall include a buffer zone of reasonable width to protect the integrity of the area. Exclusion areas are mapped for the Project Corridor/Route in Volume II.

Table 3.1-1 Exclusion Areas

Geographic Area	Present within Corridor/Route	Proposed Buffer	Section Addressed
Designated or registered national: parks; memorial parks; historic sites and landmarks; natural landmarks; monuments; and wilderness areas	Not present within Corridor/Route	No impacts are anticipated and no buffer is proposed	5.2, 5.8, 5.9
Designated or registered state: parks; historic sites; monuments; historical markers; archaeological sites; and nature preserves	Not present within Corridor/Route	No impacts are anticipated and no buffer is proposed	5.2, 5.8, 5.9
County parks and recreational areas; municipal parks; and parks owned or administered by other governmental subdivisions	Not present within Corridor/Route	No impacts are anticipated and no buffer is proposed	5.2, 5.9

Areas critical to the life stages of threatened or endangered animal or plant species	Not present within Corridor/Route	ESA Section 7 consultation has been initiated with the USFWS to ensure that the Project will not jeopardize the continued existence of any listed species or adversely modify critical habitats Whooping crane: The Project will be designed to meet requirements for the protection of avian species from electrocution and line strikes Piping plover: The Corridor/Route will be constructed adjacent to an existing transmission line located next to U.S. Highway 85 where the Corridor/Route crosses an area designated as critical habitat for the piping plover; however construction will not occur within the primary constituent elements of piping plover habit. Pallid sturgeon: No transmission structures will be located within the Missouri River; BMPs will be used to prevent impacts to water resources Sprague's pipit and Dakota skipper: Potential temporary disturbance to grassland habitat within Corridor/Route; grassland habitat will be re-established upon completion of construction	5.13

Areas where animal or plant species that are unique or rare to this state will be irreversibly damaged	Not present within Corridor/Route	Potential temporary disturbance to native grassland habitat within Corridor/Route; grassland habitat to be re-established upon completion of construction Surveys for USFS MIS will be conducted during May 2013; following the surveys, Project-specific mitigation measures will be developed in consultation with USFS and will be included as conditions in the USFS Special Use Permit if needed	5.13

3.2 AVOIDANCE AREAS

Per Section 69-06-08-02(2), the geographical areas listed in Table 3.2-1 shall not be considered in the routing of a transmission facility unless the applicant shows that under the circumstances there is no reasonable alternative. In determining whether an avoidance area should be designated for a facility, the Commission may consider, among other things, the proposed management of adverse impacts; the orderly siting of facilities; system reliability and integrity; the efficient use of resources; and alternative routes. Avoidance areas are mapped for the Project Corridor/Route in Volume II.

Table 3.2-1 Avoidance Areas

Avoidance Area	Present within Project Corridor/Route	Proposed Buffer	Section Addressed
Designated or registered national: historic districts; wildlife areas; wild, scenic or recreational rivers; wildlife refuges; and grasslands	Approximately 143.8 acres of the LMNG within the Corridor/Route	The Corridor/Route does not cross any designated Roadless Areas within the Grassland; the Corridor/Route will be located in a utility corridor along U.S. Highway 85 that is compatible with the USFS land management plan for the area; Basin Electric has submitted a Special Use Permit Application to USFS for the Project	5.2, 5.8, 5.9

Designated or registered state: wild, scenic, or recreational rivers; game refuges; game management areas; management areas; forests; forest management lands; and grasslands	Approximately 57.7 acres of the Lewis and Clark Wildlife Management Area within the Corridor/Route Corridor/Route crosses the Little Missouri River, a designated State Scenic River	Direct impacts to the WMA include acquisition of the ROW and potential clearing of 6.0 acres of woodland; An easement or permit to cross public land will be acquired from USACE for the Project; vegetation removal and replacement will be conducted according to requirements in the Public Service Commission's Woody Species Replacement Plan (Appendix V)	5.2, 5.9
Historical resources which are not specifically designated as exclusion or avoidance areas	Based on the Class I cultural resources investigation conducted for the Project, known sites have been avoided; a portion of the Corridor/Route has been surveyed at the Class III level. The rest of the Corridor/Route will be surveyed prior to construction and any cultural resource sites will be avoided.	Section 106 consultation has been initiated for the Project and will address the need for Class II and/or Class III cultural resource inventories Known archaeological sites within the Corridor/Route will be spanned and protected from disturbance during construction	5.8
Areas which are geologically unstable	Corridor/Route crosses approximately 5,618.3 feet of terrain (19.5 acres within the Corridor/Route) where landslides have occurred previously Corridor/Route crosses approximately 5,238.8 feet of terrain with a slope greater than 10 percent (18.0 acres within the Corridor/Route)	A majority of the identified landslide areas will be spanned by the transmission line, with no structures being placed within susceptible landslide areas; geotechnical assessments will be conducted at structure locations to minimize the potential development of landslides in susceptible areas during construction	5.11

Within 500 feet of a residence, school, or place of business	2 residences within 500 feet of the Corridor/Route No schools or business within 500 feet of the Corridor/Route	The transmission line was routed to minimize impacts to residences, and the Project will not result in any displacement of residences Basin Electric has obtained waivers of the 500-foot setback requirement for the 2 residences	5.1
Reservoirs and municipal water supplies	Not present within Corridor/Route	No impacts are anticipated and no buffer is proposed	5.12
Water sources for organized rural water districts	Not present within Corridor/Route	No impacts are anticipated and no buffer is proposed	5.12
Irrigated land.	Not present within the Corridor/Route	No impacts are anticipated and no buffer is proposed	5.2, 5.10
Areas of recreational significance which are not designated as exclusion areas	Corridor/Route crosses the Lewis and Clark National Historic Trail at the Missouri River Corridor/Route crosses approximately 20 North Dakota School Trust Land parcels, for a total of approximately 123.5 acres within the Corridor/Route	The crossing of the Trail at the Missouri River will occur adjacent to an existing transmission line and U.S. Highway 85; access to the Trail will be maintained and recreational activity may continue Basin Electric will obtain an easement from the North Dakota Department of Trust Lands to cross these parcels and is coordinating with the Department to ensure that the Project does not impact the ability to continue to develop the Trust Lands per their planning.	5.2, 5.7, 5.9

3.3 SELECTION CRITERIA

Per Section 69-06-08-02(3), a corridor or route shall be designated only when it is demonstrated to the Commission by the applicant that any significant adverse effects resulting from the location, construction, and maintenance of the facility as they relate to the following, will be at an acceptable minimum, or that those effects will be managed and maintained at an acceptable minimum (Table 3.3-1). Selection criteria are mapped for the Project Corridor/Route in Volume II.

Table 3.3-1 Selection Criteria

Selection Criteria	Potential Adverse Effects	Section Addressed
Agricultural production	1,392.2 acres of cultivated cropland and 158.0 acres of pasture/hayland within the Corridor/Route ; Current agricultural production will be maintained for most of the Corridor/Route; The only land unavailable for agriculture will be the area occupied by structures for a total of 1.03 acres (0.0009-acre per structure); There will be approximately 1,161 structures for the Corridor/Route. Landowners will be compensated for crop and forage loss that occurs as a result of construction and maintenance activities, and any damage to soils will be redressed. At the proposed Judson and Tande substation sites, the agricultural land within the approximately 12 acres at each site will be permanently converted to utility use.	5.2, 5.10
Family farms and ranches	No family farms will be displaced due to construction of the Corridor/Route. Basin Electric will work with landowners to minimize impacts to their land and agricultural operations.	5.2, 5.10
Land which the owner can demonstrate has soil, topography, drainage, and an available water supply that cause the land to be economically suitable for irrigation	No irrigated land was identified within or adjacent to the Corridor/Route. No owner has expressed concerns related to economically suitable irrigation on their land.	5.2, 5.10

Surface drainage patterns and ground water flow patterns	No impacts to surface drainage patterns or groundwater flow patterns are anticipated. The Corridor/Route will cross 12 perennial waterways (including the Little Missouri River and Missouri River) and numerous intermittent streams. All stream crossings will be spanned by the Project, and no transmission structures will be placed in the streambed. All FEMA-designated floodplain areas within the Corridor/Route including the Missouri River floodplain will be spanned, and no impacts to these areas are expected during construction or operation of the Project. Considerable area at the Missouri River crossing is subject to regular flooding. However, very little is designated as floodplain on the FEMA Federal Insurance Rate Maps (FIRM) which designate floodways and 100 and 500 year flood areas. BMPs will be utilized to prevent soil erosion and sedimentation.	5.12
Noise-sensitive land uses	2 sensitive noise receptors (all residences) will be located within 500 feet of the Corridor/Route. These receptors will potentially be exposed to temporary construction-related noise impacts. Noise generated from the operation of the transmission line (corona effect) is expected to be negligible. None of the residences are located close enough to the Corridor/Route to experience any changes in noise levels during operation of the Project. 1 residence is located within 800 feet of the proposed Tande Substation that could experience an increase in sound levels during operation of the Project; however, HUD site acceptability noise standards will not be exceeded	5.6
The visual effect on the adjacent area	Project will introduce a new man-made feature into the viewsheds of TRNP, LMNG, Lewis and Clark National Historic Trail, and Killdeer Mountain Four Bears Scenic Byway (ND State Highway 22). Project will not adversely affect the scenic integrity of these resources because existing transmission lines, roadways, communications towers, and oil and gas development facilities are already present in the visual landscape where the Corridor/Route crosses these resources. Majority of LMNG tracts in Project area have a scenic integrity level (SIL) of low.	5.7

	Change in the visual characteristics and viewshed within Project area and for residents located near the transmission line (2 residences within 500 feet)	
Extractive and storage resources	24 oil and gas wells identified within 500 feet of the Corridor/Route; Project will not directly affect any wells or drill rigs since the Corridor/Route has been designed to avoid these areas, span collector systems, and provide sufficient clearance for well maintenance and operation	5.11
Wetlands, woodlands, and wooded areas	No effect. All 29.4 acres of wetland within the Corridor/Route will be spanned. No structures will be placed in wetlands and no wetland vegetation will be cleared. Approximately 113.8 acres of woodland potentially removed within the Corridor/Route, depending on slope.	5.13
Radio and television reception, and other communication or electronic control facilities	No impacts to radio and television reception, and other communication or electronic control facilities are expected 6 AM and FM towers located within 6 miles of Corridor/Route (nearest tower is located approximately 275 feet from Corridor/Route), none within Corridor/Route.	5.4 5.3
Human health and safety	During construction, Project may add an additional temporary burden on public health and safety services such as police, fire, ambulance, and hospital services. Basin Electric conducted an electric and magnetic field (EMF) analysis for the Project. Results of the analysis indicate that the maximum predicted EMF value at the edge of the Corridor/Route will be far less than recommended levels identified for protection of the general public. Therefore, no adverse effects from Project-induced electric fields will occur. Accidents involving direct contact with energized transmission line will be avoided by transmission line design features.	5.4

Plant life	Approximately 113.8 acres of woodland potentially removed within the Corridor/Route, depending on slope. One acre of vegetation permanently removed within Corridor/Route at structure locations. Potential introduction of noxious weeds within Corridor/Route to be avoided by weed mitigation measures. Removal of all vegetation within the fenced area of the proposed Judson and Tande substations (approx. 12 acres per substation)	5.13

3.4 POLICY CRITERIA

Per Section 69-06-08-02(4), the Commission may give preference to an applicant that will maximize benefits that result from the adoption of the following policies and practices, and in a proper case may require the adoption of such policies and practices (Table 3.4-1).

Table 3.4-1 Policy Criteria

Policy Criteria	Suitable Policy or Practice of Applicant	Section Addressed
Location and design	Basin Electric's policy is to locate and design to minimize environmental impacts and utilize existing corridors.	1.1, 1.2.1
Training and utilization of available labor in this state for the general and specialized skills required	Basin Electric will use local labor to the extent practicable.	5.1
Economies of construction and operation	The Project creates economies of construction and operation by double-circuiting a MWEC 115-kV transmission line for a portion of the Project	4.2
Use of citizen coordinating committees	Several public participation activities were conducted for the Project. The use of citizen coordinating committees is not expected for this Project.	6.0
A commitment of a portion of the transmitted product for use in this state	The Project will meet the need for additional electric transmission capacity in northwestern North Dakota as a result of increased demand and will meet reliability and system stability requirements for the region.	1.0, 2.1
Labor relations	No labor relations will be negatively affected by the Project.	5.1

The coordination of facilities	Basin Electric is coordinating with MWEC to double-circuit a portion of the Project with a 115-kV transmission line; The Project is being considered by Western in coordination with the Western/ Basin Electric Power Cooperative/ Heartland Consumers Power District Integrated System (IS) to maintain a reliable transmission system	4.2
Monitoring of impacts	Basin Electric will utilize BMPs during construction to minimize environmental impacts and will monitor construction compliance with the commitments made in this application and applicable permit conditions, including the Commission's Order.	5.1.3, 5.2.3, 5.3.3, 5.4.3, 5.5.3, 5.6.3, 5.7.3, 5.8.3, 5.9.3, 5.10.3, 5.11.3, 5.12.3, 5.13.3
Utilization of existing and proposed rights of way and corridors	Basin Electric has coordinated with MWEC to double-circuit a portion of the transmission line with a 115-kV transmission line. The Project follows half- and quarter-section lines to the extent practicable.	4.2
Other existing or proposed transmission facilities	A portion of the Project will be double-circuited with a MWEC 115-kV line that is associated with other regional improvement projects.	4.2

3.5 DESIGN AND CONSTRUCTION LIMITATIONS

The Project Corridor/Route is the most direct route that also minimizes impacts to the criteria identified in NDAC 69-06-08-02. Constraints present within the Project area include communities and developed areas, Lake Sakakawea, the Missouri River, TRNP, the LMNG, the Little Missouri River, and areas of rough and steep terrain around the Missouri River and Little Missouri River. The Corridor/Route was routed to minimize impacts to these areas to the extent possible. Basin Electric intends to span all streams and associated wetlands, and no structures will be placed in streambeds or wetlands.

Basin Electric and/or its contractors have performed initial surveys on lands whose access for survey permissions were given. When survey permissions have been acquired on the remainder of the route, the required surveys will be performed prior to construction of the transmission line. These surveys will consist of centerline location, profile, access, cultural, wetland delineations, and in some cases biological surveys. Geotechnical studies will be conducted along the transmission line route to determine engineering requirements for structures. Geotechnical studies have been performed on lands whose access was available to the Project. Following geotechnical exploration it may become necessary to

utilize special structures or materials to avoid sensitive environmental features or to accommodate poor soil conditions or other design limitations.

3.6 ECONOMIC CONSIDERATIONS

Basin Electric identified the need for additional electric transmission capacity in northwestern North Dakota as a result of increased demand and to meet system reliability requirements for the region. Investigations and analysis conducted for the overall power delivery system found that without improvements, the flow along the existing lines may result in local line overloads, especially in the Williston/Tioga region. The Project will meet the electrical demands in the region. Without construction of the Project, the load growth will be capped at the projected 2015 load level and no new load growth could be accommodated and transmission systems reliability will be severely impacted. This will limit the future potential development activities related to the expanding oil and gas industry in the region and impact the existing infrastructure in the Bakken oil field and any other load requirements in this service region.

There are many economic considerations in the design and routing of a transmission line. In general, minimizing the length of the route and minimizing the number of angle structures decreases the cost of the transmission line by minimizing the material, construction, and ROW costs. The Corridor/Route effectively balances the economic considerations of overall length of the line and the number of angle structures required with impacts on the environment, agricultural lands, and landowners.

The selection of materials and structure types also affects the cost of a transmission line. Basin Electric proposes to use steel, single-pole or H-frame self-supporting structures, depending on the voltages, terrain, and connector scenarios of the different Project components.

* * * * *

4.0 ENGINEERING AND OPERATIONAL DESIGN

Engineering design data is presented in Appendix E, and the plan and profiles are provided in Appendix G. A legal description for the Project Corridor/Route is provided in Appendix H.

4.1 GENERAL CORRIDOR/ROUTE DESCRIPTION

The route proceeds west out of the AVS Substation in Mercer County paralleling an existing Basin Electric 345-kV transmission line for 2.8 miles before turning north and extending for approximately 0.8-mile. The route then crosses another Basin Electric 345-kV transmission line before heading in a northwest direction for approximately 1.5 miles. From here, the route travels approximately 8 miles due west, primarily along a quarter-section line. The route then heads in a northwest direction for approximately 1 mile, and then turns due west for approximately 3.4 miles along a section line, paralleling the south side of County Road 2. The route then heads southwest for approximately 1.2 miles, entering Dunn County. The route continues due west for 5.5 miles before crossing ND State Highway 8.

The route continues west along the quarter-section line for another 16.5 miles before turning to the northwest and extending for approximately 1.2 miles, then heading due west for 3/4 mile, and then northwest for 3/4 mile to another quarter-section line. The route then generally proceeds west along the quarter-section line for 2.8 miles and crosses ND State Highway 22 before angling to the northwest for approximately 0.5 mile parallel to ND State Highway 22. The route then continues to the west for approximately 5.7 miles, then heads southwest for approximately 6 miles, before turning back to the west. The route continues west and parallels a section line for 2.3 miles and then shifts slightly to the southwest for approximately one mile as it crosses into McKenzie County. Once entering McKenzie County, the route proceeds south for 1.6 miles while crossing an existing Western 115-kV transmission line and ND State Highway 200. The route proceeds southwest for 0.8 mile and west for 1.8 miles along a section line, while generally paralleling the south side of ND State Highway 200 and an existing Basin Electric 345-kV transmission line as the route enters Basin Electric's Charlie Creek Substation.

Upon exiting the Charlie Creek Substation, the route crosses ND State Highway 200 and extends to the north for approximately one mile before proceeding generally in a northwest direction for approximately 3 miles. The route then extends generally to the north and proceeds for approximately 8.5 miles, then heads generally northwest for approximately 1.8 miles. The route continues to the north paralleling the east side of U.S. Highway 85 for approximately one mile. The route then extends to the east-northeast for 1.1 miles before turning and traveling northeast for 1.2 miles. The route continues north for

approximately 0.4 mile, then northwest for approximately 0.4 mile. The route then extends north for approximately 1.5 miles, crossing the Little Missouri River. The route then generally extends to the northwest for approximately 6.7 miles before crossing U.S. Highway 85 and a Western 230-kV transmission line. The route continues in a general northwest direction for another 4.7 miles before turning west. The route continues west for approximately 1.8 miles along a quarter-section line, then turns north. The route extends to the north generally along a quarter-section line for 8.3 miles, crossing a Western 230-kV transmission line and U.S. Highway 85 approximately five miles west of Watford City. The route proceeds to the northwest for 3 miles, then to the north for 1.8 miles, then again to the northwest for approximately 11.5 miles and then crosses U.S. Highway 85 and a Western 230-kV transmission line. The route continues to the northwest for about 1.5 miles and then turns north, extending for approximately 5 miles. The route then parallels a Western 230-kV transmission line located next to U.S. Highway 85 to the northwest for approximately 2.4 miles. The route then crosses the Missouri River and enters Williams County shortly after leaving the Western 230-kV transmission corridor and proceeds for approximately 2 miles in a northwesterly direction. The route then turns west, extending for approximately 1 mile along a quarter-section line, then turns north and extends along another quarter-section line for approximately 1.4 miles. The route angles to the east for approximately 0.2 mile, then heads north for 0.3 mile, crossing U.S. Highway 2. The route then extends to the west for 0.3 mile, then to the north for 0.3 mile, and then to the west for 0.1 mile terminating at the site of the proposed Judson Substation, located approximately 5.5 miles west of Williston.

Upon exiting the proposed Judson Substation, the route extends approximately 0.4 mile to the northwest and then 0.2 mile due west before extending north for approximately 1.5 miles to the north. The route proceeds east-northeast for approximately 1.2 miles, crosses an MDU 115-kV transmission line, and then turns to the north. The route proceeds to the north, paralleling a section line, for approximately 3.5 miles before turning east and following a quarter-section line for 2.1 miles. The route then heads north for 1 mile, paralleling the east side of County Highway 6, then turns east and follows another quarter-section line for 1.5 miles. The route continues north for approximately 3 miles along a quarter-section line, then turns east for 3.7 miles along a quarter-section line, crossing U.S. Highway 2. The route then extends to the northeast for approximately 1 mile, then to the east for 1 mile, and then to the southeast for 1.4 miles, crossing a Basin Electric 230-kV transmission line. The route then turns due east, traveling approximately 10 miles while following a quarter-section line and crossing a MDU 115-kV transmission line. The route then proceeds due north for one mile using a quarter-section line, then extends 12.9 miles to the east utilizing a quarter-section line. After proceeding approximately 1.5 miles to the northeast, the route travels another 7.8 miles to the east along a quarter-section line. The route then turns north and

extends for 1.5 miles along a quarter-section line before crossing U.S. Highway 2. The route continues north for another two miles and crosses into Mountrail County. From here, the route continues north approximately 0.5 mile, then extends to the northwest for approximately 0.8 mile. The route then turns north and extends 0.5 mile to the site of the proposed Tande 345-kV Substation. After leaving the substation, the route extends north for 0.05 mile, then turns east for 0.1 mile, then heads back north and continues for approximately 0.4 mile. The route then turns back to the west-northwest for approximately 0.5 mile before terminating at the existing Neset Substation.

4.2 DESCRIPTION OF PROPOSED FACILITIES

Basin Electric is proposing the construction of new 345-kV, 345/115-kV and 230-kV electric transmission lines connecting the existing AVS, Charlie Creek, and Neset Substations and future Judson and Tande Substations. This proposed line was identified as part of a systematic evaluation of alternatives to meet the need for the Project and identify appropriate alternatives for construction and operation. A description of the proposed Project is presented below.

4.2.1 Transmission Line Characteristics

The proposed Project includes:

- A 345-kV transmission line connection from AVS Substation to Charlie Creek Substation to proposed Judson Substation
- A 345-kV transmission line connection from proposed Judson Substation to the proposed Tande 345-kV Substation, approximately 31 miles of which will be double-circuited with a MWEC 115-kV line associated with other regional improvement projects
- A 230-kV transmission line connection from the proposed Tande 345-kV Substation to the Neset Substation

The proposed 345-kV, single-circuit transmission line will be constructed using single-pole or H-frame self-supporting structures within a 150-foot-wide ROW. Double-circuit 345/115-kV lines will be constructed using single-pole, self-supporting structures. The proposed 230-kV, single-circuit transmission line will be constructed using single-pole, self-supporting structures within a 100-foot-wide ROW. Detailed construction access considerations and construction techniques are described further in the following sections. Several transmission line structure types will be necessary to address the various voltages, terrain, and connector scenarios included as part of different components of the proposed project. Structures proposed for this project by Basin Electric are shown in Figures 4.2-1 through 4.2-5. A

summary of Basin Electric's proposed structure characteristics for each of these structure types is provided in Table 4.2-1.

Project construction and design will meet the requirements of the National Electrical Safety Code-Heavy Loading District, RUS design criteria (USDA, 2009a), and other applicable local or national building codes (Institute of Electrical and Electronics Engineers Standards Association, 2012). The Heavy Loading District refers to those areas (including North Dakota) that are subject to severe ice and wind loading. Minimum conductor clearance is measured at the point where conductor sag is in closest proximity to the ground. The proposed transmission line will be constructed with clearances that exceed standards set by the National Electrical Safety Code.

Table 4.2-1: AVS-Neset 345-kV Transmission Project
Typical Structure Design Characteristics

Description of Design Component	345-kV (Fig 4.2-1)	345/115-kV (Fig 4.2-2)	230-kV (Fig 4.2-3)	345-kV H-Frame (Fig 4.2-4)
Conductor Size(inches)	1.8	1.8/1.108	1.345	1.800
ROW Width (feet)	150	150	100	150
Typical minimum and maximum Span Distance between Structures (feet) *	650-1100	650-1000	650-950	900-1000
Average Span (feet)	900	800	800	1000
Minimum and Maximum Structure Height (feet)	100-130	115-145	70-110	80-100
Average Height of Structures (feet)	115	130	95	90
Average Number of Structures per mile	6	6.5	6.5	5.5
Temporary disturbance per Structure (acre) **	0.0003	0.0003	0.0002	0.0004
Minimum Conductor-to-Ground Clearance to agricultural lands, rural roads and paved highways @ 100 deg C (feet)	30	30	26	30
Minimum Conductor-to-Ground Clearance to Railroads @ 100 deg C (feet)	As required by specific Railroad			
Circuit Configuration***	See Figure	See Figure	See Figure	See Figure

* Actual span distance will vary depending on topography.

** Angle and dead-end structures (for longitudinal stability) will be constructed with concrete foundations. Guy wires will not typically be required.

*** Single pole tangent structures will be freestanding on concrete foundations or directly embedded. H-frame tangent structures will likely be directly embedded into the ground.

Figure 4.2-1: 345-kV Single Circuit Structure

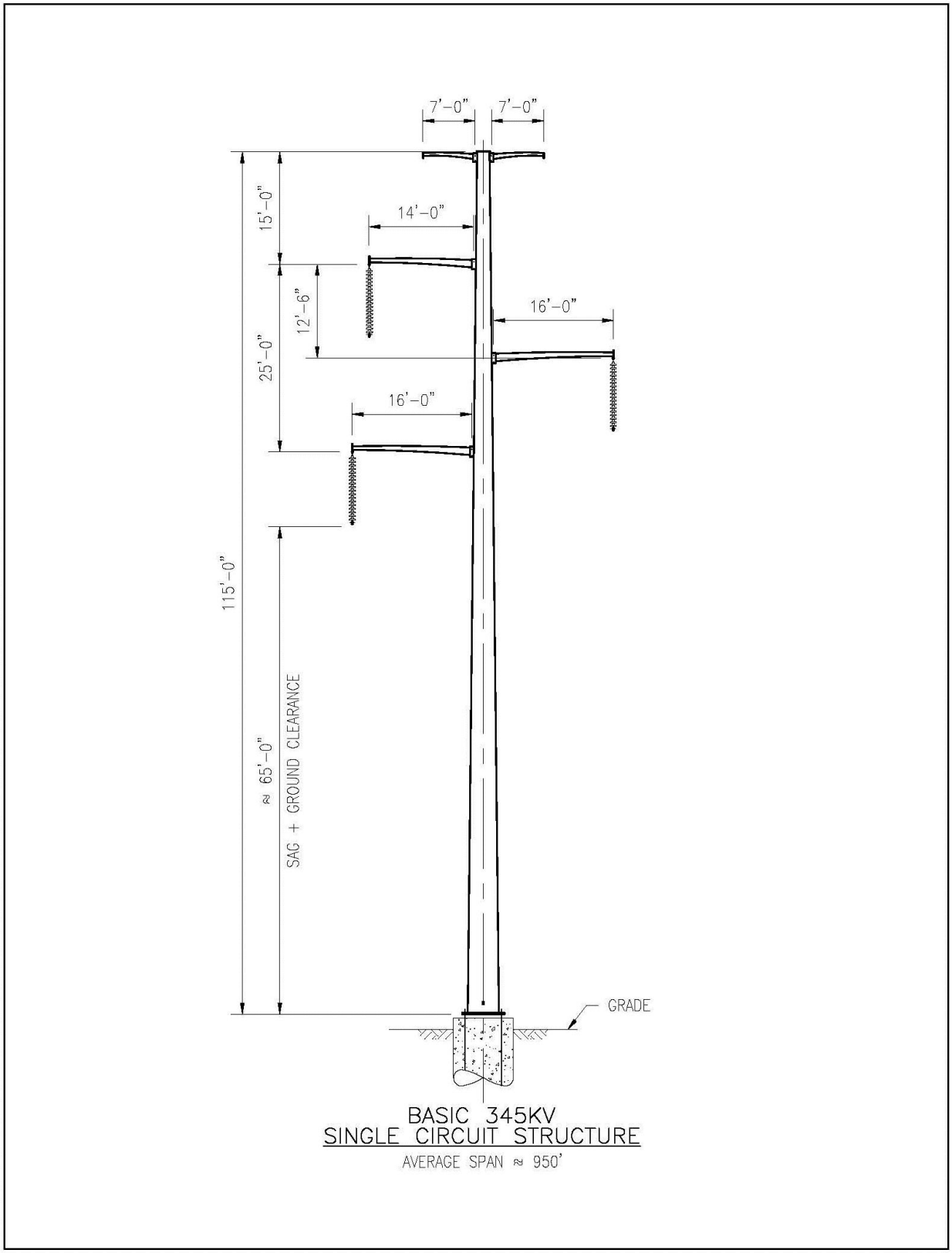


Figure 4.2-2: 345/115-kV Double Circuit Structure

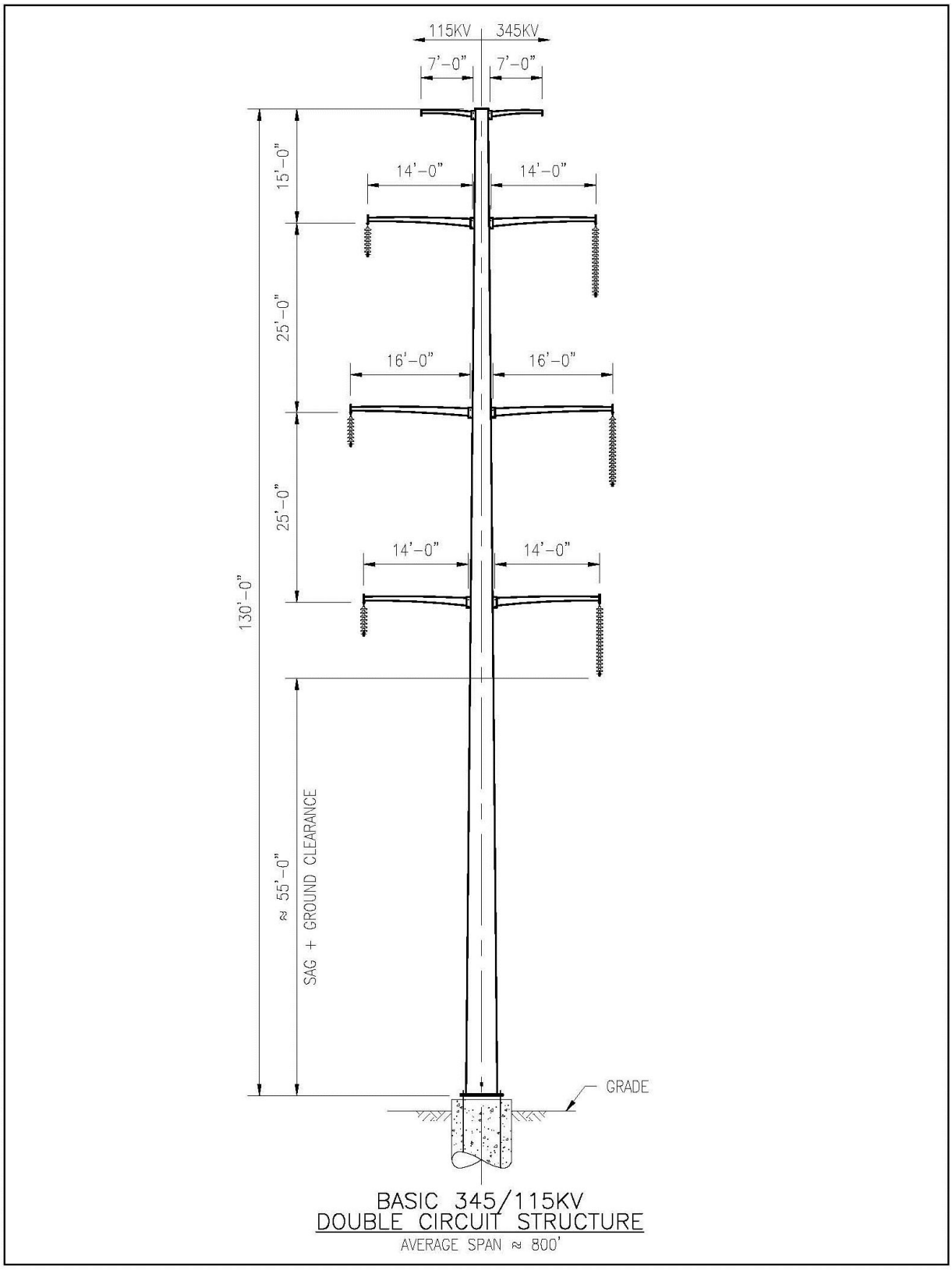


Figure 4.2-3: 230-kV Single Circuit Structure

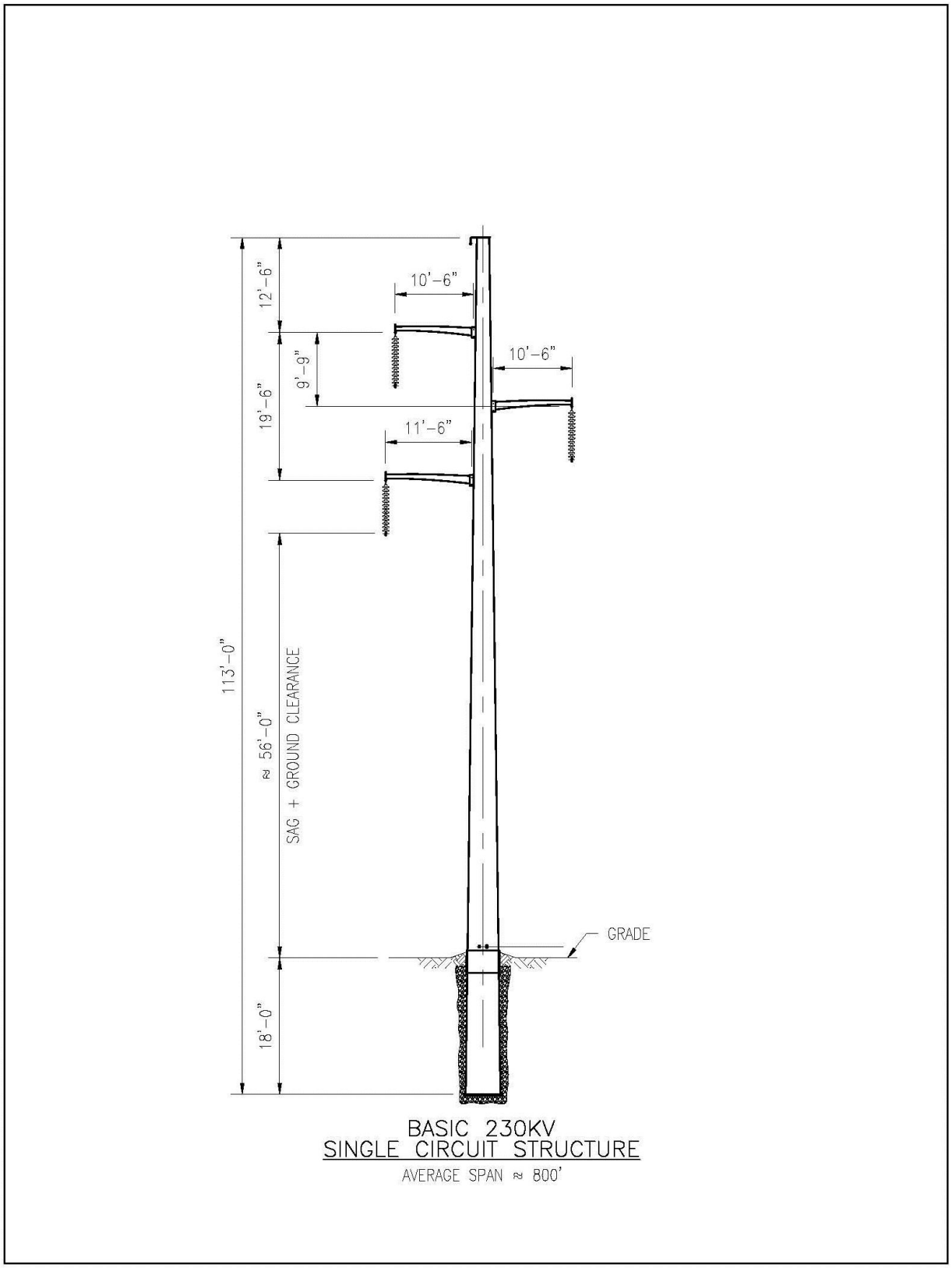
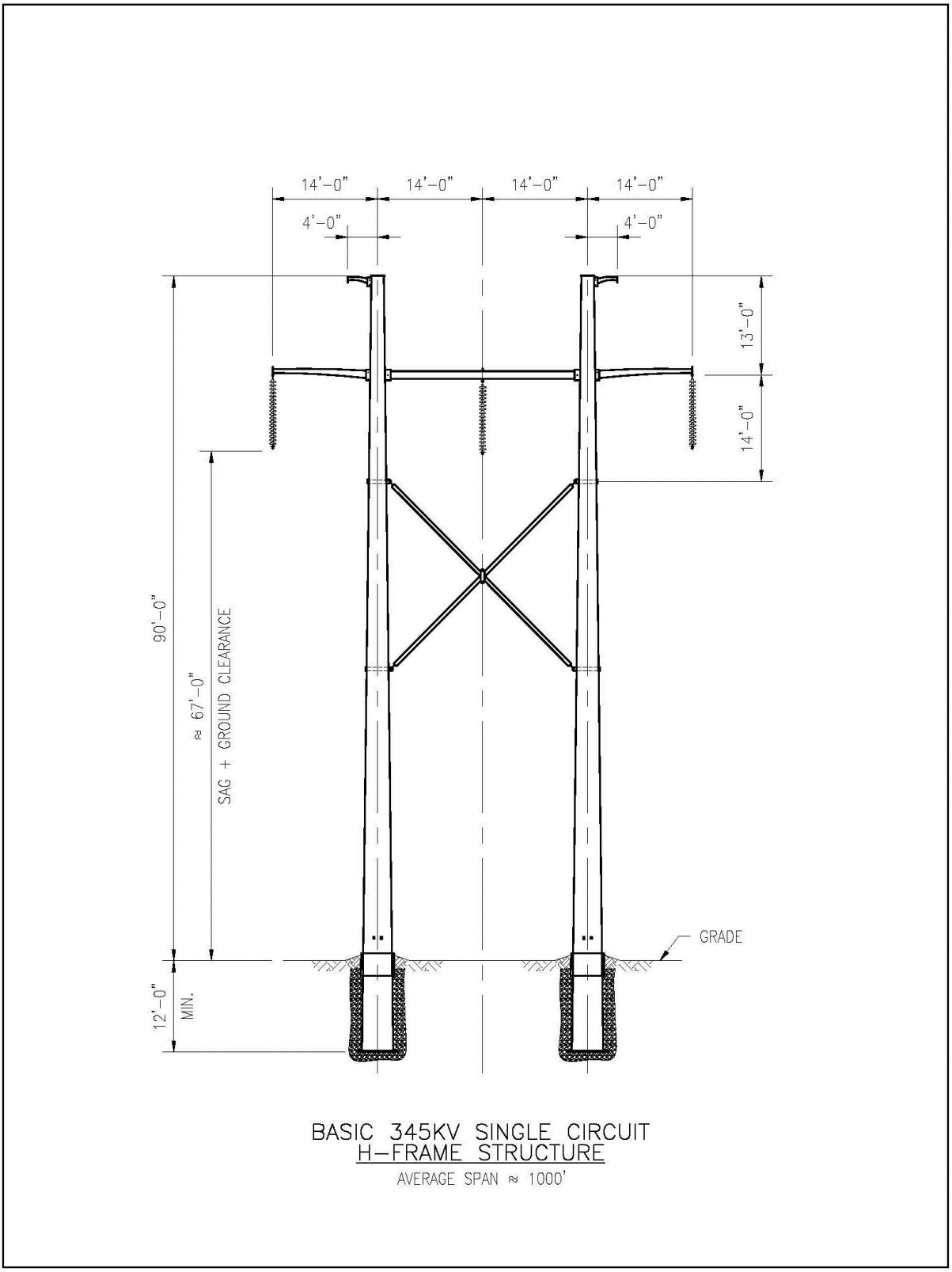


Figure 4.2-4: 345-kV Single Circuit H-Frame Structure



4.2.2 Associated Facilities and Project Components

The project will require upgrades to Basin Electric's existing facilities at the Antelope Valley Station 345-kV Substation, Charlie Creek 345-kV Substation, and Neset 230-kV Substation. These upgrades are all within the existing Substation's fence line. No expansion of physical area is required. Furthermore no additional power generation capacity will be required for this project. The proposed overall project will require the following associated facilities and project components:

- **AVS 345-kV Substation.** The existing AVS Substation's 345-kV switchyard will require the installation of one 345-kV power circuit breaker and associated transmission bay bus expansion, including disconnect switches, grounding switches, potential transformers, and protection and control equipment. No new land or grading is required at this Substation.

- **Charlie Creek 345-kV Substation.** Upgrades to the existing Charlie Creek 345-kV Substation will require the installation of the necessary bus, circuit breakers, disconnect switches, grounding switches, and protection and control equipment to support the addition of a 345-kV interconnection. No expansion of the substation fence is anticipated.

- **Judson 345-kV Substation.** The proposed Judson 345-kV Substation near Williston will be approximately 12 acres in size and will require the installation of a 345-kV/230-kV transformer, and the necessary bus, circuit breakers, disconnect switches, grounding switches, and protection and control equipment to support the 345-kV interconnection and the addition of the 230-kV interconnect to Western's nearby Williston 230-kV Substation.

- **Tande 345-kV Substation.** The proposed 12-acre Tande 345-kV Substation will require the installation of a 345-kV/230-kV transformer, and the necessary bus, disconnect switches, circuit breakers, grounding switches, and protection and control equipment to support the 345-kV connection and the connection to the nearby existing Neset 230-kV Substation.

- **Neset 230-kV Substation.** The existing Neset 230-kV Substation will require the expansion of transmission bus bay and the necessary circuit breakers, disconnect switches, grounding switches, and protection and control equipment to support the addition of the 230-kV connection. No expansion of the substation fence is anticipated.

4.2.3 Construction Techniques

The proposed 345-kV, single-circuit transmission line will be constructed using single-pole or H-frame self-supporting structures within a 150-foot-wide ROW. Double-circuit 345/115-kV lines will be

constructed using single-pole, self-supporting structures. The proposed 230-kV, single-circuit transmission line will be constructed using single-pole, self-supporting structures within a 100-foot ROW. Detailed construction access considerations and construction techniques are described further in the following sections.

4.2.3.1 Pre-Construction Activities

Basin Electric and/or its contractors will perform engineering surveys prior to construction of the transmission line. These surveys will consist of centerline location, profile, and access surveys. Pre-construction surveys will likely coincide with other pre-construction activities.

Geotechnical studies will be conducted along the transmission line route to determine engineering requirements for structures and foundations. Truck-mounted augers will be transported to selected locations to drill small-diameter boreholes, and borehole cuttings will be analyzed to determine specific soil characteristics. These activities will be conducted after harvest to minimize impacts on agricultural fields. Minimal land disturbance (approximately 400 square feet) will be anticipated for each geotechnical boring site. Additionally, small access trails may be required for some of the boring locations.

Approximately ten temporary construction material and equipment laydown areas will be used for the duration of construction. Figure 4.2-6 shows the location of seven of the laydown areas that have been identified; three additional laydown areas are expected to be required for the Project but have not yet been identified. All laydown areas will be approximately five acres in size.

Construction laydown areas are typically located at previously disturbed or developed locations such as vacant lots, existing utility yards, or parking lots to avoid or minimize impacts on sensitive resources. Where existing yard locations were not available, preferred locations for yards were undeveloped areas, such as grazing or cropland that are cleared and flat; have all-weather access; and do not contain streams, wetlands, or other environmentally sensitive resources. Laydown yards consist of flat or gently sloping lands where construction material will be placed on pallets or cribbing. No topsoil will be removed and minimal if any re-grading is expected to take place at these facilities. Laydown areas will be returned to pre-construction conditions upon completion of the Project. Vegetation removal within the ROW is anticipated to be minimal throughout a large portion of the project, especially in rangeland and cropland areas. In more forested portions of the ROW, trees and shrubs will be removed if they interfere with construction activities or the safe and reliable operation of the transmission line. Vegetation will be

NORTH

0 11.5

Miles

Jackman Material Laydown Yard

Neset

Tande

Tioga

White Earth

Ray

Daniel Material Laydown Yard

Epping

Spring Brook

Ross

Stanley

Palermo

Donnybrook

Renville

Carpio

Berthold

Burlington

Des Lacs

Minot

Judson

Williston

Williston

Williams

Mountrail

Ward

Plaza

New Town

Parshall

Makoti

Ryder

Douglas

Max

Alexander

Arnegard

Watford City

Lonesome Creek Material Laydown Yard

McKenzie

Dunn

McLean

Garrison

Tarnavsky Material Laydown Yard

Jepson Material Laydown Yard

Killdeer

Dunn Center

Pick City

Riverdale

Antelope Valley

Keller Material Laydown Yard

Golden Valley

Zap

Beulah

Mercer

Hazen

Stanton

Oliver

Charlie Creek

Dukart Material Laydown Yard

Golden Valley

Billings

CANADA

Montana

North Dakota

South Dakota

LEGEND

- Project Route
- Existing Substation
- Proposed Substation
- Material Laydown Yard (Approximately 5 acres)
- State Boundary
- County Boundary

Existing Transmission Lines

- 345-kV
- 230-kV and Below

Burns & McDonnell SINCE 1898

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

Figure 4.2-5
Basin Electric Power Cooperative
Antelope Valley Station to Neset
345-kV Transmission Project
Temporary Construction Material
and Equipment Laydown Areas

R:\Basin\61495_AVS_345\GIS\DataFiles\ArcDocs\PSC - Chapter 4 Figures - Project Route\4-2-6 Construction and Equipment Laydown- Project Route.mxd 1/3/2013

Source: North Dakota GIS; Esri; Basin Electric; Burns & McDonnell.

Revised January 03, 2013

removed at ground level to provide access to the ROW. Disposal of trees and shrubs will be consistent with the landowner's wishes and all state waste management regulations. It is expected that the woody species removed will be replaced at a 2:1 ratio. Final replacement requirements will be dependent on the final regulatory requirements stipulated for the project through the Public Service Commission's siting process. A copy of the Commission's Tree and Shrub Replacement Plan is included in Appendix V.

4.2.3.2 Transmission Structure Site Preparation

Transmission structure site clearing is expected to be minimal over a large portion of the Project, due to much of the Corridor/Route being located across rangeland, grasslands, or agricultural areas. In these areas, site leveling is expected to be minimal. In areas of difficult terrain, structure location sites may require more extensive leveling using bulldozers or front-end loaders to ensure the safe operation of equipment. In areas where access is extremely difficult, structure placement will be performed through the use of helicopters. All blading and leveling will occur within the boundary of the ROW throughout the length of the Project. Soil removed during leveling of structure sites will be stockpiled nearby and replaced following construction. Disturbed ground will be re-graded to as close to pre-construction condition as appropriate for stabilization and revegetated or approved for tillage depending on pre-construction land use.

Structure holes will be drilled by truck-mounted auger or power auger at appropriate locations along the length of the Corridor/Route. Total land disturbance at each structure location will vary depending on location (i.e. level terrain versus steep, rugged terrain) and structure type. All disturbances related to the boring of structure holes will be confined to the ROW.

Structures used for the Project will be either directly imbedded into the ground or will be bolted on reinforced poured concrete foundations. Determinations on whether a structure will be directly imbedded into the hole or will require a foundation will be based on available access due to terrain and soil conditions. Screw anchors may be used in certain locations based on terrain and soil conditions. The helix on the anchor cuts through the soil, resulting in minimal soil disturbance. An estimated 1,161 structures will be used for the proposed Project, with an average of approximately six structures per mile.

4.2.3.3 Structure Assembly and Erection

Structure components such as pole segments, davit arms, hardware, and insulators will be brought to the structure site via truck and assembled on-site. Davit arms, insulators, and other components will be attached to the structure while on the ground. The structure will be placed into the boreholes and backfilled or bolted onto reinforced foundations using cranes or large boom trucks. In areas of very rough

terrain that have limited accessibility or are even inaccessible, such as those areas around the Little Missouri River or Missouri River badlands, some aerial placement of structures by helicopter may be required. The upper sections of the structure will then be bolted onto the lower section. Structure setting activities will be done within the boundaries of the ROW. Conductor pulling may require some work outside of the permanent ROW but within the area of the construction easement.

4.2.3.4 Stringing and Tensioning of Conductors

Following structure construction, crews will install the conductor wires, overhead groundwire (OHGW) and an optical groundwire (OPGW) using conductor stringing sheave blocks and line pulling and tensioning equipment. The conductor, OHGW and OPGW are kept under tension during the stringing process to keep the conductor clear of energized circuits, the ground, and obstacles that could damage the conductor, OHGW and OPGW surfaces.

Pulling and tensioning sites are typically located at 8,000 to 9,000-foot intervals and at angle point structures. Sites along tangent structures are located within the construction ROW; those at angle points typically are located partially outside of the normal ROW. Stringing equipment generally consists of wire pullers, tensioners, conductor OHGW and OPGW reels, and sheave blocks. After the conductors, OHGW and OPGW are pulled for a section of line, they are tightened or sagged to the required design tension in compliance with the National Electrical Safety Code (NESC). The process will be repeated until the OPGW and conductors are pulled through all sheaves. Conductor stringing also will require access to each structure for securing the conductor to the insulators, OHGW or OPGW to each structure, once final line sag is established.

For public safety and property protection, temporary wooden guard structures will be used to provide temporary support when stringing conductors, OHGW and OPGW across existing power lines, roads, highways, railroads, and other linear obstacles. The structures will be removed when stringing is complete; the guard structure holes will be backfilled and the sites will be reclaimed. All temporary wooden guard structures will be installed within the transmission line ROW. Pipelines crossing will be identified on construction plans and may be visibly marked in the field. Matting will be installed across pipeline rights-of-way as necessary to allow equipment to safely cross these areas. Following construction, matting will be removed and the area restored.

4.2.3.5 Structure Site Access and Traffic

Construction crews will gain access to the ROW from public roads and section line trails, as well as within the transmission ROW itself in areas with no public access. Access for line construction will be by

truck within the ROW. Structures located along section lines will be accessed from section line roads and trails where possible. The exception will be on the lands of the LMNG, managed by the USFS, where permission will need to be obtained from USFS to access any trails or roads that exist along section lines. For most existing access roads and trails, no additional widening, surfacing, or improvements, including culverts will be necessary. New surface access roads are not anticipated for a majority of the line; however, they may be required in certain areas with no access. Access in areas with steep or rugged terrain, particularly near the Little Missouri River and associated tributaries will likely be gained using helicopters and will not require additional new roads. Existing roads and trails used for construction access will be rehabilitated after construction to comparable or better conditions than they were prior to construction activities. New roads will be restored to the natural condition of the surrounding area. Gates installed to facilitate access and to keep livestock from roaming on-site during the construction process will be left in place, with landowner concurrence, following construction of the line. Fences and gates removed during the construction process will be replaced or rebuilt following completion of construction.

Temporary overland access will be used in areas not accessible by local roadways or section line trails with the exception of the LMNG. If possible, access through cultivated fields will be done during the non-growing season. If crop damage occurs, landowners will be compensated for loss of crops.

Temporary overland access routes will result in temporary disturbance and compaction of soil and vegetation. Vegetation along these routes will recover quickly, as no grading will be required. Landowners will be compensated for temporary overland access routes.

4.2.3.6 Substation Construction Procedures

Construction procedures for the Judson and Tande 345-kV Substations will be essentially the same, except for the specific equipment installed. Each site will be approximately 12 acres, although additional area around the substation will be acquired for buffer with adjacent lands and to provide space for transmission line connections. Following survey and staking of the site, erosion control best management practices (BMPs) will be followed. Site access will be prepared, including installation of culverts in adjacent road drainage to install a gravel driveway. No clearing of forested areas is anticipated for any of the substation locations. The sites will be graded and fenced. Concrete pads and footing for equipment will be installed. Aggregate will be spread throughout the fenced area. Equipment will be delivered to the sites and generally stored inside the fenced area, although some materials may need to be stored on the property outside the fence due to size or safety considerations. Equipment such as circuit breakers, bus work, capacitors, and dead-ends will be assembled and installed. Transformers will be delivered to the sites and installed. Substation control house and supervisory control and data acquisition equipment

will be installed. Upon completion of construction activities, disturbed areas outside the fence will be restored and erosion control measures removed.

4.2.3.7 Transmission Line Maintenance and Operation

Continued access to the transmission line ROW will be needed following construction to conduct periodic inspections, perform routine maintenance and vegetation management, and repair any damage to the transmission line or structures. Maintenance activities will be limited to the ROW where possible, and will be in accordance with all local, state, and federal regulations and permits. Landowners will be compensated for any damages occurring during routine maintenance, inspections, or repairs.

4.2.3.8 Substation Maintenance

Substations and switching stations will be subject to regular inspections to ensure equipment is in good working order and the area is neat and tidy. Faulty or worn equipment will be repaired or replaced. Trash will be collected and properly disposed of off-site. Fluid levels in transformers are monitored remotely by system operators and will be regularly checked and transformers will be inspected for leaks. Batteries for emergency back-up operations will be inspected, fluid levels checked, and replaced as necessary. In the event of system disturbances, equipment will be inspected and reset as necessary. Any potential security concerns such as damage to the fence, exterior lighting, or locks will be addressed. The control house will be kept clean and in good structural and visual condition. All maintenance and operations activities will occur within the fenced area of the substation.

4.2.3.9 Construction Schedule and Projected Workforce

Although construction will occur over two years, individual crews may be required for only a few months in a particular construction area before moving out to another area on a subsequent phase of the project. Additionally, construction will not be confined to one area or community, but workers will be spread out over nearly 200 miles in three crews of approximately 50 workers each, for a total of 150 workers.

4.2.3.10 Procedures for Minimizing Environmental Impact during Construction

Numerous BMPs and mitigation measures have been incorporated into the development and construction of the proposed project to protect environmental and human resources. These measures are varied and may be intended to address specific resource concerns, be more general in nature, or address multiple areas of concern for different resources. Minimizing measures range from avoiding sensitive resources during project and route development to conditions for restoring the project ROW following construction. BMPs that will be implemented as part of the project are discussed in Appendix I. Other mitigation

measures specific to each resource are discussed throughout Section 5 in conjunction with the analysis of project-related impact to the various human and natural resources.

Waste Management

Waste materials resulting from Project construction will be removed from the sites and disposed of in appropriate landfills. Sanitary waste will be removed from the site and disposed of according to local sanitary waste ordinances. Hazardous waste such as oil, gasoline, solvents, paint, and cleaning chemicals will be stored and disposed of in accordance with local, state, and Federal regulations.

Reclamation

Following construction, disturbed areas will be graded and/or leveled to their approximate preconstruction condition to minimize erosion. Compacted agricultural soils will be disked or plowed to loosen the soil. Disturbed areas include temporary overland access trails, staging areas, the transmission ROW, and any other areas disturbed by project construction activities. Reclamation activities include the removal of all temporary facilities and construction debris, completion and removal of proper erosion control measures, and re-seeding of disturbed ground. Grassland areas will be re-seeded with native species based on county NRCS and USFS recommendations.

4.2.3.11 ROW and Property Issues

Basin Electric Property and Right-of-Way Division will be responsible for acquiring easements for the project. Initially landowners will be contacted to request their permission for property boundary, biological, terrain mapping and archeological surveys. The survey permit form is not an easement and not all properties will require all types of surveys. When a final route is approved, land values will be determined and landowners will be contacted to start the easement process. Basin Electric staff will give the landowners ample time to review and comment on the easement location. Landowners will be compensated for the easement and any damages to existing crops or other property features and for potential future years of agricultural impacts from the transmission ROW and transmission structures on the property.

* * * * *

5.0 ENVIRONMENTAL ANALYSIS

This section describes the environmental setting as it relates to the Project Corridor and Route and discusses potential impacts associated with the construction and operation of the proposed Project. For this application, the Corridor/Route consist of the same ROW of 150 feet for 197 miles of the Project from AVS to near Tioga and ROW of 100 feet for the 1mile connection from Tioga to the proposed Tande substation. The analysis has been conducted on this ROW and, where appropriate to the resources and criteria, areas adjacent to the ROW. North Dakota Century Code 49-22-09 lists factors to be considered in evaluating the application and designation of sites, corridors, and routes. The North Dakota Public Service Commission shall be guided by, but is not limited to, the following considerations, where applicable, to aid in the evaluation and designation of sites, corridors and routes:

1. Available research and investigations relating to the effects of the location, construction, and operation of the proposed facility on public health and welfare, natural resources, and the environment.

2. The effects of new energy conversion and transmission technologies and systems designed to minimize adverse environmental effects.

3. The potential for beneficial uses of waste energy from a proposed energy conversion facility.

4. Adverse direct and indirect environmental effects which cannot be avoided should the proposed site or route be designated.

5. Alternatives to the proposed site, corridor, or route which are developed during the hearing process and which minimize adverse effects.

6. Irreversible and irretrievable commitments of natural resources should the proposed site, corridor, or route be designated.

7. The direct and indirect economic impacts of the proposed facility.

8. Existing plans of the state, local government, and private entities for other developments at or in the vicinity of the proposed site, corridor, or route.

9. The effect of the proposed site or route on existing scenic areas, historic sites and structures, and paleontological or archaeological sites.

10. The effect of the proposed site or route on areas which are unique because of biological wealth or because they are habitats for rare and endangered species.

11. Problems raised by federal agencies, other state agencies, and local entities.

For each resource, a general description on each resource is provided, followed by a discussion of potential impacts and potential mitigation measures. The description of resources subsections describe the resources and environmental settings found in the vicinity of the Project. The Corridor/Route extends through Mercer, Dunn, McKenzie, Williams, and Mountrail Counties in North Dakota.

The impact discussion subsections describe the potential effects on each resource from the Project. Based on a centerline alignment, a 150-foot ROW was established to quantify the nature and extent of the impacts that could be expected for the Corridor/Route. For many of the resources discussed, such as vegetation and soils, impacts will be limited to this 150-foot ROW. For other resources such as wildlife, recreation, and visibility, impacts may extend outside the ROW.

In addition to impacts associated with construction and operation of the proposed Project within a 150-foot ROW, other potential impacts will result from construction-related facilities and activities. These will occur from establishment of laydown and staging yards and the development of access roads to structure locations. As some of these details will not be known until later in the process as field survey and final design are completed and coordination with landowners progresses, impacts from these activities are discussed in general terms.

The mitigation discussion subsections provide potential measures to reduce or eliminate anticipated adverse impacts identified.

Standard mitigation measures have been incorporated into the development and construction of the proposed Project. These mitigation measures are designed to reduce or eliminate anticipated impacts resulting from the construction or operation of the proposed Project. They include Best Management Practices (BMPs) such as the spanning of wetlands, use of silt fencing and other erosion-control measures, and using existing corridors where feasible for locating and constructing the transmission line. These standard mitigation measures are included in Appendix I, Standard Mitigation Measures.

5.1 DEMOGRAPHICS

5.1.1 Description of Resources

5.1.1.1 Regional Setting

The oil and gas development boom in the Bakken region has influenced socioeconomic trends in the region over the past several years. Oil and gas development activities have occurred in the region since the 1950's. After a brief boom in the 1970's, the region's oil and gas activity decreased dramatically. After losing population between 1990 and 2000, the region experienced population growth between 2000 and 2011, especially between 2008 and present, as oil and gas development-related workers moved into the region to take advantage of newly-developed technology advances in drilling techniques. As a result, the Bakken formation has seen rapid development due to the implementation of hydraulic fracturing processes that can access this previously-untapped oil bearing feature in the region.

The oil and gas industry has provided increasing employment opportunities, and, as a result, unemployment rates have been very low, or less than two percent in most of the Project counties. Poverty rates, which were close to 20 percent for several of the Project counties in 2000, dropped below 15 percent in 2011. The housing characteristics of the region are also influenced by the oil and gas development boom. While the majority of housing consists of owner-occupied, single family residences, many of the Project counties have a high percentage of mobile homes, which could be reflective of the larger transient population in the region in recent years.

5.1.1.2 Population

The Corridor/Route extends through five counties in northwestern North Dakota, including Dunn, McKenzie, Mercer, Mountrail, and Williams Counties. The populations of these counties are shown in Table 5.1-1. These counties are predominantly rural with small populations compared to the state as a whole. Williams County has the largest population of all the Project counties.

The population of all the Project counties declined between 1990 and 2000, while the population of North Dakota as a whole remained relatively constant. As a result of the oil and gas development boom in recent years, population growth trends in the Project counties have reversed. McKenzie, Mountrail, and Williams Counties experienced relatively high growth rates between 2000 and 2010, with much of this growth occurring since 2008. Dunn and Mercer Counties experienced slower rates of population decline compared to the previous decade.

Table 5.1-1: Population of Project Area Counties

	1990 Population	2000 Population	2011 Population	% change 1990-2000	% change 2000-2011
North Dakota	638,800	642,200	683,932	0.5%	6.5%
Dunn	4,005	3,600	3,535	-10.1%	-1.8%
McKenzie	6,383	5,737	6,262	-10.1%	9.2%
Mercer	9,808	8,644	8,382	-11.9%	-3.0%
Mountrail	7,021	6,631	7,482	-5.6%	12.8%
Williams	21,129	19,761	22,918	-6.5%	16.0%

Source: U.S. Census Bureau, 1990, 2000, 2011a, 2011b, and 2011c

The Corridor/Route does not extend through any cities or towns, although there are several nearby communities. The populations of communities within the Project vicinity are shown in Table 5.1-2. In terms of population, the largest town is Williston, followed by Beulah, Watford City, and Tioga. The remaining towns all have populations of less than 1,000.

Table 5.1-2: Populations of Towns within Project Vicinity

Town	2010 Population
Alexander	285
Arnegard	223
Beulah	3,116
Dodge	91
Dunn Center	103
Epping	69
Golden Valley	175
Halliday	213
Killdeer	819
Ray	683
Springbrook	24
Tioga	1,040
Watford City	1,996
White Earth	51
Williston	14,440
Zap	204

Source: U.S. Census Bureau, 2010a

It is expected that the population in the Bakken region will continue to rapidly increase in the future, concurrent with the continued expansion of oil and gas development activities. Estimates indicate that the population of the State of North Dakota increased by 11,341 people in just the last year, between 2010 and 2011 (U.S. Census Bureau 2011a). In addition to the permanent population of the Project counties, the region also has a high transient population, which primarily includes drilling rig-related workers but also construction workers. Official population estimates may not include these temporary workers who

consider their home residence in another state. The increasing numbers of temporary workers moving to the region has heavily impacted the region's cities and towns, such as Williston and Watford City located within the Project area. Including the transient population, the current population of Williston is likely closer to 17,000, and the current population of Watford City is likely closer to 6,500 (Smith 2011; Ruggles 2011). Estimates indicate that the population of Williston could reach 25,000 by the year 2015 and reach as high as 50,000 by the year 2030 (City of Williston 2011).

5.1.1.3 Housing

The total number of housing units within the Project counties and the State of North Dakota as a whole are displayed in Table 5.1-3 along with various characteristics of the housing in the Project vicinity. The percent of housing that is owner-occupied is higher in the Project counties as compared to the state, with Dunn and Mercer Counties having the highest rates. Vacancy rates are relatively low throughout the Project counties and the state as a whole, with the lowest rates occurring in McKenzie and Williams Counties. Housing is of similar age throughout the Project area and the state.

Table 5.1-3: Project Area Housing Characteristics

	North Dakota	Dunn	McKenzie	Mercer	Mountrail	Williams
Number Housing Units	320,888	2,107	3,069	4,441	4,041	10,519
Percent Owner-Occupied	65.7%	85.0%	69.2%	79.4%	73.8%	69.6%
Vacancy Rate (homeowner/rental)	(1.3% / 4.5%)	2.0% / 8.1%	0.4% / 0.0%	0.6% / 7.7%	0.9% / 5.1%	0.2% / 0.0%
Median Year Built	1974	1972	1974	1976	1968	1972
Percent Single Family	67.3%	70.6%	81.7%	71.9%	64.8%	67.6%
Percent Multi-Family	24.8%	4.3%	7.0%	14.3%	9.9%	20.4%
Percent Mobile Homes, RVs, etc.	7.9%	25.1%	11.4%	13.8%	25.3%	12.0%
Median Value	$128,600	$81,000	$88,400	$109,300	$75,400	$127,100
Median Rent	$626	$432	$469	$448	$536	$620

Source: U.S. Census Bureau 2011a, 2011b, 2011c

Single family housing accounts for the majority of housing in North Dakota as well as the Project counties, with McKenzie County having the highest percentage of single family housing. There is a higher percentage of multi-family housing in the state as a whole as compared to the Project counties. Williams County has the highest percentage of multi-family housing of all the Project counties. Mobile homes comprise a smaller percentage of housing units in the state as compared to the Project counties. In addition to permanent housing in the Project counties, an increasing amount of transient housing has been constructed/utilized in the region in the last several years. Transient housing may include man

camps, RV parks, informal RV parking, and hotels. Housing construction in the region has increased in the past several years as communities struggle to keep up with demand.

Housing values are lower on average in the Project counties as compared to the state, with median values lowest in Mountrail County and highest in Mercer and Williams Counties. Rents are also lower in the Project counties than in the state as a whole, with the lowest median rent in Dunn County and the highest in Williams County. As communities within the region struggle to keep up with housing demand in recent years, however, rents have been increasing, and affordability has become an issue in heavily impacted communities, such as Williston, Tioga, and Watford City (Ondracek et al. 2010).

5.1.1.4 Income

Between 2000 and 2011, median household incomes increased considerably in all the Project counties as well as in the state as a whole (Table 5.1-4). While poverty rates increased slightly in North Dakota over this time period, poverty rates in most of the Project counties dropped, with Dunn and McKenzie Counties experiencing the most significant reductions. Poverty rates in Mountrail County remained higher than the State rate in 2010.

For the year 2011, median household incomes in all the Project counties were higher than the median household income for the State as a whole, with the highest incomes in Williams County. County poverty rates were lower than the State rate in all but one county. Poverty rates were lower than the State in Dunn, McKenzie, Mercer, and Williams Counties, and higher in Mountrail County.

Table 5.1-4: Project Area Income

	Median Household Income (2000)	Median Household Income (2011)	Percent below Poverty (2000)	Percent below Poverty (2011)
North Dakota	$34,604	$51,704	11.9%	12.2%
Dunn	$30,015	$52,861	17.5%	8.7%
McKenzie	$29,342	$53,902	17.2%	12.0%
Mercer	$42,269	$62,578	7.5%	8.7%
Mountrail	$27,098	$56,593	19.3%	14.7%
Williams	$31,491	$65,913	11.9%	7.4%

Source: U.S. Census Bureau, 2000, 2011a, 2011b, and 2011c

5.1.1.5 Employment

The labor force in the State of North Dakota increased slightly each year between 2002 and 2011 (Table 5.1-5). In the Project counties, the size of the labor force fluctuated over this time period. However, between 2010 and 2011, the size of the labor force increased dramatically in Dunn, McKenzie, Mountrail, and Williams Counties, increasing by 36.8 percent, 26.0 percent, 16.5 percent, and 39.8 percent, respectively. Mercer County experienced a decline in the size of its labor force in 2011.

Unemployment rates in North Dakota and within the Project counties were relatively low between 2002 and 2011. The state's annual unemployment rate was below four percent for all years except 2009, as was also the case for Dunn County. In McKenzie County, the unemployment rate was below four percent for all years, and in Mercer County, it was below five percent for all years except 2011. Mountrail County had the highest annual unemployment rates, peaking at six percent in 2005 and 2006, but dropping to a low of 2.4 percent in 2010 and 2011. Williams County had the lowest unemployment rates of all the Project counties, with a high of 3.1 percent in 2002 and 2003, and reaching a low of 1.1 percent in 2011.

Table 5.1-5: Project Area Unemployment Rates (Labor Force/Annual Unemployment Rate)

Year	North Dakota		Dunn		McKenzie		Mercer		Mountrail		Williams	
2002	345,836	3.5%	1,775	3.8%	2,692	3.7%	4,670	4.5%	2,960	5.3%	11,042	3.1%
2003	348,929	3.6%	1,818	3.6%	2,747	3.7%	4,748	4.6%	3,014	5.2%	11,047	3.1%
2004	351,801	3.5%	1,712	3.6%	2,739	3.5%	4,738	4.6%	3,095	5.4%	11,086	2.7%
2005	355,874	3.4%	1,732	3.4%	2,694	3.7%	4,582	4.6%	2,995	6.0%	11,715	2.3%
2006	360,913	3.2%	1,730	3.3%	2,809	3.2%	4,764	3.8%	2,903	6.0%	12,634	2.0%
2007	366,467	3.1%	1,688	3.9%	2,922	3.1%	4,744	4.2%	2,966	5.7%	13,055	1.9%
2008	370,489	3.1%	1,750	3.1%	3,107	2.4%	4,834	4.5%	2,985	4.2%	14,658	1.7%
2009	371,171	4.1%	1,793	4.2%	2,930	3.2%	5,163	4.3%	3,730	3.9%	14,856	2.5%
2010	375,728	3.8%	2,130	3.2%	3,518	2.2%	4,675	4.8%	4,720	2.4%	17,770	1.7%
2011	382,944	3.5%	2,914	2.0%	4,433	1.7%	4,426	5.0%	5,500	2.4%	24,848	1.1%

Source: BLS, 2012

In conjunction with the increased oil and gas development activities in the region, monthly unemployment rates over the last year have continued to drop in the Project counties (Table 5.1-6).

Table 5.1-6: Project Area Monthly Unemployment Rates

Month	North Dakota	Dunn County	McKenzie County	Mercer County	Mountrail County	Williams County
Oct 2011	2.7	1.5	1.4	3.6	1.8	0.9
Nov 2011	2.9	1.4	1.4	4.7	1.9	0.9
Dec 2011	3.3	1.4	1.6	5.6	2.0	0.9
Jan 2012	3.8	1.6	1.5	6.7	2.1	0.8
Feb 2012	3.9	1.7	1.7	6.7	2.3	0.9
Mar 2012	3.8	1.5	1.6	6.2	2.2	0.9
Apr 2012	3.1	1.4	1.3	4.8	1.9	0.7
May 2012	2.7	1.1	1.3	4.0	1.7	0.7
Jun 2012	3.1	1.4	1.5	4.6	2.0	0.8
Jul 2012	2.9	1.0	1.2	4.5	1.7	0.7
Aug 2012	2.8	1.0	1.3	4.3	1.8	0.8
Sep 2012	2.3	0.9	1.1	3.3	1.5	0.7
Oct 2012	2.4	0.9	1.1	3.4	1.5	0.7

Source: BLS, 2012

For the State and most of the Project counties, the top three industries in terms of employment included: educational services, health care and social assistance; agriculture, forestry, fishing, hunting and mining; and retail trade (Table 5.1-7). In Mercer County, transportation, warehousing and utilities was one of the top three industries instead of retail, and in McKenzie and Mountrail Counties, arts, entertainment, recreation, accommodation and food services was one of the top three industries instead of retail trade.

Table 5.1-7: Project Area Employment by Industry

	North Dakota	Dunn	McKenzie	Mercer	Mountrail	Williams
Agriculture, forestry, fishing and hunting, and mining	9.2%	30.3%	25.3%	20.4%	18.0%	22.2%
Construction	7.3%	9.1%	5.2%	4.9%	5.5%	8.3%
Manufacturing	6.8%	7.0%	3.6%	6.2%	5.1%	2.1%
Wholesale trade	3.1%	2.4%	2.2%	1.5%	3.8%	4.2%
Retail trade	12.0%	8.9%	6.8%	12.3%	9.4%	8.9%

	North Dakota	Dunn	McKenzie	Mercer	Mountrail	Williams
Transportation and warehousing, and utilities	5.7%	5.6%	6.1%	16.3%	4.4%	6.2%
Information	1.5%	1.1%	0.6%	3.5%	3.2%	0.4%
Finance and insurance, and real estate and rental and leasing	6.2%	2.5%	5.1%	2.9%	3.3%	3.9%
Professional, scientific, and management, and administrative and waste management services	6.1%	2.1%	6.6%	4.2%	2.5%	5.7%
Educational services, health care and social assistance	25.3%	19.6%	18.5%	15.5%	20.3%	23.1%
Arts, entertainment, and recreation, and accommodation and food services	7.5%	4.8%	9.2%	6.2%	12.1%	6.0%
Other services, except public administration	4.7%	3.6%	2.9%	3.1%	2.4%	5.4%
Public administration	4.6%	2.8%	7.9%	3.0%	10.0%	3.6%

Source: U.S. Census Bureau 2010b

5.1.1.6 Racial and Ethnic Characteristics

In the State of North Dakota as a whole, the majority of the population is white (Table 5.1-8). The largest minority group in the State is American Indian. Compared to the State, Mercer and Williams Counties have higher percentages of white residents and smaller percentages of American Indian residents. In contrast, Dunn, McKenzie, and Mountrail Counties have smaller percentages of white residents as

compared to the State and higher percentages of American Indian residents. The Fort Berthold Reservation extends through portions of these counties and could explain the higher percentages of American Indian residents. Other minority groups, including Asian, Hawaiian or Pacific Islander, and Hispanic, comprise similar percentages of the population in all of the Project counties as compared to the State as a whole.

Table 5.1-8: Project Area Counties – Population by Race

	2010 Population	White	Black	American Indian	Asian	Hawaiian / Pacific Islander	Other	Two or more races	Hispanic
North Dakota	683,932	89.8%	1.0%	5.6%	1.0%	0.02%	0.6%	1.9%	2.2%
Dunn	3,535	85.1%	0.3%	8.9%	0.8%	0	0.9%	3.9%	2.0%
McKenzie	6,262	76.0%	0	21.0%	1.1%	0	0.5%	1.4%	2.3%
Mercer	8,382	95.4%	0.7%	2.5%	0.3%	0	0	1.0%	0.5%
Mountrail	7,482	64.8%	0.6%	29.4%	0.1%	0	0.2%	4.8%	0.8%
Williams	22,918	91.9%	0.04%	4.7%	0.4%	0.1%	0.7%	2.1%	2.1%

Source: U.S. Census Bureau, 2011a, 2011b, and 2011c

5.1.1.7 Property Valuation and Taxation

Local and state governments generate a portion of their tax revenues by assessing and taxing certain categories of property. In North Dakota, property taxes are levied on real property owned by a corporation, partnership, individual, estate, or trust. Taxation is based on the value of the object that is taxed. Williams County provided the highest tax revenue of all of the counties in the study area, followed by Mercer County (Fong, 2010), as noted in Table 5.1-9.

The primary laws that determine how transmission lines are taxed in North Dakota are in Chapter 57-33.2 and 57-06-17.3 of North Dakota's Century Code. Chapter 57-33.2 applies only to lines whose voltage is 40.6 kV or more, and 57-06-17.3 applies only to lines whose voltage is 230 kV or more. Transmission lines that are taxable under 57-33.2 pay a rate ranging from $50 to $600 per mile, depending on the voltage of the line. However, if the line was placed in service after January 1, 2009, it is exempt from taxes during its first year. Its taxes are reduced by 75 percent the second year, 50 percent the third year, and 25 percent the fourth year, after which the standard rates are applied.

Table 5.1-9: Project Tax Revenue in the Study Area and in North Dakota, Payable 2006-2010

	Total Property Tax Revenue, 2006	Total Property Tax Revenue, 2007	Total Property Tax Revenue, 2008	Total Property Tax Revenue, 2009	Total Property Tax Revenue, 2010
Dunn	$4,163,603	$4,213,242	$4,257,953	$4,273,671	$3,587,498
McKenzie	$3,750,757	$3,913,769	$3,808,607	$4,002,063	$3,310,266
Mercer	$6,556,798	$6,815,946	$6,992,218	$7,342,704	$6,161,729
Mountrail	$5,477,741	$6,054,008	$6,210,285	$6,281,791	$5,880,367
Williams	$16,460,801	$17,622,072	$18,263,736	$19,383,080	$17,347,646
Project Area Total	$36,409,700	$38,619,037	$39,532,799	$41,283,309	$36,287,506
North Dakota	$659,789,374	$706,427,621	$740,540,738	$776,398,475	$678,749,378

Source: Fong, 2010

Transmission lines that are not taxable under Chapter 57-33.2, if they were placed in service after October 1, 2002, and are of 230 kV or greater, are taxable under Chapter 57-06-17.3, at a rate of $300 per mile. These lines also are exempt from taxes during their first year, followed by a 75 percent reduction in their second, 50 percent in their third, and 25 percent in their fourth years of operation.

Transmission line tax revenues accounted for less than one percent of the total property tax revenue in North Dakota in 2011. Total property tax revenues levied in 2010 (payable in 2011) were $816,215,633, of which electric generation, distribution, and transmission taxes statewide accounted for 0.86 percent of this total, or $7,036,194 (Fong, 2011). The share of this figure accounted for specifically by transmission lines was not available for the taxes levied in 2010. However, this share was available for the taxes levied in 2009 (payable in 2010). In 2009, transmission line taxes accounted for $1,328,339 of $7,065,609 of total electric generation, distribution, and transmission taxes levied, or approximately 18.8 percent (Fong, 2010, 2011). Due to the similarity of the total revenue generated in each year, it is likely that transmission line taxes levied in 2010 accounted for a similar share of the total electric generation, distribution, and transmission tax revenue for that year.

5.1.2 Impacts

Socioeconomic resources include elements of the human environment such as population characteristics, employment and other economic factors, public services, and human health and safety. These resources are characterized, measured and tracked at levels such as census block groups and tracts, counties, and the state as a whole. The effects from the proposed project on these types of factors are typically not limited

to the ROW itself but measured by the effects that will result to the wider geographic areas for which indicators in these areas are recorded. Effects typically are limited to the county or census block levels as the influence of these projects on social and economic trends are generally temporary, short-term and inconsequential when compared to all the activities at the broader state level.

Construction and operation of the proposed Project will result in both direct and indirect socioeconomic impacts. Potential socioeconomic impacts include:

- Improved electric reliability and increased capacity for existing, developing, and future customers
- Temporary increase in population as a result of the influx of construction workers
- Temporary increase in demand for temporary lodging facilities as a result of the influx of construction workers
- Temporary increase in demand and spending for local goods, services, and construction materials from construction of the proposed Project
- Potential changes to property values
- Proximity of the new line to existing residences

5.1.2.1 Regional Economy

As discussed above, the regional economy of northwest North Dakota and adjoining areas of Montana is heavily influenced by the rapid and widespread oil and gas development associated with the Bakken oil shale fields. The level of development that has occurred and is planned for the future in the Bakken region likely requires numerous increases in infrastructure throughout the region, including an increase in electrical transmission capacity and reliability. As a vital component to provide power for heating, lighting, and machinery for commercial and industrial development, the continued reliable electric service to the region is necessary to serve the needs of business and enable the economy of the area to continue to develop.

Under the proposed Project, construction of a new 345-kV transmission line from the Beulah area to the northwest that connects directly to the 230-kV system in the Williston/Tioga area will provide an increase in the load-serving capacity to accommodate the long-term electrical needs of the northwest North Dakota region. Projected load growth will be accommodated and the reliability of the regional transmission system will be maintained, continuing to serve the electricity needs of the area and make the region attractive for additional growth and development opportunities.

In addition to electrical support for the economy of the area, project construction will itself generate a certain amount of economic activity in and around the area of line construction. While minimal when compared to the current sales throughout the region, the presence of approximately 150 construction workers over a two-year period will generate additional sales of food, fuel, lodging, and services (primarily vehicle and equipment repairs). Construction workers will introduce an additional approximately $13.4 million into the local economy, across the five Project counties over the two-years of construction.[1] Construction activity will also require concrete, aggregate, lumber, and hardware items. These materials will likely be purchased locally, contributing further to local sales. Most material comprising the structures themselves and conductor will be shipped from manufacturers outside the region. However, many of these materials may be subject to sales and subsequent property taxes payable to local jurisdictions that will benefit local programs like roads and schools.

5.1.2.2 Population

The project region has seen a dramatic increase in population over the past several years as a result of the economic activity and availability of jobs in the area. Table 3-2 shows a population increase in three of the five Project counties between 2000 and 2010, amounting to over 4,000 new permanent residents. A considerable number of additional individuals moving to the area are temporary or semi-permanent, relocating to the area for short-term financial incentive or until work assignments are expended. Construction of the proposed Project will provide similar types of population changes. Transmission line construction generally requires specialized equipment, contractors, and labor. As such, line construction contractors and workers will temporarily relocate to the project area. Construction will include clearing, foundation, structure erection, line stringing, and restoration crews. Although construction will occur over 24 months, individual crews may be required for only a few months before moving out of the area to the next phase of the project. Because of the short-term residency, most workers will not relocate their families. Additionally, construction will not be confined to one area or community but workers will be spread out over nearly 200 miles in three crews of approximately 50 workers each, for a total of 150 workers. Temporary housing for workers will likely include available facilities at several towns throughout the area as well as man camps and RV parks in more remote locations. The larger towns of Williston, Beulah, Watford City, and Tioga will likely be impacted the greatest by this temporary population increase, as workers will seek to take advantage of amenities offered in these towns. Population changes in local communities will be negligible, particularly compared to the current growth

[1] Conservatively estimated based on IRS 2012 Per Diem rate of $123 per day for 150 workers at total of 730 days. As per diem would be dollars spent on lodging and food it is reasonably assumed to be spent locally as opposed to sent home or saved.

in the area. No additional permanent jobs requiring permanent staff that will add to the local population are anticipated as a result of this project.

It is estimated that the Project will require approximately 150 temporary construction workers to construct the transmission line and the proposed Judson and Tande substations. These workforce numbers are based on the assumption that the proposed Project will require three construction crews, each with a 50 person crew, for construction of three separate geographic segments of the transmission line route, including the substations.

5.1.2.3 Housing

The construction workforce required for the Project will have an impact on the availability of temporary housing in the Project area. Many of the construction workers will seek temporary housing for varying time periods based on their individual roles in the proposed Project. Arrangement for longer-term housing may be established by the construction contractor, with crews rotating in and out as their assignments begin and are completed. Dunn, McKenzie, Mercer, Mountrail, and Williams Counties have a very limited supply of temporary housing units available for use by construction workers relocating to the area on a temporary basis. Short-term housing is likely to experience the largest increase in demand due to the transient nature of construction workers and their limited duration in the Project area. Generally, housing options for construction crews will consist of area hotels, existing man camps, or RV camps. No centralized housing location will be established during construction of the proposed Project, as construction will likely involve multiple construction crews based in different locations along the project route.

It is not anticipated that permanent employees will be required for the proposed Project. No additional requirements for permanent housing will occur in the project areas following completion of construction activities

5.1.2.4 Employment and Income

Project-related construction jobs will provide a short-term influx of income to the area and may result in a small positive economic impact to the region. Basin Electric will use local labor to the extent practicable. However, the specialized workforce skills required for the Project may limit the number of workers that will be hired locally, and permanent jobs are not anticipated to be added to the area. Expenditures of wages, particularly approximately $13.4 million in per diem, by workers temporarily relocating to the area will benefit businesses in the local communities but any changes will be minimal. Additionally,

wages for construction workers will be approximately $23.4 million.[2] This will represent only a little more than one percent of the salaries and wages paid within the Project counties in 2010, reported by the U.S. Bureau of Economic Analysis to have exceeded $2.013 billion.[3] Any benefits to local businesses as a result of spending associated with this Project will not require them to add additional staff.

Short-term indirect positive economic impacts will also result from construction of the proposed Project, as revenue will likely increase for some local businesses, such as hotels, restaurants, gas stations, and grocery stores, due to increased spending from construction workers. The spending will create minimal socioeconomic impacts to the overall region.

The proposed Project will induce positive socioeconomic impacts as a result of increasing transmission capacity and reliability. Additional capacity will provide electricity for the expanding Bakken oil field development activities and other future potential development activities in the region. A reliable supply of electricity will continue to support the expanding economy of the region, indirectly supporting the creation of new and support for existing jobs.

5.1.2.5 Property Values

New ROWs for the construction and maintenance of the new transmission line will be required for the project. Existing access roads will be used where possible, but additional access road easements will also need to be acquired. Basin Electric will pay market value to nonfederal landowners, as established through the land evaluation process, for any new land rights required for the proposed project. The process takes all factors affecting value into consideration, including the impact of transmission lines on property value.

5.1.2.6 The land evaluations may reference similar properties to support their conclusions. Property Taxes

The construction, operation, and maintenance of the transmission line will generate additional property taxes to counties where the line will be located. Table 5.1-10 summarizes these tax receipts to local governments association with the 197.8 miles of transmission line. Additionally, there will be property taxes collected from the substation properties.

[2] Conservatively estimated using an average salary for transmission line construction workers of $25/hour, working 10 hour days, 6 days per week for two years for a construction work force of 150.
[3] Bureau of Economic Analysis (BEA). 2011. Local Area Personal Income and Employment Data. Available at http://www.bea.gov/regional/index.htm (accessed April 2012).

Table 5.1-10: Property Tax Revenues to Project Area Counties Associated with the Corridor/Route

	Corridor/Route (miles)	Year 2	Year 3	Year 4	Years 5-45
Dunn	43.1	$3,233	$6,465	$9,698	$12,930
McKenzie	71.7	$5,378	$10,755	$16,133	$21,510
Mercer	18.1	$1,358	$2,715	$4,073	$5,430
Mountrail	3.0	$225	$450	$675	$900
Williams	61.8	$4,635	$9,270	$13,905	$18,540
Project Area Total	197.8	$14,835	$29,670	$44,505	$59,340

Source: Staff calculations based on North Dakota Title 57, Taxation, n.d.

5.1.2.7 Impacts to Residences

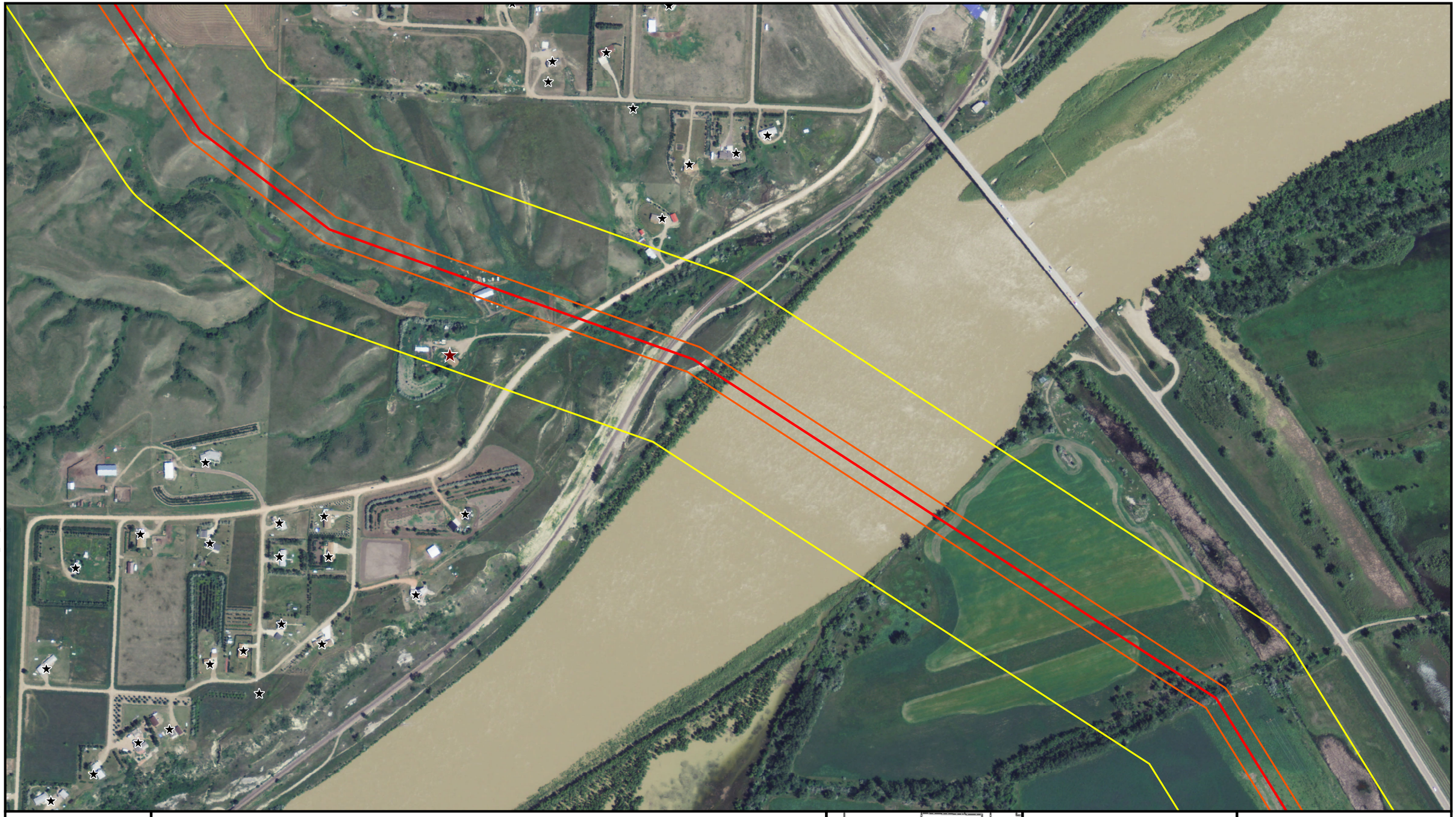
Short-term impacts to nearby residents as a result of the proposed Project will include temporary disruptions during construction. These will include increased noise from construction activities and equipment, the visual presence of construction equipment, and potential traffic disruptions and congestion resulting from construction trucks and equipment accessing the ROW, using local roads, and from potential short-term road closures during conductor stringing. Long-term impacts to nearby residents as a result of operation of the proposed Project will include minor, infrequent disturbance during any maintenance or repair activities. These activities will be most apparent near Williston with its higher density of housing as compared to the sparsely populated remainder of the Corridor/Route.

The transmission line was routed to minimize impacts to residences, and the Project will not result in any displacement of residences. There will be two residences within 500 feet of the Corridor/Route, resulting in potential temporary noise impacts related to construction of the line (Figures 5.1-1 and 5.1-2). Due to the fast-paced expansion of oil and gas development in the region and the associated expansion of housing development, additional temporary residences may be constructed in the vicinity of the Project. Basin will continue to monitor this development and identify potential effects of the Project on new residences.

5.1.3 Mitigation

- The construction contractor, after assessing utilization of existing housing availability, should plan to establish its own housing in the form of man-camps and/or recreational vehicles (RVs) brought in from outside of the region to a number of locations secured by the contractor.

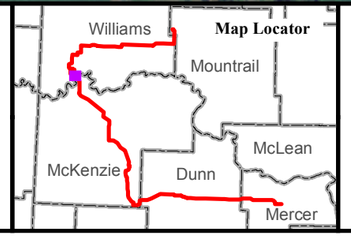
- Work with agricultural producers to minimize disruptions during the harvest season and to limit the impact on the farmers' ability to maneuver equipment in the vicinity of the immediately affected area.
- Work with individual landowners to try to coordinate the timing of construction to minimize short-term impacts on agriculture.
- Initiate discussions with local fire and police districts prior to construction and work with the districts and other appropriate emergency response providers to develop fire and emergency response plans.



NORTH

0 500
Feet

★ Residence within 500 feet
★ Residence
Project Route
150-Foot ROW
1000-Foot Corridor



Burns & McDonnell
SINCE 1898

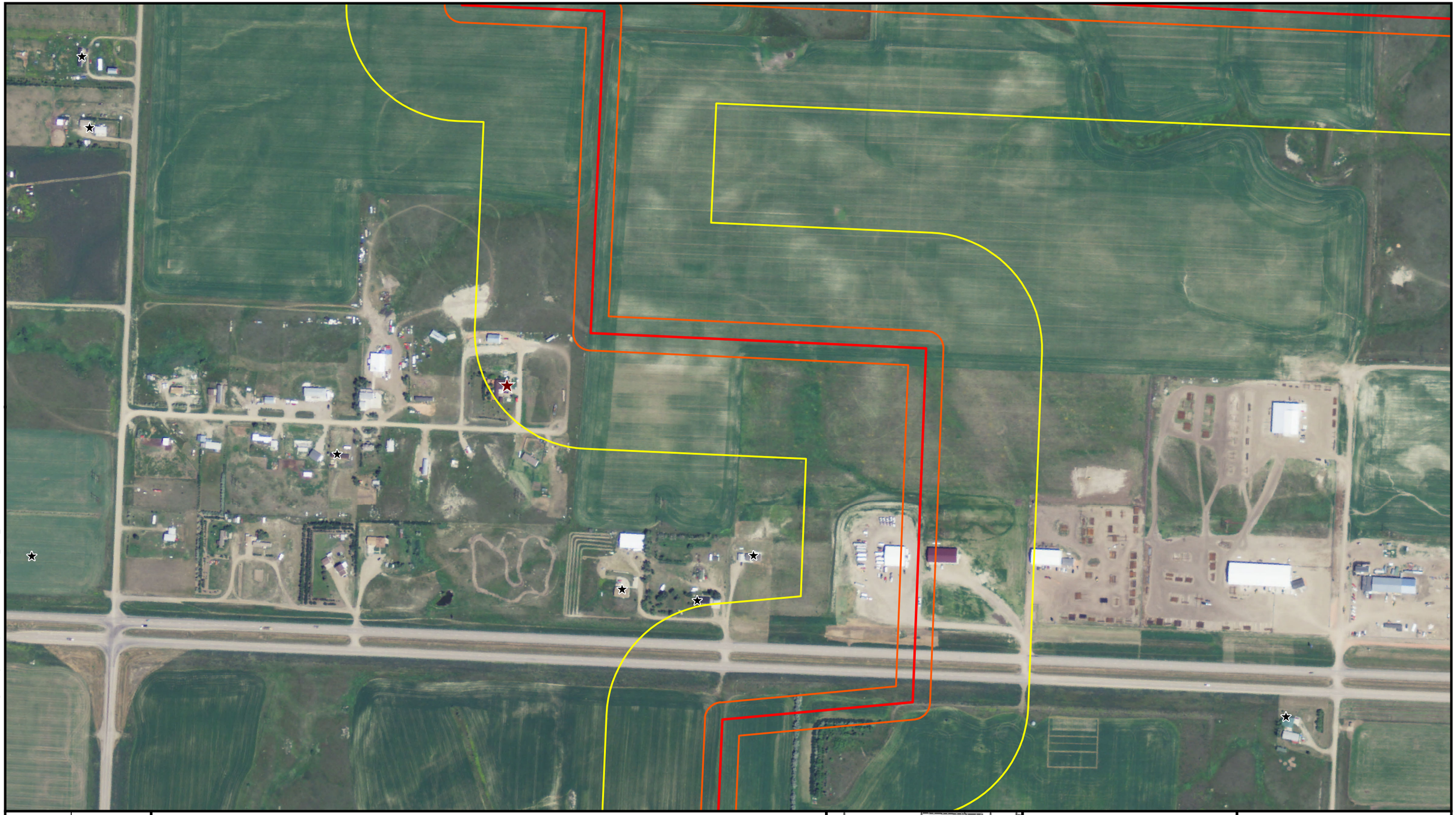
BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

Figure 5.1-1
Basin Electric Power Cooperative
Antelope Valley Station to Neset
345-kVTransmission Project
Residences within 500 feet
of Corridor/Route - 1

Source: USDA NAIP 2010 Aerial Photography; North Dakota GIS; Burns & McDonnell.

February 25, 2013

\\espsrv\data\Projects\Basin\61495_AVS_345\GIS\DataFiles\ArcDocs\PSC - Chapter 5 Figures - Project Route\5-1-1 Residences_500ft_11x17.mxd



NORTH

0 500

Feet

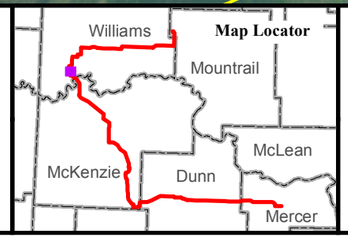
★ Residence within 500 feet

★ Residence

Project Route

150-Foot ROW

1000-Foot Corridor



Burns & McDonnell
SINCE 1898

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

Figure 5.1-2
Basin Electric Power Cooperative
Antelope Valley Station to Neset
345-kVTransmission Project
Residences within 500 feet
of Corridor/Route - 2

Source: USDA NAIP 2010 Aerial Photography; North Dakota GIS; Burns & McDonnell.

February 25, 2013

\\espsrv\data\Projects\Basin\61495_AVS_345\GIS\DataFiles\ArcDocs\PSC - Chapter 5 Figures - Project Route\5-1-2Residences_500ft_11x17.mxd

5.2 LAND USE

5.2.1 Description of Resources

5.2.1.1 Regional Setting

The Corridor/Route extends through portions of Dunn, McKenzie, Mercer, Mountrail, and Williams Counties in northwestern North Dakota. Williston, located in Williams County, is the largest city in the Project area. Several other small towns are scattered throughout the area. State and federal properties managed by various agencies are located within the Project area, and include the LMNG, TRNP, USFWS conservation easement lands, U.S. Army Corps of Engineers (USACE) lands surrounding Lake Sakakawea, as well as state wildlife management areas (WMA) and school trust lands.

5.2.1.2 Existing Land Use

The Project area contains large expanses of rural, undeveloped areas with scattered rural residences and farmsteads interspersed throughout. Land use within the Project area consists of a mixture of grassland and rangeland, with smaller areas of woodland and cropland around river drainages and lakes. Numerous oil and gas wells are scattered throughout the area. The Corridor/Route crosses the upper portion of Lake Sakakawea near Williston.

5.2.1.3 Zoning

Dunn County –The Dunn County Land Development Code, adopted December 30, 2011, regulates development in the areas of Dunn County that are outside the jurisdiction of the Bureau of Indian Affairs and the municipalities of Dodge, Dunn Center, Halliday, and Killdeer (Dunn County Planning Commission 2011a). There are three zoning districts established by the development code, which include Rural Preservation, Rural Development, and Municipal Development. Transmission lines are a permitted use in all three zoning districts. The development code also includes regulations for a Floodplain Overlay District.

McKenzie County – The McKenzie County Zoning Ordinance has been prepared and is in the process of being approved (February 2013) and when adopted will , apply to all unincorporated areas of the county, except those townships that have not relinquished zoning power to the county (McKenzie County Commissioners, 2013a). The County is divided into seven zoning districts, which include Agricultural, Low Density Residential (R-1), Medium Density Residential (R-2), High Density Residential (R-3), Recreational, Commercial, and Industrial. Electric transmission lines and associated facilities are specified as a conditionally allowed use in the Agricultural and Industrial Districts. Transmission lines are a conditionally allowed use in the Recreational District. Public utilities, which include facilities for

electricity by definition, are a conditionally allowed use in the R-1, R-2, and R-3 Districts. Transmission towers are listed as a conditionally allowed use in the Commercial District. The Ordinance also establishes two overlay districts, including Planned Unit Development (PUD) Overlay and Floodplain Overlay.

Mercer County – The Mercer County Zoning Ordinance regulates land use and development in the areas of Mercer County excluding the Fort Berthold Indian Reservation and incorporated cities (Board of Mercer County Commissioners 2009). The ordinance establishes 11 zoning districts, which include Agricultural, Residential (R-1 through R-5), Commercial, Industrial, Recreation, Conservation, and Flood Hazard. Transmission lines of 115-kV or less and associated facilities are permitted uses in all zoning districts except Conservation. Transmission facilities greater than 115-kV require a conditional use approval in the Agricultural, Industrial, Recreation, and Flood Hazard districts and are not listed as a permitted or conditional use in the other districts.

Mountrail County –The Mountrail County Zoning Ordinance, adopted May 15, 1982, and amended March 16, 2010, regulates development in all areas of Mountrail County, including incorporated and unincorporated areas. Certain incorporated or other areas are excluded from the regulations if they adopt a zoning ordinance of their own, which include the cities of New Town, Parshall, Plaza, Stanley, and White Earth, and the townships of Bicker, Howie, Shell, and Van Hook. The ordinance establishes five zoning districts, including Agricultural, Commercial, Industrial, Residential, and Rural Recreational. Transmission lines require a conditional use permit in all zones.

Williams County – Land use and development in unincorporated Williams County is regulated by the Zoning Ordinance and Subdivision Regulations of Williams County, North Dakota (Williston Planning Department and Williams County Planning Commission 1987). The regulations establish five zoning districts, which include Agricultural, Residential, Public, Commercial, and Industrial. Transmission lines of 115-kV or greater, including accessory buildings and associated structures, are conditionally permitted uses in the Agricultural and Industrial districts and are not listed as a permitted or conditional use in the other districts.

5.2.1.4 Comprehensive Plans

The Dunn County Comprehensive Plan, adopted October 12, 2011, establishes a vision for future development of the county (Dunn County Planning Commission 2011b). The primary vision described in the comprehensive plan is to maintain the existing quality of life for Dunn County residents while taking advantage of opportunities created as a result of the expanding oil and gas development industry. The

plan includes general goals and objectives for land use, transportation, housing, economic development, public services, infrastructure, natural resources, intergovernmental cooperation, and planning.

The Williams County Comprehensive Plan was adopted December 4, 2012, in light of the boom in oil and gas development in the county and associated steep population growth. The plan sets goals and objectives for accommodating future growth in the community, including housing, commercial, and industrial development. The plan also addresses the infrastructure needs to support future growth, including transportation, utilities, public facilities and services, and natural resources.

The McKenzie County Comprehensive Plan, has been prepared and is getting approved, once it is adopted it will provide goals, objectives, and implementation strategies for the county, as it confronts growth and development issues in the agriculture and energy sectors (McKenzie County Commission, 2013). Areas addressed by the plan include economic development, government, natural resources, land use, public facilities and services, transportation, recreation, and housing.

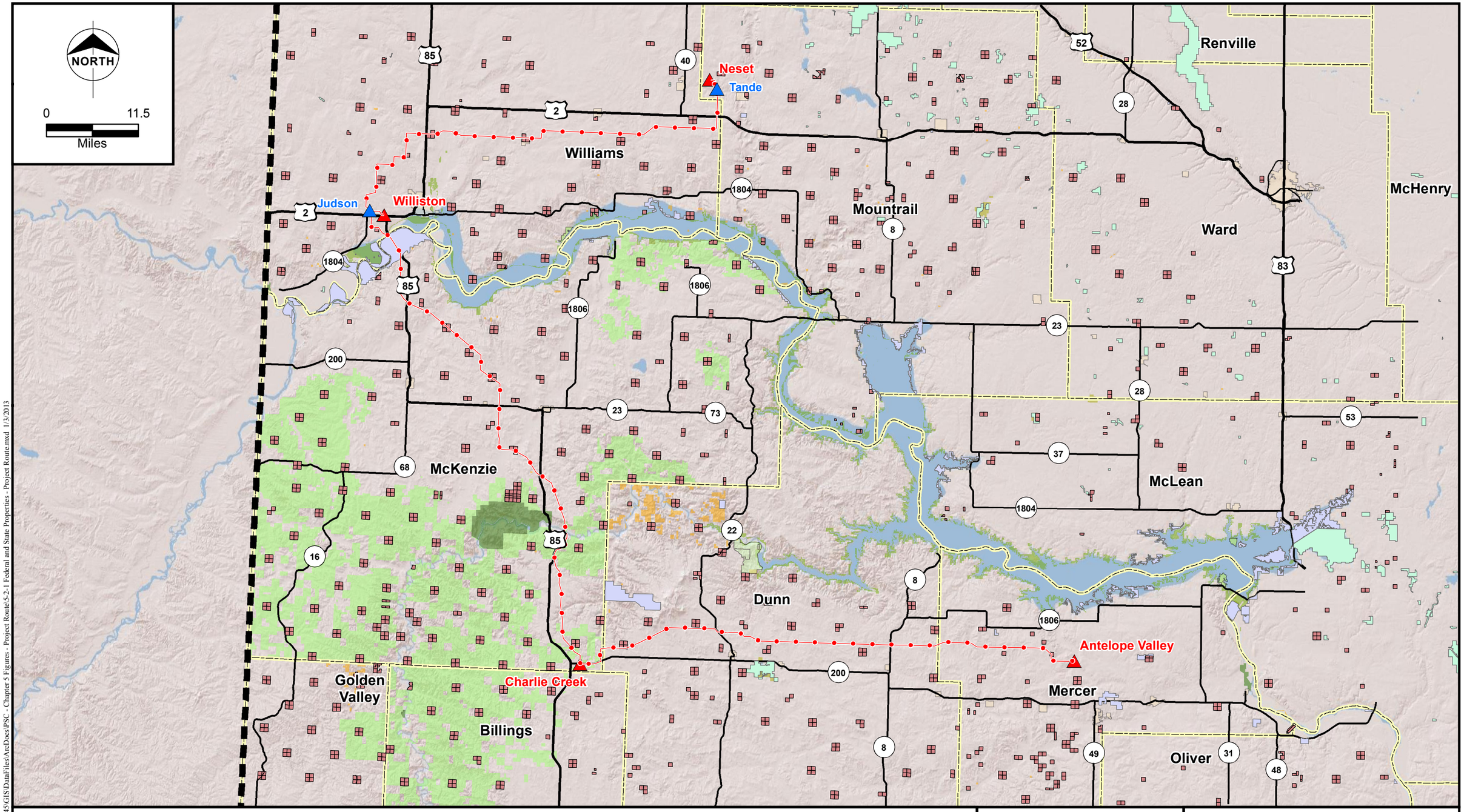
Mountrail County has a comprehensive plan; however, it has not been updated since originally adopted in 1982. Mercer County does not currently have a comprehensive plan.

5.2.1.5 State and Federal Properties

The Corridor/Route crosses the following state and federal lands (Figure 5.2-1).

USFS - The LMNG includes 1,028,000 acres of publicly-owned lands administered by the USFS (USFS 2010). Within the Project area, the LMNG is located throughout portions of McKenzie County. In addition to providing recreational opportunities, these lands also support livestock grazing and oil and gas production. Portions of the LMNG are designated as Inventoried Roadless Areas, or areas identified as lands without existing roads that could be suitable for conservation as a wilderness area. Many of the Roadless Areas are associated with badland areas adjacent to the Little Missouri River and TRNP. The Corridor/Route does not cross any special management areas designated as Roadless Areas within the LMNG.

NPS - The North Unit of TRNP, managed by the U.S. National Park Service (NPS), is located in McKenzie County, south of Watford City along U.S. Highway 85. This national park provides numerous outdoor activities such as camping, canoeing, fishing, horseback riding, and hiking (NPS 2011). A variety of wildlife species occur within the park boundaries, making it a popular wildlife viewing area.



LEGEND

- Project Route
- Existing Substation
- Proposed Substation
- State Boundary
- County Boundary
- Municipal Areas
- Wildlife Management Areas
- State Park
- Army Corps of Engineers
- National Grassland
- National Park
- National Wildlife Refuge
- BLM Lands
- State School Trust Lands
- Waterfowl Production Area

Burns & McDonnell SINCE 1898

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

Figure 5.2-1
Basin Electric Power Cooperative
Antelope Valley Station to Neset
345-kV Transmission Project
Federal and State-Owned Lands

Source: North Dakota GIS; Esri; Basin Electric; Burns & McDonnell.

Revised January 03, 2013

\\esprsrv\data\Projects\Basin\6195_AVS_345\GIS\DataFiles\ArcDocs\PSC - Chapter 5 Figures - Project Route\5-2-1 Federal and State Properties - Project Route.mxd 1/3/2013

USACE and North Dakota Game and Fish Department (NDGFD) - The USACE oversees management of Lake Sakakawea and the public lands surrounding the lake. USACE partners with various federal, tribal, state, and local entities for management of various parks and recreational facilities and WMAs on these lands (USACE 2007). The Corridor/Route crosses the Lewis and Clark WMA in McKenzie County, which is managed by USACE and the NDGFD. The Lewis and Clark WMA is managed for recreational purposes and also contains agricultural, haying and grazing lands, and oil leases. A Ducks Unlimited waterfowl project pumps water to enhance over 100 acres of wetlands. Recreational amenities include picnic shelters, a rifle range, boat ramps, and fishing access sites.

North Dakota School Trust Lands - School Trust Lands, which are managed by the North Dakota State Land Department, are scattered throughout the Project area. School trust lands are leased for the purpose of generating income for the schools and designated trust funds of the state (N.D. State Land Department 2011). The majority of the lands are leased for grazing. These lands are also open to the public for walk-in recreational uses such as hunting, fishing, hiking, and bird watching.

5.2.2 Impacts

A land use impact is one that restricts the future use of land or conflicts with an existing use. Transmission lines tend to restrict certain activities but may or may not change the land use.

Construction and operation of the proposed Project will result in both direct and indirect impacts to land use. Potential impacts to land use include:

- Temporary and permanent land use changes
- Restrictions on activities within the ROW
- Inconsistency with local land use plans and zoning
- Removal of land from future development
- Potential use restrictions, conflicts, or eligibility with conservation easements

5.2.2.1 Agricultural Land Use Impacts

The majority of the land crossed by the proposed project is used for agricultural purposes. Long-term land use impacts to grassland, cropland, and pasture will be primarily the result of structure placement, ROW maintenance, and access roads. Current agricultural practices will be maintained for most of the ROW. Areas of cropland within the ROW will continue to be farmed. The only land that will be unavailable for agriculture will be the area occupied by structures located within tillable areas. This area is estimated to be about 7 feet in diameter, which is equivalent to 38.5 square feet or 0.0009 acres per

structure, or approximately 1.03 acres overall. There will be approximately 1,161 structures for the Corridor/Route. This land will be removed from production and structures will present obstacles that will need to be avoided. Impacts on pasture land will also be negligible, because grazing could continue within the ROW. Structures will remove small areas of land from forage production and structures will present obstacles to haying equipment. Overall, however the line will result in minimal reduction in agricultural production or land available for agricultural activities.

Easements will be obtained from landowners along the Corridor/Route for the purpose of constructing and maintaining the transmission line. The landowner will maintain ownership of the property, and continue to pay taxes on the property, but Basin Electric will acquire an easement allowing them to construct and maintain a transmission line ROW in exchange for a monetary payment to the landowner. The easement agreement between the landowner and Basin Electric will outline any use restrictions applying to the easement. The easement agreement will include certain restrictions on the continued use of the ROW, such as prohibiting permanent structures and establishment of certain types of vegetation within the ROW that could affect access to the line or safe and reliable operation. The land could still be used for agriculture.

During construction and maintenance activities, agricultural lands will be subject to temporary impacts. Depending on the time of year, access for construction will result in damage to crops, compaction and rutting of soil, restrictions on access to the ROW, and restrictions on general agricultural practices in and around the ROW (such as prescribed burning of grassland pasture). Landowners will be compensated for crop and forage loss and any damage to soils will be redressed. Cattle may need to be re-located or confined away from the ROW areas of pasture during construction. Following completion of construction, disturbance and disruption to agricultural activities will largely cease. Periodic maintenance activities and emergency repairs will result in impacts similar to those for construction. However, these activities will be infrequent over the life of the project. Landowners will be compensated for any damage and the ROW will be restored to previous conditions.

In addition to the ROW for the transmission line, approximately ten temporary construction material and equipment laydown areas will be necessary for the duration of construction. These laydown areas will be approximately five acres in size. Where feasible, construction laydown areas are typically located at previously-disturbed or developed locations such as vacant lots, existing utility yards or parking lots to reduce impacts to sensitive resources. If existing yard locations are not available, preferred locations for yards will be undeveloped areas, such as grazing or cropland, that are cleared, flat, have all-weather access, and do not contain streams, wetlands, or other environmentally sensitive resources. Laydown

yards will typically consist of flat or gently sloping lands where construction material will be placed on pallets or cribbing. No topsoil will be removed and minimal if any re-grading is expected to take place at these facilities. Laydown areas will be returned to pre-construction condition upon completion of the Project.

In total, approximately 3,589.8 acres of ROW will be required for the Project. These lands will be restricted from various types of future development but could continue to be used for agricultural uses. Table 5.2-1 shows the acreages of each land use type within the Corridor/Route. The majority of the Corridor/Route consists of grassland and cultivated cropland, with a small percentage consisting of pasture/hayland and woodland. Impacts to all land use types will include the temporary loss of use for landowners within the Corridor/Route to allow for line construction. Temporary disturbance from heavy equipment within the ROW may result in the loss of some crops during construction.

Two new substations, including the proposed Judson 345-kV Substation and the proposed Tande 345-kV Substation, will also be constructed as part of the Project. Construction will take place on approximately 12 acres of land per substation and will result in the permanent conversion of this area from agricultural land to utility land use.

Table 5.2-1: Acres of Land Affected within Corridor/Route

Land Use	Project Corridor/Route
Grassland (acres)	1,641.5
Cultivated cropland (acres)	1,392.2
Pasture/hay (acres)	158.0
Developed lands (acres)	104.6
Other lands(acres)*	293.5
Total (acres)	**3,589.8**

*includes woodland, shrub/scrub, wetlands, barren lands, open water
Acres were calculated using available National Land Cover Dataset (NLCD) information

5.2.2.2 Zoning and Land Use Plans

Local zoning ordinances and comprehensive plans were examined for potential conflicts between the proposed Project and current land uses and future development plans. The Corridor/Route extends through Dunn, McKenzie, Mercer, Mountrail, and Williams Counties. Transmission lines are generally a permitted use in Dunn County and a conditional use in McKenzie, Mercer, Mountrail, and Williams Counties. As the Corridor/Route extends across numerous counties and organized townships that have

specific land use requirements, all applicable county and township zoning and land use approvals will be obtained for the proposed Project prior to construction.

The Project will be consistent with the identified zoning ordinances or comprehensive plans. The Project will be consistent with the county or township zoning ordinances, because transmission lines are a permitted or conditional use in all these jurisdictions. Therefore, the Project will not be anticipated to conflict with any zoning and land use plans. All applicable zoning and land use approvals will be obtained prior to construction.

5.2.2.3 State and Federal Properties

The proposed Corridor/Route crosses lands owned by Federal and state agencies. The following summarizes the lands crossed by the Corridor/Route under Federal or state ownership and the potential concerns or conflicts between agency management and the proposed Project.

USFS – The Project will incorporate into utility ROW approximately 143.8 acres of the LMNG unit of the Dakota Prairie National Grasslands. The LMNG, at more than a million acres, is the largest national grassland in the nation. This mixed-grass prairie found in badlands topography is located in McKenzie, Billings, Slope, and Golden Valley Counties in western North Dakota. The LMNG through which the Corridor/Route is located is administered by the McKenzie Ranger District, Watford City, North Dakota.

The LMNG is home to a great variety of wildlife, including bighorn sheep, eagles and falcons, prairie dogs, and pronghorn antelope. Oil and gas production and livestock grazing are important on this unit, as are opportunities for remote roadless experience. These 143.8 ROW acres consist of 94.0 acres of grassland, 18.6 acres of woodland, 12.0 acres of shrub/scrub, 14.3 developed acres, 3.5 acres of pasture/hayland, 0.6 acre of cultivated crops, and 0.8 acre of barren land. Direct impacts will include the acquisition of ROW and potential clearing of 18.6 acres of woodland area. A Special Use Permit to cross public land will be obtained from the USFS for the Corridor/Route.

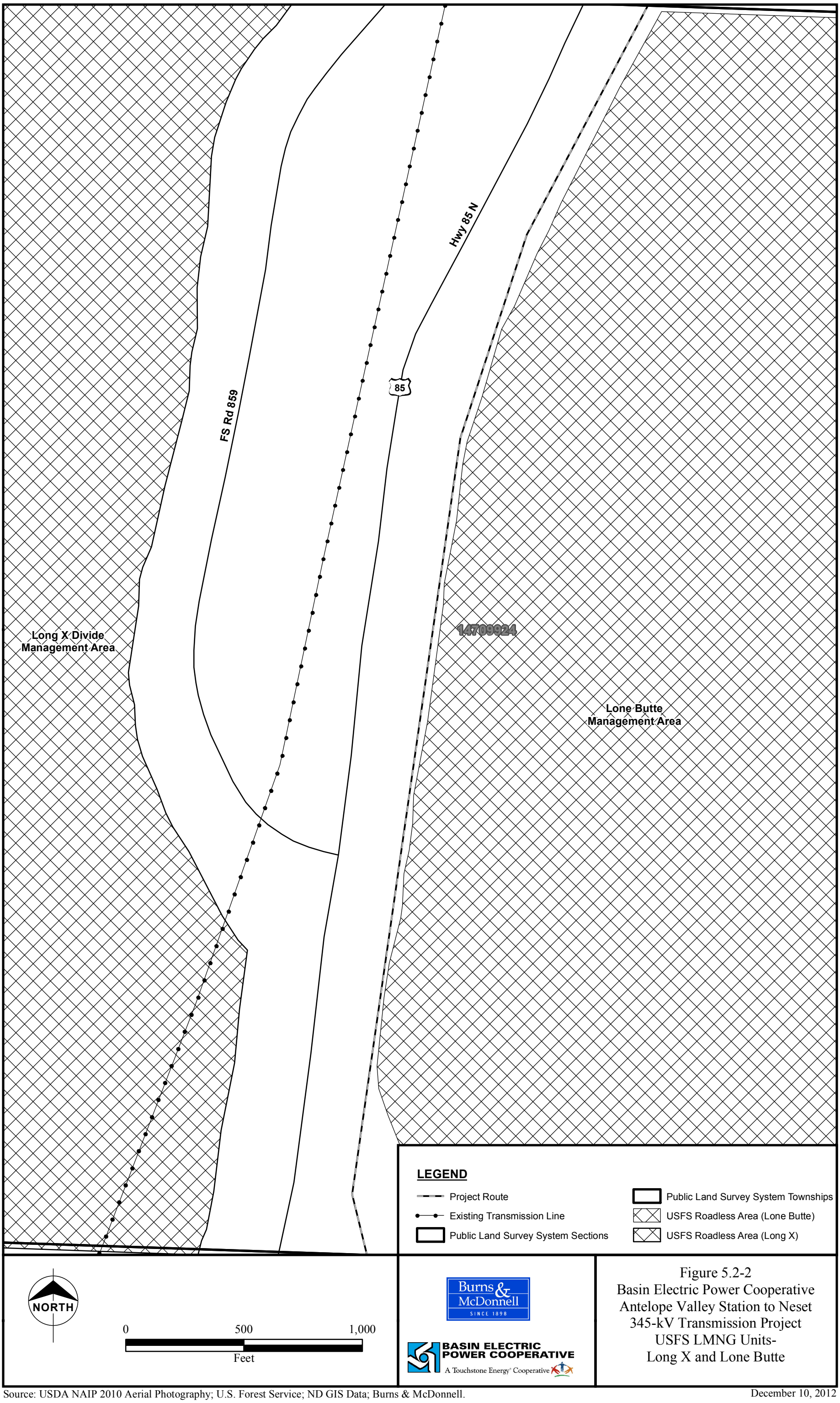
Grassland areas within the LMNG will be relatively unaffected by the proposed project. These areas will be restricted from public access during construction but will continue to be accessible to the public following construction and ROW restoration. Woodland areas within the LMNG may be cleared and converted to ROW, which, although a permanent change in the land cover within the easement ROW, will not be inconsistent with land use and management of the LMNG. Should LMNG property crossed by the proposed project be leased for grazing, cattle may need to be relocated or otherwise restricted from the ROW during construction.

The Corridor/Route will not cross any special management areas that have been designated Roadless Areas within the LMNG. The Corridor/Route does parallel immediately alongside the western edge of the Lone Butte Management Area and within approximately 500 feet of the Long X Divide Management Area. These two management areas of the LMNG are designated as Roadless and are located in close proximity to each other. They are separated by U.S. Highway 85 (Figure 5.2-2). The Corridor/Route will be located just outside the far western edge of the Lone Butte management boundary and in a utility corridor along U.S. Highway 85. This segment of the Corridor/Route was originally sited further east, within the Lone Butte Management Area, but based on comments received during the scoping process, the route was realigned to move outside of the Lone Butte Management Area.

Basin Electric has submitted a preliminary Application for Transportation and Utilities Systems and Facilities on Federal Lands for the Corridor/Route to the USFS. Roadless areas are designated to preserve the lands in a natural state and restrict vehicle access, thereby limiting potential activities to those that have low impact on the environment. To help preserve and protect this designation, the potential alignment of the project in this area was relocated outside of this land management area and therefore will have no effect on the Roadless designations of these areas.

USACE and NDGFD - The Corridor/Route will cross approximately 57.7 acres of USACE-owned property, which is within the Lewis and Clark WMA managed by the NDGFD. ROW acres impacted include 18.5 acres of cultivated crops, 15.5 acres of wetland, 12.2 acres of grassland, 6.0 acres of woodland, 3.5 acres of pasture/hay, 1.4 acres of open water, and 0.6 acre of shrub/scrub. Direct impacts will include the acquisition of the ROW and potential clearing of 6.0 acres of woodland that may result in loss of wildlife habitat. Some wildlife habitat may be removed or altered within the Corridor/Route as a result of the proposed Project. An easement or permit to cross public land will be acquired from the USACE for the Project. Based on coordination with USACE, the Corridor/Route was sited along U.S. Highway 85 adjacent to an existing transmission line through the Lewis and Clark WMA. This segment of the route was originally sited further west, but based on the input provide by USACE and their management plans for the land to the west of U.S. Highway 85, they preferred to have the Corridor/Route aligned closer to the existing highway and transmission line infrastructure.

During construction, public use of lands within and adjacent to the proposed ROW will be restricted for security and safety for the line, workers and public. Following construction, these lands will again be available for public use.



\\espsrv\data\Projects\Basin\61495_AVS_345\GIS\DataFiles\ArcDocs\PSC - Chapter 5 Figures - Project Route\5-2-2_US_Forest_Service_Roadless_Areas_BlackWhite_April162012.mxd

Burns & McDonnell SINCE 1898

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

Figure 5.2-2
Basin Electric Power Cooperative
Antelope Valley Station to Neset
345-kV Transmission Project
USFS LMNG Units-
Long X and Lone Butte

Source: USDA NAIP 2010 Aerial Photography; U.S. Forest Service; ND GIS Data; Burns & McDonnell.

December 10, 2012

North Dakota School Trust Lands – Within the proposed Project area, School Trust Land parcels consist of approximately 1,363 acres. These lands are used to generate revenue for schools from grazing and agricultural uses and the extraction of mineral resources such as aggregate and oil and gas production. The Corridor/Route will cross 20 School Trust Land parcels, for a total of approximately 123.5 acres within the ROW. Of the 123.5 ROW acres, 102.4 acres are grassland, 9.2 acres are in cultivated crops, 5.6 acres are wetlands, 2.9 acres are woodland, 2.0 acres are shrub/scrub, 1.1 acres are developed, and 0.3 acre is barren land. Woodland will be permanently converted to cleared ROW suitable for agricultural activities. No permanent changes in land use, inconsistent with the current school land requirements within these parcels are anticipated as a result of the proposed Project. Temporary impacts will be expected during construction, with permanent impacts to grasslands and cultivated cropland occurring only at structure locations. An easement to cross these public lands will be needed from the North Dakota Department of Trust Lands for these portions of this route. Basin Electric has been engaged with the Department to ensure that the Project does not impact the Department of Trust Lands' ability to continue to develop the Trust Lands per their planning.

5.2.3 Mitigation

- Coordinate with landowners for potential measures to minimize project impacts on uses on specific properties.
- Coordinate with appropriate federal and state land management agencies to obtain appropriate permits and easements for portions of the Corridor/Route traversing public lands.
- Obtain the appropriate permits as necessary to comply with county and township zoning ordinances.
- Plan and conduct construction activities to minimize temporary disturbance, displacement of crops, and interference with agricultural activities.
- Restore compacted cropland soils as close as possible to pre-construction conditions using tillage.
- Compensate landowners for any new land rights required for ROW or access road easements.
- Compensate landowners at market value for any new land rights required for ROW easements or acquired for new temporary or permanent access roads on private lands. This should include compensation for agricultural production and market values lost during the construction period.

5.3 INFRASTRUCTURE/TRANSPORTATION

5.3.1 Description of Resources

5.3.1.1 Regional Setting

Northwestern North Dakota is currently experiencing a rapid increase in development as a result of the activities associated with the extraction of oil from the Bakken shale. In North Dakota, Bakken shale development is currently concentrated in McKenzie, Mountrail and Williams Counties. The level of development that has occurred and is planned for the future will require an increase in electrical transmission capacity and reliability, associated substations, pipelines, water supply and wastewater treatment.

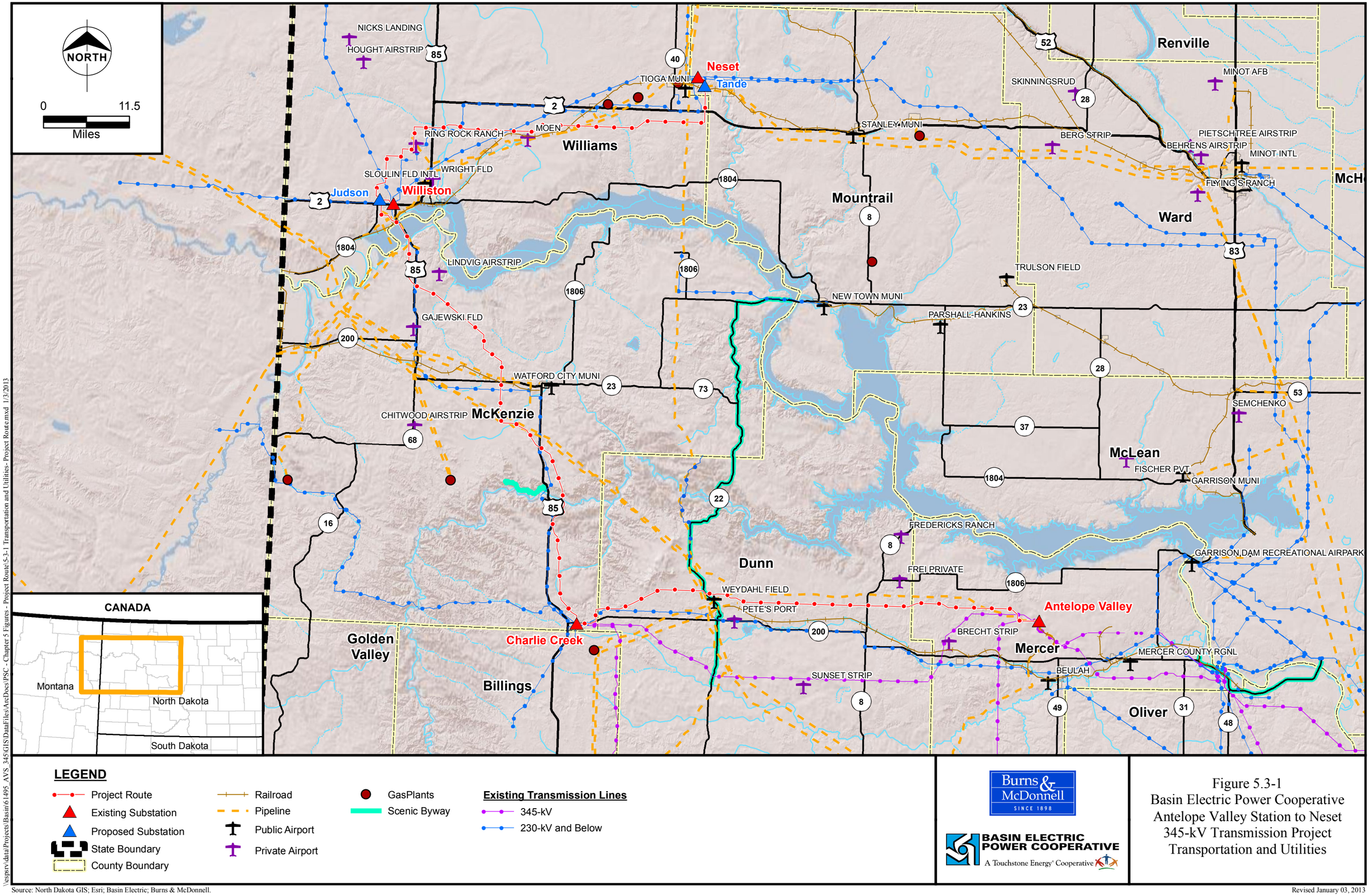
Historically, Northwestern North Dakota has had minimal infrastructure compared to more populated areas of the United States. This area consists of small communities and rural farmsteads, with agricultural activities, along with past and current oil development, being the primary factors in defining most infrastructure needs. Populations, up until recently, were steady or declining, and new infrastructure projects were not necessary.

Infrastructure development related to the recent expanding oil and gas industry activity in the region includes pipelines, rail, natural gas plants, roads, and transmission/distribution line development. Pipeline infrastructure is being developed to transport crude oil out of the Bakken to refinery and marketing hubs, such as the U.S. Gulf Coast, as well as to transport natural gas, fracking water, and salt water. Crude oil is being transported by rail out of the Bakken oil field, and expansion of rail infrastructure and associated loading and unloading facilities is under development. Natural gas plants are expanding to process natural gas for consumer use. Local transmission lines for distribution have recently been constructed or are in development in western North Dakota to support the expanding drilling activity and supporting infrastructure. Existing roadways are requiring expansion and more frequent maintenance due to increased industrial activity in the region, and new roadway projects are being developed for the region. Further discussion regarding utility infrastructure and transportation infrastructure in the region is found in the following sections. Figure 5.3-1 shows some of the existing utility and transportation infrastructure within the Project area.

5.3.1.2 Utility Infrastructure

5.3.1.2.1 Pipelines

Numerous existing pipelines are located within the Project area, with additional pipelines planned for construction in the near future. Increasing oil and gas industry activity has facilitated the construction of numerous crude oil and natural gas pipelines. More pipelines occur in the western portion of the Project



Burns & McDonnell SINCE 1898

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

Figure 5.3-1
Basin Electric Power Cooperative
Antelope Valley Station to Neset
345-kV Transmission Project
Transportation and Utilities

Source: North Dakota GIS; Esri; Basin Electric; Burns & McDonnell.

Revised January 03, 2013

\\espsrv\data\Projects\Basin\61495_AVS_345\GIS\DataFiles\ArcDocs\PSC - Chapter 5 Figures - Project Route\5-3-1 Transportation and Utilities- Project Route.mxd 1/3/2013

area due to its more favorable location for oil and gas activity. Natural gas pipelines typically consist of a network of gathering pipelines, which transport natural gas to refining gas plants, and a network of transmission pipelines, which transport treated natural gas to markets both within and out of state. There are also numerous crude oil pipelines that occur within the Project area, and one existing CO_2 pipeline extending from Antelope Valley Station to the Canadian border.

Natural gas processing plants associated with the oil and gas industry also occur within the Project area. According to a report issued by the North Dakota Pipeline Authority (2010) as an update on North Dakota's natural gas infrastructure, there are five natural gas processing plants within the Project vicinity. These plants occur in McKenzie, Mountrail, and Williams Counties.

In addition to the numerous pipelines associated with increasing oil and gas activity, there are water and sewer pipelines occurring within the Project area. Most of these pipelines are associated with the small communities located in the vicinity, but there are other water lines occurring within the Project area that are associated with agricultural purposes such as center-pivot irrigation systems.

5.3.1.2.2 Electrical Transmission Lines

Several transmission lines (115-kV or greater) are present within the Project area. Basin Electric's existing Charlie Creek to Antelope Valley Station 345-kV transmission line and the Charlie Creek-Squaw Gap 115-kV line is located in the southern portion of the Project area. Basin Electric has the Williston to Tioga, Logan to Tioga and the Tioga to Canadian Border 230-kV transmission lines located in the northern portion of the Project area north and east of Williston. Western's Indian Hills to Williston, Culbertson to Williston and Charlie Creek to Williston 230-kV transmission lines also occur within the Project area.

Basin Electric's member distribution cooperatives, such as RoughRider Electric, McKenzie Electric, and Mountrail-Williams Electric Cooperatives, all have 115-kV transmission systems in the Project area. Montana-Dakota Utilities' Williston to Genora and Williston to Tioga 115-kV lines are present within the Project area as well.

Numerous smaller transmission and distribution lines occur throughout the Project area to provide electrical service to communities, rural residences and businesses. Distribution lines are generally located along area roadways. Transmission lines more commonly extend cross-country following section, quarter-section, or fence lines. Increasing oil and gas activities have resulted in additional distribution being needed to serve oil pump sites and drill rigs, and to serve the increasing worker populations living in temporary housing camps.

5.3.1.2.3 Electrical Substations

Several transmission substations are located within the Project area. Some of these substations are owned and operated by utilities not involved with the proposed Project. Transmission substations transform voltage from higher to lower, and increase or decrease current levels depending on the type of transformers installed within the substation. Existing substations in the Project area associated with the Project are Basin Electric's existing Antelope Valley Station 345-kV Substation, Charlie Creek 345-kV Substation, Neset 230-kV Substation and Western's Williston 230-kV Substation.

5.3.1.2.4 Power Supply/Generation

Basin Electric owns all or portions of thirteen existing energy conversion facilities located in North Dakota, South Dakota, Montana, Wyoming and Iowa. Four of these facilities are in North Dakota. Two are coal-fired facilities: Antelope Valley Station near Beulah and Leland Olds Station near Stanton and two are wind projects: Prairie Winds I near Minot and Minot Wind Project near Minot. Two generation facilities that consist of one natural gas-fired 45-MW simple-cycle combustion turbine are currently being constructed in northwest North Dakota. Other generation resources are located in Montana, South Dakota, Wyoming and Iowa.

Basin Electric purchases all or portions of the output from eight Waste Heat Recovery Units. Three waste Heat recovery units are located in North Dakota, three located in South Dakota and one in Montana and one in Minnesota.

Basin Electric purchases all or portions of the output of seven wind projects in North Dakota, South Dakota and Minnesota. Basin Electric also purchases all or portions of the generation from numerous coal, gas and liquid fuel generation facilities throughout our service territory in South Dakota and Iowa.

Project Need

In the Williston/Tioga region, the preliminary load forecast for Williston Load pocket prepared for Basin Electric is noted in Table 5.3-1. It is projected that the load is increasing in the regions adjacent to Williston/Tioga in a similar manner.

Table 5.3-1: Load Forecast for Transmission Lines in the Williston/Tioga Region

Year	Load (MW*)	% Increase
2011	280	--
2012	390	39
2013	454	16
2014	481	6
2015	509	6
2016	538	6

*MW = mega watts

An analysis of transmission line capacity indicates by the year 2016 the load will have increased beyond the load-serving capacity of the existing system for the Williston/Tioga region and a new transmission line is required to provide additional capacity and system reliability. The nearest transmission system infrastructure that is capable of supporting this load growth is located at the existing Antelope Valley Station, which is located near Beulah (see Figure 5.3-1). This system is operated at 115-kV, 230-kV and 345-kV and extends west, south and east from Beulah.

5.3.1.2.5 Reliability Issues

The existing high voltage system in the Williston/Tioga region consists of 230-kV and 115-kV systems that connect to: Saskatchewan, Canada; eastern Montana; central North Dakota; and western North Dakota. Outage of any of these paths could cause low voltage criteria violations and overload adjacent transmission lines in the Williston/Tioga region.

5.3.1.2.6 AM and FM Towers

There are currently six AM and FM towers located within 6 miles of the proposed project alternatives. Three of these are located in Williston, two are located in Tioga, and one is located in Watford City. None of these towers are located within the Corridor/Route; the nearest tower is located approximately 275 feet from the Corridor/Route (ND GIS, 2011).

5.3.1.2.7 Water Supply and Treatment

Much of rural northwestern North Dakota, including the Project area, relies primarily on groundwater for its water supply, through wells or rural water districts. Communities located near the Missouri River/Lake Sakakawea appropriate surface water to support their needs. Table 5.3-2 provides a listing of all municipal and industrial water treatment plants (WTP) within Dunn, Mercer, McKenzie, Mountrail and Williams counties. This information was provided by the North Dakota Department of Health. The

WTPs that are owned by Basin Electric or its subsidiaries are Antelope Valley Station and Leland Olds Station. Both are located in Mercer County.

As the oil and gas industry continues to grow in this area, increasing amounts of water will be needed to support drilling efforts and a growing population and workforce. Efforts are currently underway to further develop water supply systems that will utilize Missouri River water to help with the increasing demand for water in the region (North Dakota State Water Commission 2010). According to North Dakota Department of Health, the following three entities are known to be expanding their water treatment plant and/or distribution system to address the increased demand:

South West Water Authority. The water authority constructed a new water treatment plant near Golden Valley, ND. The treatment plant serves the Oliver, Mercer, North Dunn (OMND) Regional Service Area.

Table 5.3-2: Water Treatment Plants in Project Area Counties

COUNTY	PWSNAME	CONTACT	ADDRESS 1	ADDRESS 2	CITY	STATE	ZIP
DUNN (ND)	DUNN COUNTY LODGE	KELLEY, TRAVIS	13589 57TH ST		WILLISTON	ND	58801
DUNN (ND)	KILLDEER CITY OF	MARQUARDT, DAWN	165 RR ST SE	PO BOX 270	KILLDEER	ND	58640-0270
MCKENZIE (ND)	ALEXANDER CITY OF	MRACHEK, ANNE	112 MANNING AVE W	PO BOX 336	ALEXANDER	ND	58831-0336
MCKENZIE (ND)	BADLANDS POWER FUELS TC	JORE, RICK	3711 4TH AVE NE		WATFORD CITY	ND	58854
MCKENZIE (ND)	JUNIPER CAMPGROUND	HEISER, LYNN	315 2ND AVE	PO BOX 7	MEDORA	ND	58645
MCKENZIE (ND)	LONG X SALOON	CARR, JEROME	504 MAIN ST	PO BOX 96	GRASSY BUTTE	ND	58634-0096
MCKENZIE (ND)	MCKENZIE COUNTY RURAL WATER	ROLES, KRISTY	201 5TH ST NW, SUITE 1456		WATFORD CITY	ND	58854
MCKENZIE (ND)	PRAIRIE VIEW ESTATES	KASKI, RYAN	1935 SAMCO RD STE 102		RAPID CITY	SD	57702
MCKENZIE (ND)	RIDGEVIEW PARK	KASKI, RYAN	1935 SAMCO RD STE 102		RAPID CITY	SD	57702
MCKENZIE (ND)	T ROOSEVELT NATL PK-NORTH	HEISER, LYNN	315 2ND AVE	PO BOX 7	MEDORA	ND	58645
MCKENZIE (ND)	WATFORD CITY CITY OF	ANDERSON, LAURA	213 2ND ST NE	PO BOX 494	WATFORD CITY	ND	58854
MCKENZIE (ND)	WATFORD CITY CITY OF	ANDERSON, LAURA	213 2ND ST NE	PO BOX 494	WATFORD CITY	ND	58854
MERCER (ND)	ANTELOPE VALLEY STATION	CHICK, TED	294 COUNTY ROAD 15		BEULAH	ND	58523
MERCER (ND)	BEULAH CITY OF	NEUBERGER, GARY	120 N CENTRAL	PO BOX 910	BEULAH	ND	58523
MERCER (ND)	BEULAH CITY OF	NEUBERGER, GARY	120 N CENTRAL	PO BOX 910	BEULAH	ND	58523
MERCER (ND)	COYOTE STATION	ZIMMERMAN, BRAD	6240 13TH ST SW		BEULAH	ND	58523
MERCER (ND)	DAKOTA GASIFICATION CO	NELSON, RICHARD A	420 COUNTY RD 26		BEULAH	ND	58523
MERCER (ND)	GREAT RIVER ENERGY - STANTON STATION	JOHNSON, ROBERT	4001 HIGHWAY 200A		STANTON	ND	58571
MERCER (ND)	HAZEN CITY OF	BOHRER, SANDY	146 EAST MAIN	PO BOX 717	HAZEN	ND	58545-0717
MERCER (ND)	KNIFE RIVER INDIAN VILLAGE	BUTLER, KEITH		PO BOX 7	MEDORA	ND	58645
MERCER (ND)	LELAND OLDS STATION	ALLERY, LES	3901 HIGHWAY 200A	BASIN ELECTRIC POWER COOP	STANTON	ND	58571
MERCER (ND)	STANTON CITY OF	HONEYMAN, RICHARD	109 HARMON AVE	PO BOX 156	STANTON	ND	58571-0156
MOUNTRAIL (ND)	MBI ENERGY SERVICES, INC.	WENTZ, WENDELL		PO BOX 26	ROSS	ND	58776
MOUNTRAIL (ND)	NEW TOWN CITY OF	BURNETT, KAYLA	301 SOO PLACE	PO BOX 309	NEW TOWN	ND	58763-0309
MOUNTRAIL (ND)	NEW TOWN EMPLOYEE MHP	CARTER, BEN		PO BOX 140	BAINVILLE	MT	59212
MOUNTRAIL (ND)	OMAR FARMS TC	DAVIS, BILL		PO BOX 88	RIFLE	CO	81650
MOUNTRAIL (ND)	PARSHALL CITY OF	ZIEMAN, LARRY	213 4TH ST SW	PO BOX 159	PARSHALL	ND	58770-0159
MOUNTRAIL (ND)	PARSHALL CITY OF	ZIEMAN, LARRY	213 4TH ST SW	PO BOX 159	PARSHALL	ND	58770-0159
MOUNTRAIL (ND)	PLAZA CITY OF	PROCK, DEBORAH S.	501 BERTHOLD ST	PO BOX 188	PLAZA	ND	58771-0096
MOUNTRAIL (ND)	ROSS CITY OF	SEIBEL, DIANE	2 CENTRAL AVE WEST	PO BOX 4	ROSS	ND	58776-0004
MOUNTRAIL (ND)	WHITING OIL & GAS	WURM, BRIAN	4498 HWY 8		NEW TOWN	ND	58763
WILLIAMS (ND)	GRENORA CITY OF	SCHENSTAD, JANE	#1 MAIN ST	PO BOX 296	GRENORA	ND	58845
WILLIAMS (ND)	R & T WATER SYSTEM	SUHR, LIZ	6392 114TH AVE NW	PO BOX 126	RAY	ND	58849-0126
WILLIAMS (ND)	WILLISTON CITY OF	KAUTZMAN, JOHN		PO BOX 1306	WILLISTON	ND	58801

Source: North Dakota Department of Health, 2012

Western Area Water Supply (WAWS). This rural water authority is expanding its distribution system throughout the western part of North Dakota near Williston. WAWS receives its water from the City of Williston.

City of Williston, ND. The City of Williston is expanding its water treatment plant capacity to serve the Western Area Water Supply expansion. The City of Williston's water supply originates from the Missouri River.

5.3.1.3 Transportation Infrastructure

5.3.1.3.1 Roadways

Primary roadways within the Project area include U.S. Highway 2 and U.S. Highway 85. U.S. Highway 2 runs generally east to west through the northern portion of the Project area, passing through the towns of Williston and Ray. The proposed Judson 345-kV Substation will be constructed adjacent to, or very near, U.S. Highway 2 approximately five miles west of Williston, and the proposed Tande 345-kV Substation is located approximately four miles north of U.S. Highway 2 and four miles east of the community of Tioga, on the eastern edge of the Project area. U.S. Highway 85 extends generally north to south through the western portion of the Project area, passing through the towns of Williston, Alexander, Arnegard, Watford City and Grassy Butte.

Several state highways are located within the Project area. North Dakota State Route 200 extends east to west in the southern portion of the Project area and passes through the communities of Killdeer and Dunn Center. North Dakota State Route 22 extends north to south within the Project area and passes through Killdeer. North Dakota State Route 8 extends north to south and passes through the community of Halliday in the eastern portion of the Project area. North Dakota State Route 1806 extends through the Project area northeast of Watford City. North Dakota State Route 73 and North Dakota State Route 23 both extend through the Project area in an east-to-west fashion, extending to the east from Watford City. North Dakota State Route 1804 is located within the Project area southwest of Williston. Several paved county routes exist within the Project area, along with numerous smaller paved and unpaved roads. Oil and gas well access roads are also common in portions of the Project area, although these are generally private, dead-end gravel roads terminating at an oil well or drill rig. Many areas within the proposed Project, especially in areas near the Little Missouri River and Lake Sakakawea, are remote with little to no access via public roads.

5.3.1.3.2 Rail

There are two active Burlington Northern Santa Fe (BNSF) rail lines providing service to customers within the Project area. One of these lines runs generally west to east across the northern portion of the Project area, passing through the towns of Williston and Tioga. Another BNSF line extends from the eastern edge of the Project area and terminates at the Antelope Valley Station northwest of the town of Beulah. Additionally, two abandoned Burlington Northern (BN) rail lines exist within the Project area;

one extending from the eastern portion of the Project area to Killdeer, and the other extending across the western portion of the Project area to Watford City.

5.3.1.3.3 Airports/Airstrips

Data on airports within the Project area were obtained from the National Flight Data Center (FAA, 2011) and North Dakota GIS (2011). There are several public and private airports and airstrips located within the Project vicinity. Private airstrips generally consist of small airstrips or grass strips and are often associated with private ranches within the Project area. Public airports are generally larger and can accommodate commercial or freight flights. The Tioga Municipal Airport is located in the town of Tioga. Weydahl Field is located northwest of the community of Killdeer. The Sloulin Field International Airport is located in the City of Williston, Watford City Municipal Airport is located in Watford City, and Beulah Airport is located just west of Beulah.

An Airport Master Plan currently being prepared for the City of Williston was initiated to better understand community needs and desires regarding improvements to Sloulin Field International Airport. The study, which is ongoing, announced findings to date as of February 2012, and determined two possible options: expand the current site to accommodate larger aircraft or relocate the airport. The City of Williston and its partners in this study are currently evaluating land in the region that may be suitable for a new airport location (Sloulin Field International Airport, 2012). As of September 2012, three possible sites for the relocation of the airport have been identified. The sites are located in municipalities adjacent to Williston. It is anticipated that the FAA study will be completed in 2013, and a decision will be made regarding whether the airport will be expanded or relocated. In late July 2012, a public hearing was held to update residents on the plan and provide information about the ongoing environmental assessment (Williston Herald, 2012).

The Weydahl Field located near Killdeer is currently a closed airport. However, the Dunn County Airport Authority recently received a grant from the North Dakota Aeronautical Authority to evaluate its future.

5.3.1.3.4 Proposed Roadway Improvements

The rapid increase in oil and gas development activities within the Project area has added a significant amount of traffic to the local road system. Much of the increase in traffic can be attributed to the increase in heavy-haul trucks and associated equipment traveling to and from oil rigs and well sites. Improvements and repairs to existing roadways not designed for heavy-haul traffic will likely be initiated in the coming years to account for the rapid increase in vehicle traffic over these roadways. The North Dakota Department of Transportation (NDDOT) has divided North Dakota into eight districts, two of which occur within the

Project area. Below are listings of ongoing or proposed road projects associated with roadways occurring within or near the Project area during the 2011-2014 time period. These projects are not necessarily a result of the increase in vehicle traffic, as some of these projects are routine maintenance projects. It is reasonable to assume that additional improvements to local roadways will be needed in the future to address the growing oil and gas exploration and development industry in the region. The following is a list of key current or proposed roadway improvement projects within the Project area for District 5 and District 7.

5.3.1.3.5 NDDOT District 5

Current Projects:

- Grading on ND State Route 22 from the junction of ND State Route 200 in Killdeer north to Lost Bridge.
- Complete reconstruction of portions of Interstate 94 from Taylor to east of Richardton and west of Taylor.
- Surfacing of U.S. Highway 85 from Fairfield to Grassy Butte.
- Complete reconstruction of a three-mile stretch of ND State Route 49 from Beulah north to the junction of ND State Route 200.
- Pipe replacement and grading of ND State Route 200: Hazen bypass to Junction 200A.

Future Projects:

- Three year re-grading project on ND State Route 22 from Dickinson to ND State Route 23. From Killdeer north for 13 miles will begin this year, with the remainder in 2012 and 2013
- Complete reconstruction of ND State Route 200 extending east from the junction of U.S. Highway 85, possibly all the way to Beulah. This is in a 3-5 year time frame.
- Complete reconstruction of ND State Route 49 from Interstate 94 to Beulah. This is in a 3-5 year time frame.[4]

5.3.1.3.6 NDDOT District 7

2011-2014 Projects:

- Major reconstruction of U.S. Highway 85 from Arnegard to Williston (proposed widening of U.S. Highway 85 to four lanes and replacement of the Lewis & Clark Bridge over the Missouri River near Williston).
- Resurfacing and widening of ND State Route 40 north of Tioga.
- Preventative maintenance on U.S. Highway 2 from Williston to Tioga.

[4] Source: Personal conversation with Larry Gangl, District 5 Engineer, ND Department of Transportation, 2011

- Preventative maintenance on ND State Route 1806 north of Watford City.
- Preventative maintenance on ND State Route 23 and ND State Route 73 east of Watford City.[5]

In addition of the NDDOT, Williston has identified over $110 million dollars in roadway improvements to ease the congestion and reduce the truck traffic in Williston that include (Williston CIP, 2011):

- East Williston Truck Route ($5.6 million)
- 26th Street West ($7.5 million)
- Highway 2 Corridor ($35.5 million)
- Northwest Bypass ($33.0 million)
- 32nd Avenue West ($31.0 million)

5.3.1.3.7 Scenic Highways

Two state-designated scenic highways are included within the Project area. The Killdeer Mountain Four Bears Scenic Byway incorporates approximately 64 miles of ND State Route 22, and passes through the central portion of the Project area in a north-south direction (Figure 5.3-2).

Figure 5.3-2: Killdeer Mountain Four Bears Scenic Byway

The TRNP North Unit Scenic Byway is an approximately 14-mile byway within TRNP, and is included in the western portion of the Project area west of U.S. Highway 85 in McKenzie County (Figure 5.3-3).

[5] Source: ND Department of Transportation, Statewide Transportation Improvement Program, 2011-2014. 2010.

**Figure 5.3-3: TRNP
North Unit Scenic Byway**

Image Source: North Dakota Parks and Recreation Department
http://www.parkrec.nd.gov/byways/theodore/theodore.html

5.3.2 Impacts

As discussed in Section 1.0, Introduction, northwestern North Dakota is experiencing a rapid increase in development as a result of activities associated with the extraction of oil from the Bakken shale. The level of current and future development will require increases in transmission capacity, pipelines, rail, roads, gas refineries, and other infrastructure needs. This section discusses potential impacts to current utility and transportation infrastructure resulting from construction and operation of the proposed Project.

Direct impacts to existing utility and transportation infrastructure resulting from the construction and operation of the proposed Project are anticipated to be minor. Impacts will include:

- Temporary power outages during construction and stringing of conductors across existing lines
- Delays, detours, or temporary road closures during line construction
- Road congestion near construction areas
- Road deterioration from heavy equipment used for construction

Utility Infrastructure

Temporary impacts to existing utilities during construction of the transmission line may include short-term power outages on existing transmission and distribution lines for safety reasons during construction. Basin Electric will identify all utilities to be crossed by the project (electric, gas, oil, telephone, water, sewer) and coordinate with the owner to ensure protection of these facilities and construction safety during utility crossings. Impacts to utilities such as water, sewer, and wastewater are not anticipated, as efforts will be made to locate transmission structures away from these existing utilities and protect them at project crossings.

The Corridor/Route will include 14 crossings of existing transmission lines. Potential impacts to these existing lines are expected to be temporary, such as taking these lines out of service for short periods of time for safety reasons during stringing of conductors across an existing line. Such outages will be scheduled during off-peak use times to avoid or minimize any outages to customers. The Corridor/Route will include 21 crossings of various oil, natural gas, or CO_2 pipelines. Impacts to pipelines are not anticipated, as they will be identified during route survey activities, located on design and construction drawings and all transmission structures will be placed outside of pipeline ROWs. Appropriate measures will be taken to protect them should equipment be required to use or cross pipeline ROWs.

Transportation Infrastructure

Temporary impacts to local roads and highways may also occur during the construction phase of the proposed Project. The Corridor/Route has 103 road crossings and construction at road crossings my result in occasional short-term traffic delays during the stringing of conductors across the roadway. Traffic will likely be detoured or temporarily halted as conductors are pulled across the road.

Transportation concerns will include delays or detours on local roadways when stringing conductors across these roads, and general traffic increases and congestion along roads near the proposed transmission line due to construction-related vehicles and equipment. These effects will be minor and temporary as construction will occur at several locations along the line, reducing the amount and intensity of construction at any particular location. Construction crews will only be at a particular location for several days during the various stages of construction so any construction-related delays or congestion at any specific location along the line will occur for only a short time. Most of the roads that will be crossed by the project have low levels of vehicle traffic and the grid of section line roads in the area provides numerous opportunities for traffic to detour around construction areas with only minimal delay and inconvenience to motorists.

Temporary lane closures, flag men or pilot vehicles for traffic control will be implemented for traffic control and motorist and construction crew safety. Overall, however, any lane or partial road closures will likely only last a few hours, with any complete stoppage of traffic only anticipated for a few minutes. While such activities will likely create considerable congestion along these highways, they will only occur for a short time during the actual stringing across the road. Once accomplished, traffic flow patterns will be restored to normal. Additionally, stringing across these roads could be conducted during off peak travel hours to reduce the number of motorists exposed. Stringing across these roadways will only be expected to take several hours, minimizing the period of inconvenience to motorists.

Construction equipment will be required to operate over local roadways, contributing to the wear and tear they experience. Overall, construction vehicles will be similar to current vehicle and semi-trailer traffic and will not result in a significant increase in average daily traffic on major thoroughfares or contribute to road wear. On more local roadways, heavy construction vehicles will be similar to agricultural traffic, although the level of vehicle use will likely increase in the areas along the line during construction. Such increases could contribute to road deterioration. Basin Electric will coordinate with the counties and North Dakota Department of Transportation to redress any road damage related to construction of the project.

Following completion of construction, impacts to transportation and infrastructure will largely cease. Infrequent and short-term congestion and road closures may be necessary for maintenance and repair activities. Road crossing permits will be acquired from the affected counties as part of the requirements for construction of the Project.

Railroads

The Corridor/Route will cross active railroad tracks at a vertical elevation at three locations in the northern portion of the Project. These crossings will be located near Williston, Ray, and Tioga.

BNSF has developed a utility accommodation policy that addresses new utility installations that parallel or cross BNSF railroad lines. According to this policy, utility lines should be located to avoid or minimize the need for adjustments for future railroad improvements and to permit access to the utility lines for their maintenance with minimum interference to railroad traffic. For utilities that parallel BNSF railroad lines, BNSF considers any utility line greater than 500 feet in length to be a parallel line. The line then must be located on a uniform alignment within 10 feet or less of the property line. Authorization from BNSF will be required should construction activities enter the BNSF ROW. In areas where construction of the Corridor/Route will cross BNSF track, rail traffic may need to be temporarily stopped

or rerouted resulting in a disruption to BNSF freight movements or Amtrak trains. Because this will occur at few locations and construction activities could likely be timed to avoid train movements, no short-term impacts are anticipated. Basin Electric will coordinate such activities with BNSF and Amtrak.

Basin Electric will work to ensure that project design and construction activities result in minimal or fully avoid electrical interference with the railroad. Such activities will need to be conducted in accordance with BNSF's Utility Accommodation Policy (Engineering Services, 2011).

Once in operation, maintenance activities associated with the Corridor/Route will be timed to avoid rail traffic. The Project will be properly designed to encompass adequate structure heights at railroad crossings to minimize potential impacts on railroad maintenance activities. Railroad maintenance crews will need to conduct such activities with caution to avoid contact with the transmission line. It may be necessary to require additional safety precautions or employee training, similar to those that may already be in place, to ensure worker safety. No long-term impacts on railroad operations are anticipated.

The American Railway Engineering and Maintenance-of-Way Association has specifications in place for steady and rail-to-ground and equipment-to-ground voltage levels to ensure the safety of railroad operating personnel and the public. Such specifications will need to be followed in order to avoid electrical interference from capacitive, electric and magnetic, and conductive effects (American Railway Engineering and Maintenance-of-Way Association, 2012).

Airports and Airstrips

Several public and private airport and airstrips occur in the vicinity of the Corridor/Route. Under Title 14 Code of Federal Regulations Part 77 (Part 77) the sponsor of a proposed project with the potential to affect navigable airspace is required to notify the Federal Aviation Administration (FAA) 45 days prior to construction. This provides the FAA time to determine if the structure will be a hazard to airport operations. The FAA has established standards to identify proposed or existing structure that will be an obstruction to the navigable airspace surrounding public airports. These standards are defined in Part 77 by imaginary surfaces that extend above and beyond the physical surface of the runway and are based on the dimensions, composition, and type of approach available or planned for the runway. The imaginary surfaces include a horizontal surface 150 above the runway elevation that extends outward from the runway from 5,000 to 10,000 feet, a conical surface that begins at the outer edge of the horizontal surface and extends outward and upward at a 20:1 slope for an additional 4,000 feet, an approach surfaces that extends outward and upward from the runway end for 5,000 to 50,000 feet at a slope determined by the category of runway, and transition surfaces between the various surfaces.

Public airports and private airstrips within five miles of the Corridor/Route that may be potentially impacted include:

- Weydahl Field in Dunn County (City of Killdeer)
- Two private airstrips in Dunn County
- One private airstrips in McKenzie County
- Tioga Municipal Airport in Williams County (City of Tioga)
- Three private airstrips in Williams County
- One private airstrip in Mercer County

Public airports with published instrument approach procedures (IAP) could potentially be affected by transmission structures that will be within the final approach portion of the IAP. The final approach portion typically begins at point located within 50,000 feet from the IAP runway end and must begin within 10 nautical miles or 60,760 feet of the runway end. Based on this maximum distance, the Corridor/Route will be within 10 nautical miles of three airports with published IAP's, the Tioga Municipal Airport in Williams County; the Sloulin Field International Airport in Williams County; and the Watford City Municipal Airport in McKenzie County. An Obstruction Analysis filing will be submitted to the FAA for the Project once final plan and profile drawings are available to determine specific impacts.

At the nearest point, the Corridor/Route will be approximately 11,000 feet east of the Tioga Municipal Airport, within the conical surface, and across an IAP area. It is possible that this portion of the Corridor/Route will exceed Part 77 obstruction standards and could affect the minimum decent altitude (MDA), published in the IAP, which will result in an impact to the flight operations at for this airport. Another portion of the Corridor/Route will be located approximately 24,000 feet west of the Sloulin Field International Airport and could affect the MDA published in the IAP. The Corridor/Route will be approximately 34,000 feet west of the Watford City Municipal Airport and possibly within an IAP area. Public airports with no published or planned IAP's could be affected by transmission structures that exceed a Part 77 imaginary surface. Transmission structures that exceed an imaginary surface will require a study by the FAA to determine the effect they will have on air navigation. An Obstruction Analysis was submitted to the FAA in the area of Weydahl Field Airport in Dunn County in November 2012 (Obstruction Analysis 2012-AGL-11085 thru 2012-AGL-11097) to determine any impacts of the Project at the Airport. The FAA in their Obstruction Analysis provided a Determination of No Hazard to Air Navigation for the structures near the Weydahl Field. When the remainder of the final structure plan and profile is available, further FAA Obstruction Analysis will be submitted for evaluation with the FAA.

Although the FAA does not typically protect airspace associated with private airports, an overhead transmission line can have a permanent impact to their operations. There will be seven private airports within 5,000 feet of the Corridor/Route, two in Dunn County, one in McKenzie County, one in Mercer County, and three in Williams County.

Basin Electric will coordinate with the FAA to determine if the proposed Project will have any impact to local aircraft facilities. Further consultation with the Federal Aviation Administration (FAA) will be required to determine specific impacts and potential mitigation measures to address any impacts to aviation safety and the operation of the airports and airstrips in proximity to the Corridor/Route.

In addition to airports, radars and other navigational aids necessary for safe air navigation are protected by the FAA. Proposed construction of a permanent structure in proximity to a navigational aid requires notice to the FAA to determine any possible effects on the equipment. Northwest of the town of Williston, North Dakota, the Corridor/Route will be within approximately 7,000 feet west of the Williston VORTAC radar, a navigational aid used for both civilian and military air navigation. Further study by the FAA will likely be required for structures in this portion of the Corridor/Route to determine the potential impact to navigational equipment.

Williston is in the planning stages for a new airport and has identified three potential sites in the northwest portion of the Williston area. Basin Electric is aware of the airport plans and developed the proposed alignment for the route northwest of Williston knowing that there are three candidate sites and that a final site for a future airport has not yet been determined. Once the final plan and profile of the Project is known, an Obstruction Analysis will be filed with the FAA to determine impacts to navigation and airport infrastructure.

Substation Impacts

Impacts to existing utility and transportation infrastructure resulting from the construction and operation of the proposed Judson and Tande substations are anticipated to be minor. Temporary impacts to existing utilities and transportation infrastructure during construction of the substations may include short-term line outages on existing transmission lines for safety reasons during construction and interconnection to the substations, minimal if any service outage to electricity customers, delays or detours on local roadways during construction, and general increases in traffic along roads in construction areas due to construction-related vehicles and equipment. Substation sites are generally located along roadways but are large enough to allow equipment to pull off and park off the roadways, reducing road congestion.

5.3.3 Mitigation

- Time conductor stringing across U.S. Highway 85, U.S. Highway 2, ND State Highway 8, ND State Highway 22, and ND State Highway 23 to avoid peak traffic, in consultation with North Dakota Department of Transportation.
- Mark a detour route, if required by North Dakota Department of Transportation, and provide traffic information to motorists in advance of the detour, consistent with the Manual on Uniform Traffic Control Devices (Federal Highway Administration, 2012).
- Coordinate with townships, counties, and North Dakota Department of Transportation to redress any road damage related to construction of the project.
- Coordinate with FAA to avoid or minimize impacts on local aircraft facilities.
- Identify existing utilities and coordinate with the owners to implement appropriate measures to protect both facilities and construction workers during crossings.

Railroads (BNSF, 2011):

- Locate poles 50 feet out from the centerline of railroad main, branch and running tracks, CTC sidings, and heavy tonnage spurs.
- Provide at least 10-foot clearance from the centerline of track for poles located adjacent to industry tracks. If located adjacent to curved track, then said clearance must be increased at a rate of 1.5 inches per degree of curved track.
- Locate unguyed poles (regardless of the voltage) at a minimum distance from the centerline of any track, equal to the height of the pole above the ground-line plus 10 feet. If guying is required, place the guys in such a manner as to keep the pole from leaning/falling in the direction of the tracks.
- Locate poles (including steel poles) at a minimum distance from the railroad signal and communication line equal to the height of the pole above the ground-line or else be guyed at right angles to the lines. High voltage towers (345 kV and higher) must be located off railroad ROW.
- Perform (if requested by BNSF) an inductive coordination study for electrical lines paralleling the tracks.
- Construct utilities that cross railroad property, to the extent feasible and practical, perpendicular to the railroad alignment and preferably at not less than 45 degrees to the centerline of the track.
- Do not place utilities within culverts or under railroad bridges, buildings, or other important structures.

- Do not install crossings under or within 500 feet of the end of any railroad bridge, or 300 feet from the centerline of any culvert or switch area.
- Span property completely with supportive structures and appurtenances located outside railroad property. For electric supply lines, normally the crossing span shall not exceed 150 feet with adjacent span not exceeding 1.5 times the crossing span length.
- Encourage joint-use construction at locations where more than one utility or type of facility is involved. However, electricity and petroleum, natural gas, or flammable materials shall not be combined. Review and approve pipe truss design and layout with BNSF Engineering.
- Construct electric lines with a minimum clearance of 26.5 feet or greater above top of rail when required by the National Electric Safety Code or state and local regulations. Electric lines must have a florescent ball marker on low wire over centerline of track.
- Label the posts closest to the crossing with the owner's name and telephone number for emergency contact.

5.4 PUBLIC HEALTH AND SAFETY

5.4.1 Description of Resources

The Project area is located primarily in rural, agricultural areas with low population density. Historically, the predominant activities are farm-related and include row crop production, livestock production, grazing, and hay production. However, oil and gas development activities have increased dramatically within the Project area in recent years, resulting in an increase in population and industrial activity and placing the stress on the current level of public health and safety's resources. Public health and safety within the Project area depends on potential for hazards and risk. Occupational hazards include risks associated with farming and farm-related implements and equipment, and with construction and construction equipment, installation of equipment, and transportation of heavy equipment.

Traffic Accidents. One of the public hazards that has resulted from the rapid development in the area includes the increased traffic volume on local roadways due to construction vehicles and equipment using local roadways designed for lighter traffic. According to the State of North Dakota, the Statewide Accident Rate is 2.06 per Million Vehicle Miles Traveled (MVMT). All of the Project counties had accident rates below that of the state, except for Williams County, which had a rate of 2.96 (see Infrastructure section for additional transportation discussion).

Law Enforcement. Public safety within the Project area is provided by local law enforcement or emergency response agencies located in nearby communities. The Mercer County Sheriff's Office

provides law enforcement for Mercer County. The Killdeer Police Department and the Dunn County Sheriff's Office provide law enforcement services to the portions of Dunn County that are within the Project area. The McKenzie County Sheriff's Office and the Watford City Police Department are the law enforcement agencies located within the Project area in McKenzie County. Law enforcement services for the Project area within Williams County are provided by the Williston Police Department, Tioga Police Department, and the Williams County Sheriff's Office. The portion of Mountrail County within the Project area is served by the Mountrail County Sheriff's Office.

The increase in oil development activities in the area has brought an influx of people to the region, resulting in the need for increased law enforcement presence in the area. With the influx of people there has been an increase in local crime rates. The Watford City Police Department continues to add personnel and equipment each year to keep up with the increase in crime, adding one new officer and three new patrol cars in 2012 (Billing 2013). The Department has requested that four more officers be hired in 2013 to bring the force up to 13 officers and one administrator. The Williams County Sheriff asked for a substantial increase in staff to help patrol Williams County (Caldwell 2010). The City of Williston hired five additional officers in 2010, and plans to hire six more in 2012 to help keep up with the increasing number of calls.

In 2009, Williston police received between 6,000 and 7,000 calls for police assistance, and this number increased to more than 16,000 in 2010. In 2011, 911 calls tripled in volume as compared to calls received in 2010. Additionally, outlying areas of Williams County, patrolled by the Williams County Sheriff's Department, has seen an increase in the number of calls coming from all over the county, sometimes requiring up to 40 minutes for a deputy to respond (Domaskin 2011). Within the Project area, crimes such as oil site thefts, burglary, alcohol-related offenses, prostitution, and assault are rising. In Williston, thefts at residences and retail shops have risen steadily, with police responding to approximately 40% more burglar alarms in 2011 as compared to 2010. Assault and battery charges increased by 171% in Williston in a year's time, and police departments in many of the towns within the Project area are encountering increases in night club violence and domestic violence as well (Domaskin 2011; Ellis 2011).

Ambulance Districts. Seven ambulance districts serve the Project area. These districts provide ground-based life support services and consist of the following: Halliday Ambulance Service in Halliday, Killdeer Area Ambulance Service in Killdeer, McKenzie County Ambulance Service in Watford City, Ray Community Ambulance District in Ray, Tioga Ambulance Service in Tioga, and Williston Ambulance Service in Williston (NDDOH 2005). The increase in the oil related activity has required the

ambulance districts to expand their staffing and level of services. The majority of the ambulance districts operate on a voluntary or part-time basis.

Fire Departments. Fire services within the Project area are provided by city and community fire departments, volunteer fire departments, rural fire departments and fire protection districts. The Halliday Rural Fire Protection District and West Dunn First District are located in Dunn County. The Alexander Volunteer Fire Department and Watford City Volunteer Fire Department are located in McKenzie County. Golden Valley Rural Fire Department and Zap Rural Fire Protection District are located in Mercer County. Williams County is served by the Epping Rural Fire Protection District, Ray Fire Protection District, Tioga City Fire Department, Tioga Rural Fire Department, Williston Fire Department, and Williston Rural Fire Protection District. The oil related activity has required the fire departments to expand their staffing and services provided.

Hospitals. Hospitals located within the Project area include the McKenzie County Memorial Hospital and Healthcare Systems, located in Watford City, Mercy Medical Center located in Williston, and Tioga Medical Center located in Tioga. McKenzie County Memorial Hospital houses 24 beds, Tioga Medical Center houses 25 beds, and Mercy Medical Center houses 87 beds, and provides a Level IV Trauma Center as well (UCompareHealthCare 2011). The larger cities of Dickinson, Bismarck, and Minot, located outside of the Project area, offer more and larger health care facilities.

5.4.2 Impacts

As discussed above, the proposed Project will be located primarily in rural, agricultural areas with low population density. However, oil and gas development activities have increased dramatically within northwestern North Dakota in recent years, resulting in an increase in population and industrial activity and placing stress on the current level of public health and safety resources. This section discusses potential impacts to existing health and safety resources resulting from construction and operation of the proposed Project, as well as potential health and safety impacts directly-related to the construction and operation of the line.

Construction-related impacts will be temporary, while potential impacts from operation will remain as long as the line was in service. Potential and permanent impacts resulting from construction and operation of the proposed Project will include:

- Added stress on existing public health and safety services
- Increased likelihood of traffic accidents as a result of increased number of large construction vehicles on local roadways

- Potential health effects from EMF once the line is energized
- Safety concerns from potential stray voltage or direct contact with energized lines

A more detailed discussion of temporary and permanent health and safety impacts for the Project is provided below.

5.4.2.1 Construction Impacts

Impacts related to the construction phase of the Project are anticipated to be temporary, and will cease once the line is in service. Existing public health and safety services such as police, fire, ambulance, and hospital services are already experiencing some deficiencies and personnel shortages in the area due to the rapid growth in the region, especially in smaller communities unaccustomed to rapid increases in population. This coupled with the inherent potential for accidents and injuries associated with industrial development have added to the need for health services. Additional workers moving into the region during construction of the proposed Project, if only temporarily, may add an additional burden on some or all of the existing public service resources.

The addition of construction-related vehicles on highways and local roads will contribute to an already-increasing traffic congestion issue in northwestern North Dakota. Increased traffic congestion by itself can pose safety issues, and the large size of many of the construction vehicles using these roads will potentially increase the likelihood for serious car accidents involving large construction vehicles (see Section 5.3 for existing traffic data and crash reports for northwestern North Dakota). Additionally, large construction vehicles repeatedly using the same stretches of roadway during construction could cause road surface damage such as ruts and potholes, which will serve as potential obstacles and safety hazards to motorists. Generally, however, the additional traffic generated by Project construction will be minimal. Basin Electric will also coordinate with local road jurisdictions to redress any construction-related issues along area roads and will comply with current load limitations that are in place at the time of the construction activity.

5.4.2.2 Operation Impacts

A number of potential safety concerns are associated with high-voltage electricity transmission line. Each of these areas is discussed as they will apply to the proposed Project.

Electric and Magnetic Fields

Operation of the transmission line will produce electric fields and magnetic fields. These fields will exist whenever the transmission line is energized. Electric fields are produced by voltage and are measured in

kilovolts (kV/m) per meter. Electric fields are generally easily shielded or blocked by objects such as buildings and trees. Electric fields also decrease as the distance from the source increases. Magnetic fields are produced by current, are measured in milligauss (mG), and are not easily blocked by most materials. Magnetic fields also decrease in strength as the distance from the source increases.

The potential health effects from electromagnetic fields (EMF) associated with high-voltage transmission lines are often a subject of discussion because no definitive answers have been found, despite decades of scientific research. Generally speaking, electric fields have been suggested to pose little, if any, health risk to humans due to these fields being easily shielded by objects and their significant reduction over distance from the source. Some scientific studies have suggested a weak statistical association between magnetic fields and childhood leukemia while other studies suggest no such link, and no scientific support for a link has been found in studies using laboratory animals. The National Institute of Environmental Health Sciences (NIEHS) (Appendix J) concluded that there is very little evidence to support a link between EMF exposure and health risks.[6] As such, no Federal guidelines exist for EMF at this time.

To assess potential concerns for EMF exposure as a result of the proposed Project, an analysis for predicted EMF conditions was conducted for a double-circuit 345/115-kV transmission line.[7] The analysis used the selected input variables to calculate the approximate EMF levels using a computer program that is based on the equations and calculation methods developed by the Bonneville Power Administration. The output from these calculations was used to plot the electric and magnetic field profiles across distances from the centerline of the transmission line (Appendix K). Figure 5.4-1 illustrates the electric field values in kilovolts/meter (kV/m) compared to distance from the centerline of the Project to well beyond the edge of the ROW. The maximum predicted value at the edge of the proposed Project ROW will be 0.214 kV/m. This value will be far less than the 4.2 kV/m level identified for protection of the general public (ICNIRP, 2010)[8]. Therefore, no adverse effects from Project-induced electric fields will occur.

Figure 5.4-2 illustrates the magnetic field values in milligaus (mG). At a distance of 75 feet from the centerline the maximum predicted value is 94 mG, which is far less than the 2,000 mG standard identified

[6] NIEHS *Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields*, released on June 15, 1999.
[7] Basin Electric is proposing to construct 345, 345/115, 230/115, and 230kV transmission line configurations for the proposed Project. The 345/115kV configuration was selected for the EMF analysis because this configuration would have the potential to generate the highest levels of EMF exposure.
[8] ICNIRP, 2010 – International Commission on Non-Ionizing Radiation Protection. Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields.

Figure 5.4-1: Electric Field Strength

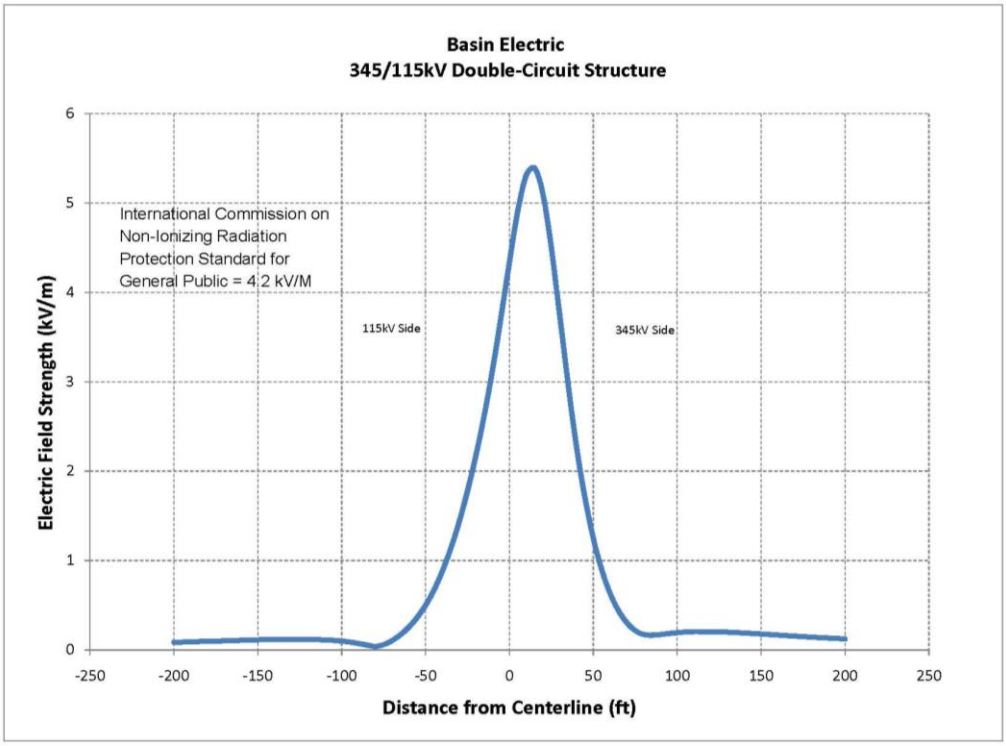
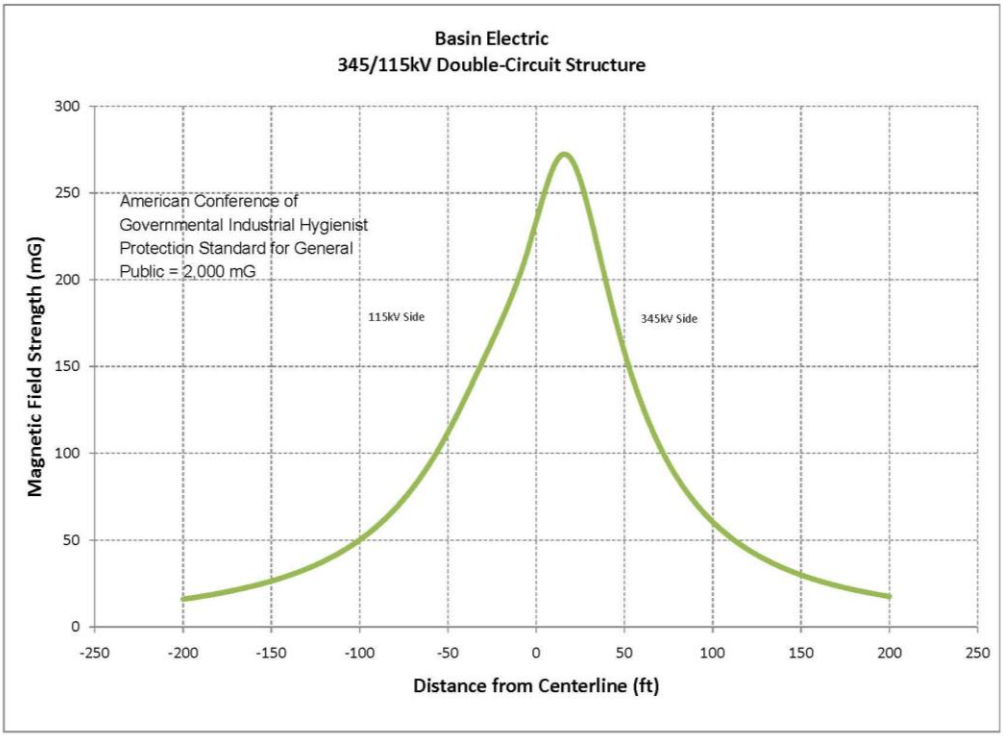


Figure 5.4-2: Magnetic Field Strength



for the protection of the general public (ICNIRP, 2010). No residences are located within the Corridor/Route, and it is anticipated that there will be no potential issues with increased EMF exposure as a result of the construction or operation of the proposed Project.

Radio and Television Interference

For high-voltage and extra-high-voltage transmission lines, the electric field attains its maximum strength at the surface of the conductors. The electric field in a line is concentrated wherever surface irregularities occur. These irregularities include dirt, insects, bird droppings, water droplets, loose hardware, scrapes and nicks. At these concentrated locations, the field strength may be great enough that the air becomes ionized and a partial spark discharge between the conductor and the surrounding air takes place. This phenomenon is called corona. The greatest corona activity occurs during rain when each clinging raindrop acts as an individual corona source.

Radio Interference and Television Interference (TVI) can occur, usually during periods of rainy weather. Usually the residences that are affected by interference are those that are in very close proximity to the transmission line. The AM broadcast band on the radio is affected more by corona-generated electromagnetic interference than the FM band or TV reception. This is because radio noise due to corona decreases at higher frequencies to a very low level. The FM band is never a problem due to its higher frequency and signal modulation method that makes it immune from impulse-type noise associated with corona. Television systems are rarely a problem, because they operate at much higher frequencies and especially when there is a good signal quality in the area before the transmission line is built. "Corona-caused TVI occurs during foul weather and is generally of concern for transmission lines with voltages of 345-kV or above, and only for conventional receivers within about 600 ft. (183 m) of a line" (T. Dan Bracken, Inc., 2001). Television systems that operate at higher frequencies such as satellite receivers are not affected by interference. Similarly cable television systems are unaffected.

Implantable Medical Devices

Devices such as pacemakers and defibrillators could experience interference from strong EMF. The majority of research on the effects of EMF on implantable medical devices has been focused on the interference with EMF to pacemakers. A 2004 Electric Power Research Institute (EPRI) report concluded that implantable medical devices may be more susceptible to interference from electric fields as opposed to magnetic fields.[9] Persons with pacemakers may experience temporary interference when exposed to high electric fields, but will resume normal function as they move away from the source of interference. The EPRI report suggests that persons with implantable medical devices such as pacemakers may

[9] Electric Power Research Institute's *Electromagnetic Interference With Implanted Medical Devices* report, 2004

experience some interference from electric fields while in close proximity to a high-voltage transmission line; however, beyond the boundary of the proposed ROW the electric fields are anticipated to be at ambient levels. Therefore if there is any potential for implantable medical devices to be affected, it will only occur if the individual remained under the line for an extended period. Most occurrences will take place while driving or passing under the transmission line for a brief moment. Such exposure will not contribute to more than an instantaneous interruption in the function of the equipment, and is not anticipated to jeopardize health under normal everyday-life conditions.

Stray voltage

Operation of the proposed Project may cause "stray voltage", which can occur from a maintenance issue or improperly grounded equipment underneath the transmission line and on the electric service entrances to structures from distribution lines. Transmission lines can induce stray voltage on distribution lines in circumstances where the transmission line is parallel to and directly over the distribution line. If such configurations are created by construction of the Project, some farm equipment (barns, fences, gates, etc.) may be subject to developing small electric charges that could be transferred to humans or livestock upon contact with the equipment, structures, or facilities. However, no anticipated stray voltage impacts are expected as a result of the operation of Project, as appropriate measures will be taken to prevent stray voltage issues in instances where the proposed Project will parallel existing distribution, and by proper grounding of metal objects near to the proposed Project. Should stray voltage concerns be identified following construction, Basin Electric will be able to correct the circumstances creating the stray voltage and eliminate the problem.

Direct Contact with Lines and Structures

Direct contact between an object on the ground and an energized conductor poses the most serious risk of injury or death from a high-voltage transmission line. Direct contact with an energized line is not anticipated during the construction phase of the proposed Project, as the line will not yet be energized. However, construction of the Project will require numerous crossings of existing energized lines, both transmission and distribution, as well as work in operating substations. Care will be taken to protect construction workers and the Project from contact with or damage to these facilities. Basin Electric will identify all electrical line crossings and coordinate closely with the owning utility to schedule line outages or implement appropriate measures for the safe construction of the line.

The Project will be designed to meet or exceed appropriate NESC standards, providing for appropriate clearances for the safe and reliable operation of the Project. During operation, the height of the energized conductors (approximately 30 feet) will protect activities below and around the line from direct contact.

Care will need to be taken by others in the future to maintain appropriate clearance from the line to avoid contact.

The Project will require the installation of several hundred structures to support the current-carrying conductors. Many of these structures will be located in or adjacent to agricultural fields and will create an obstacle for equipment. This will be particularly true of structures in crop fields where farmers will be required to prepare soil, plant, and harvest crops so as to minimize the loss of productive area from the structure. Operation of farm equipment in proximity to structures will create the potential for contact with structures, potentially resulting in damage to equipment and or the structure and injury to equipment operators. During project design and negotiations with landowners, Basin Electric will work to locate structures to minimize concern during farming operation.

Fallen lines

High-voltage transmission lines are designed to automatically trip, or become de-energized, if they fall or come in contact with trees. Distribution lines generally do not automatically become de-energized upon falling. Potential safety issues will occur if a high-voltage transmission line were to fall on a distribution line, resulting in an energized distribution line being on the ground and presenting a safety hazard. However, high-voltage transmission lines typically do not fall down unless subject to extreme weather conditions, such as a tornado or excessive ice, or possibly being struck by a large vehicle. Therefore, impacts associated with fallen lines are not anticipated to occur as a result of the operation of the proposed Project.

Proposed Substations and Switchyards

Construction of the proposed Judson and Tande substations may cause temporary impacts to public health and safety resources near the construction sites similar to those experienced during construction of the transmission line. Potential health and safety impacts during operation of the substations will be limited to direct contact with energized equipment within the substation or switchyard fence, and with potential EMF issues associated with high-voltage transmission lines connecting to the substations or the switchyard. According to NIEHS[10], EMF levels produced by substation equipment beyond the substation fence are typically indistinguishable from background levels and therefore have not been evaluated for this project.

[10] National Institute of Environmental Health Sciences, 2002.

5.4.3 Mitigation

- Prepare a construction plan in accordance with the National Electrical Safety Code and the Occupational Safety and Health Administration's regulations, as required by federal law, to ensure the safety of construction workers. This will also identify procedures should a spill occur or hazardous materials be discovered.
- Construct the proposed project with materials designed to contain electric currents and meet the highest safety standards.
- Employ standardized agency procedures should the transmission line need maintenance or repairs. The use of such can help ensure the safety of both workers and those in the surrounding area.
- Additional measures such as those identified in Appendix I are designed to ensure that Basin Electric's operational procedures are adhered to the highest standard to ensure the safety of workers and others close to the construction and operation of the proposed project.

5.5 AIR QUALITY

5.5.1 Description of Resources

5.5.1.1 Regional Setting

Existing sources of air emissions in the Project area include coal-fired electrical generating units (Antelope Valley Station), a synthetic natural gas production facility (Great Plains Synfuels Plant), oil and natural gas processing plants and other infrastructure associated with the oil and gas industry, automobiles, trucks, farm equipment, and emissions resulting from wood burning stoves in residential areas. Vehicle traffic in the Project area is responsible for tailpipe emissions including nitrogen oxides (NO_x), carbon monoxide (CO), and sulfur dioxide (SO_2). The primary pollutant produced by farm equipment is NO_x from the combustion of fuel. Farming and ranching activities and vehicles using unpaved roads are sources of fugitive dust. Oil and gas activities within the Project area have emissions, particularly from the manufacturing, construction, operation, and maintenance of oil and gas development-related facilities. The oil and gas industry is experiencing a noticeable increase in the number of wells developed in the past few years and the associated deliveries of water, material, and supplies that are required to support the current oil expansion. Oil and gas activities have occurred in the region since the 1950's, but in recent years has increased dramatically due to the implementation of hydraulic fracturing processes that can access a previously-untapped oil bearing feature in the region.

North Dakota is characterized by cold winters and moderate summers. The average annual temperature varies between 37°F in the northeast to 43°F in the southern portion of the state. During the summer,

temperatures can reach 100 °F during the day (usually just a few days each year) with lows in the lower 70's. July, the typically warmest month, has average temperatures between 67°F and 73°F. January, the coldest month, has average temperatures between 2°F and 17°F. Lows below 32°F can be expected between 180 to 210 days each year, depending on location in the state. Sub-zero temperatures occur between 35 and 65 days each year, and mostly occur in December, January, and February.

Annual rainfall in the state ranges from 13 inches in the northwest to approximately 20 inches in the southeast and the Red River Valley. The majority of the precipitation occurs in June as rain, with a monthly average between 3 and 4 inches throughout the state. North Dakota averages between 26 and 32 inches of snow each year, with the most snowfall occurring in the belt that stretches diagonally across the state from the northeast corner to the southwest.

Winds generally come from the north-northwest direction during the majority of the year for North Dakota state.

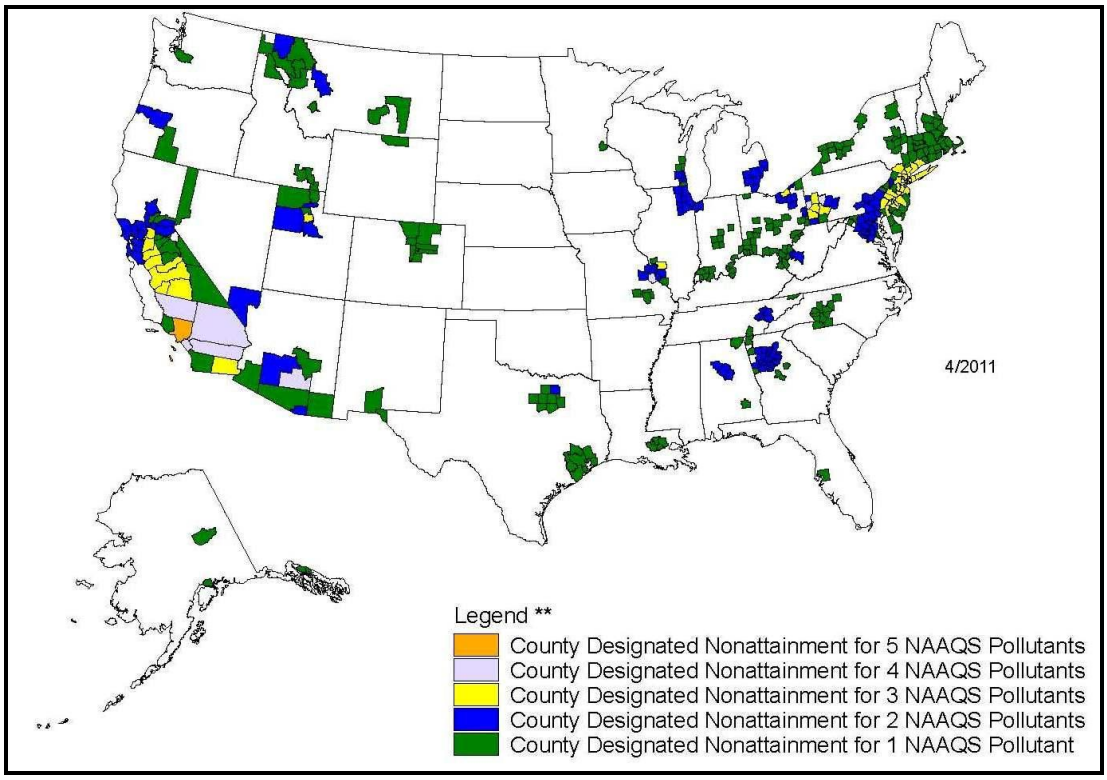
5.5.1.2 NAAQS/Attainment

The Clean Air Act, which was last amended in 1990 (CAA), requires the Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The CAA established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The EPA, Office of Air Quality Planning and Standards (OAQPS) has set NAAQS for six principal pollutants, which are called "criteria pollutants". They include: sulfur dioxide (SO_s), carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), lead (Pb) and particulate matter (PM). All counties in North Dakota are currently in attainment for all National Ambient Air Quality Standards (NAAQS), meaning that these counties meet the standards for public health and welfare concerning levels of the above-referenced criteria pollutants (Figure 5.5-1).

In 2010, 1-hour standards for NO2 and SO2 were promulgated. The North Dakota Department of Health (NDDOH) and EPA are in the process of finalizing non-attainment areas. It has been recommended to the EPA by the NDDOH that all of North Dakota be deemed unclassifiable or in attainment for both standards. Therefore, the entire state of North Dakota is expected to remain in attainment or unclassifiable.

Figure 5.5-1: Counties Designated "Nonattainment" for NAAQS



Source: Environmental Protection Agency, 2011a.

Outside of the nonattainment areas, the CAA had enacted programs to maintain the air quality in attainment areas and ensure that new sources of criteria pollutants do not detrimentally affect the air quality. These include: New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP), Prevention of Significant Deterioration (PSD), and Title V Operating Permits. Of these programs, the PSD applies to this project because in the CAA, Congress set aside special land classifications for PSD purposes. These lands where existing good air quality conditions are especially important to maintain, like National Forests and wilderness areas, have been defined as Class I areas. All other areas are designated as Class II areas. There are two Class I areas in North Dakota. One Class I area is within the Project area, the TRNP. The other Class I area is the Lostwood Wildlife Area, which is located approximately 18 miles to the northeast. In Montana, the U.L. Bend Wildlife I Area is approximately 68 miles to the northwest and Medicine Lake Wildlife I Area is approximately 43 miles to the west.

PSD Increments were established for Class I and Class II areas to ensure that air quality is maintained in attainment areas. If a Project is subject to PSD, the ground level air concentrations from the project must be below these increment values in attainment areas. In addition, all facilities must meet the NAAQS with an appropriate background value added to the source impact concentration.

5.5.1.3 Greenhouse Gases

Climate change refers to changes in the long-term trends of many climatic factors such as temperature, precipitation, or wind. There continues to be a degree of uncertainty surrounding the contemporary causes of climate change, and the importance of those changes. Climate change may be the result of:

- Natural factors such as solar and orbital variations
- Natural processes and cycles within the climate system (e.g., ocean circulation changes)
- Human activities that change the atmosphere's composition (e.g., land use changes, burning fossil fuels) and the land surface

GHGs are gases that trap heat in the earth's atmosphere by absorbing and re-emitting solar radiation. GHGs such as water vapor and CO_2 occur naturally and are emitted to the atmosphere through natural processes and human activities. The Intergovernmental Panel on Climate Change (IPCC) estimates that water vapor is responsible for 60 to 80 percent of the world's greenhouse effect (IPCC, 2007). Other GHGs such as fluorocarbons are created and emitted solely through human activities. The principal GHGs are CO_2, methane (CH_4), nitrous oxide (N_2O), and fluorocarbon gases (EPA 2009).

CO_2 enters the atmosphere through the burning of solid waste, wood, and fossil fuels (oil, natural gas, and coal), and also as a result of other chemical reactions (e.g., manufacture of cement). Most CO_2 that is naturally produced through respiration and decomposition is taken up by photosynthesis of plants on land and in the oceans. CO_2 emitted by combustion of fossil fuels and industrial processes is causing CO_2 concentrations to increase in the atmosphere (IPCC 2007). CO_2 accounts for approximately 70 percent of global man-made GHG emissions (EPA 2006).

CH_4 is emitted during the production and transport of coal, natural gas, and oil; CH_4 is also emitted from livestock, agricultural processes, and organic waste decay and amounts to about 24 billion metric tons annually in the U.S. Natural CH_4 emissions globally are from wetlands, oceans, hydrates, and fires. CH_4 accounts for approximately 15 percent of global man-made GHG emissions (EPA 2006).

N_2O emissions are emitted during the combustion of fossil fuels and solid wastes, as well as during agricultural and industrial activities. N_2O accounts for approximately eight percent of global man-made GHG emissions (EPA 2006).

Fluorocarbon gases such as perfluorocarbons, hydrofluorocarbons, and sulfur hexafluoride are emitted from a variety of industrial processes. They are seven percent of global GHG emissions. They are not naturally produced (EPA 2006).

5.5.1.4 Regional Haze

The Regional Haze Rule (40 CFR Part 51, subpart P) was intended to protect and improve visibility in areas of the country known as Federal Class I areas. Several facilities in North Dakota were subject to a regional haze analysis per 40CFR Part 51.308, known as the Best Available Retrofit Technology (BART) analyses. These analyses applied to facilities in 26 source categories (mainly power plants) that were constructed between approximately 1962 and 1977 (years prior to the Clean Air Act Amendments of 1977). Utilities are the most common facilities that met the requirements under the BART rules. The analyses include modeling sources for contribution to haze (visibility impairment) in Class I areas. North Dakota is in the process of updating their SIP to include controls and emission limits required by the BART analyses to improve visibility in Class I areas.

5.5.2 Impacts

The EPA, Office of Air Quality Planning and Standards (OAQPS), has set National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. They include: sulfur dioxide (SO_s), carbon monoxide (CO), ozone, nitrogen dioxide (NO_2), lead (Pb), particulate matter with aerodynamic diameter less than or equal to 10 microns (PM_{10}), and particulate matter with aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$). All counties in North Dakota are currently in attainment for all National Ambient Air Quality Standards (NAAQS), meaning that these counties meet the standards for public health and welfare concerning levels of the above-referenced criteria pollutants. This section discusses potential impacts to air quality resulting from construction and operation of the proposed Project.

Impacts resulting from construction activities are anticipated to be temporary and minor. Impacts resulting from the operation of the proposed Project are anticipated to be negligible. Potential impacts to air quality as a result of the construction and operation of the proposed Project will include:

- Increases in fugitive dust caused by construction activity, vehicles, and equipment
- Emissions from construction vehicles and equipment
- Potential impairments to Federal Class 1 Area airsheds
- Potential contribution of greenhouse gas emissions

Potential impacts on air quality as a result of construction include increases in fugitive dust caused by construction activity, vehicles, and equipment and emissions from construction vehicles and equipment. The primary construction impact on air quality comes from fugitive dust. The footprint of the proposed Project occurs primarily on open ranges, undeveloped, or agricultural land, with transportation occurring primarily on dirt or gravel roads. Increases in traffic on these roads from construction-related workers,

equipment, earthmoving activities, and wind action on disturbed areas will all lead to increases in the production of fugitive dust. Site-preparation for the proposed transmission line and associated projects will require earthmoving and grading activities, exposing soils and increasing the potential for wind erosion. In addition, as a result of grading activities the transportation of soil and other construction debris in uncovered trucks could also contribute to fugitive dust. The primary concern over fugitive dust will occur during the warmer, drier months when soils are not as compacted and are more prone to dust generation. Impacts from fugitive dust will be expected to be short-term and only occurring during the construction period. Based on the relatively small size of the affected area and current air quality conditions, it is expected that this alternative will result in low impacts on air quality.

Other impacts on air quality as a result of construction activities come from emissions from construction vehicles and heavy equipment used in the construction process. Emissions stemming from these vehicles and equipment will emit hydrocarbons, particulate matter, and CO_2. Emissions resulting from the construction activities will be highly localized in the immediate Project area and ROW and will be similar or less than to those created as a result of agricultural activities taking place in a majority of the project area. Air emissions as a result of construction are expected to be minimal as these activities are not excessive in nature. Estimated emissions are listed in Table 5.5-1. Therefore emissions stemming from the construction of this alternative will not reduce air quality in the project area and will not exceed USEPA *de minimis* thresholds and will not affect the current attainment status of North Dakota; resulting in short-term, low impacts.

Table 5.5-1: Transmission Line and Substations Construction Emissions Estimates and General Conformity *De Minimis* Thresholds

Pollutant	Emissions (tons)	Emissions (tons/year)	General Conformity *De Minimis* Threshold
NO_x	3.76	1.88	100
Volatile organic compounds	0.28	0.14	100
$PM_{2.5}$	0.49	0.25	100
SO_2	0.11	0.06	100
CO	1.14	0.57	100

Emissions potentially impacting air quality during operation of the transmission line, substation, and switchyard will only occur as a result of atmospheric interactions with the energized conductors. These

minor emissions consist of ozone and NO_x and occur near the conductor due to the development of a corona. These emissions relative to NAAQS will be negligible and not approach current *de minimis* standards, resulting in low impacts on air quality.

A potential area of concern regarding proposed air quality impacts associated with the Corridor/Route is the proximity of the proposed transmission line to the TRNP-North Unit, a federal Class I airshed. The proposed transmission line will be approximately 1.1 miles from the TRNP. Class I areas are sensitive areas with determined important visual qualities and are protected from air pollutants that can potentially cause visibility impairments. Visibility can be affected by several air pollutants including PM_{10}, $PM_{2.5}$, sulfates, nitrates, and sulfuric acid mist. Potential pollutants occurring as a result of construction activities resulting from the Project with the potential to impact visibility are both particulate matters. However, based on the limited amount of emissions resulting from construction activities, its highly localized short-term nature, and the implementation of management practices to control emissions and fugitive dust, construction emissions will not cause visibility impairments to the Class I area.

GHG emissions resulting from the Corridor/Route were calculated for two types of activities that produce GHG emissions: construction of the transmission line and ongoing annual operations and maintenance for its estimated 50-year-long operational life. GHG emissions associated with construction activities will occur over a period of approximately 2 years. Based on existing data, it was assumed that an average of 150 workers (50 per three crews) located throughout the Project area will work on the project daily during peak construction (including road and structure installation) and non-peak construction(including installing and removing BMP measures and staging areas, site preparation and restoration work, and equipment and materials moving). The transportation components of GHG emissions were estimated based on the approximate number of vehicles that will be used during project construction and the approximate distance those vehicles will travel. The number of round trips was conservatively estimated using the following assumptions.

- All workers will travel in separate vehicles to and within the project area each day.
- A maximum number of workers (150) will be required to construct the project.
- The round trip distance in the project area is approximately 100 miles, depending on the exact location of workers within the project area.
- Fuel consumption is based on the average fuel economy for standard pickup trucks of 18 miles per gallon. This is likely an overestimate as more efficient vehicles may be occasionally used. Average helicopter fuel mileage is anticipated to be around 1 mile per gallon.

Fuel consumption and GHG emissions will also result from operation of on-site heavy construction equipment. Heavy construction equipment may include augers, bulldozers, excavators, graders, heavy-duty trucks, and front-end loaders. It is also expected that the majority of heavy construction equipment use will occur during peak construction. Assumptions included a maximum of 50 equipment machines will be in operation during peak construction and 25 equipment machines during off-peak. It was also assumed that the average size of equipment will not exceed 250 horsepower and will operate at max power for 8 hours per day 5 days a week, which is a significant overestimation because equipment commonly operate in idle or reduced power.

The implementation of the Corridor/Route will require the permanent removal of trees and other vegetation as a result of road construction of ROW clearing. Although permanent tree removal will not immediately emit GHGs, it will reduce the level of solid carbon storage in the area. Tree growth and future carbon sequestration rates are highly variable and dependent on several factors, including, the species of the tree, the age of the tree, climate, forest density, and soil conditions. In the North Central Region, the average carbon storage associated with forest is 160,000 pounds per carbon acre (USFS, 1992). As a result of the Project, a total of approximately 113.8 acres of forested area will be removed.

During operation and maintenance of the transmission line it is expected that routine patrols, maintenance of roads and structures, and aerial inspections by helicopter will occur once per year and emergency maintenance and natural resource review will occur on average once every 4 years, with all activities estimated to incur 100 miles round trip. Operation and maintenance emissions are estimated for the 50-year life span of the transmission line.

Based on the above assumptions, the Project will result in an estimated total of 18,480 metric tons of CO_2e emissions during construction and a total of an estimated 50 metric tons of CO_2e emissions for ongoing operations and maintenance activities over the 50-year lifespan of the line. To provide context for this level of emissions, the USEPA mandatory reporting threshold for large sources of GHGs is 25,000 metric tons of CO_2e emitted annually (74 Federal Register 56260). This threshold is approximately the amount of CO_2e generated by 4,400 passenger vehicles per year. Comparatively, the emissions during project construction will be equivalent to the emissions generated by about 3,252 passenger vehicles per year. Operation and maintenance activities will translate into CO_2e emissions about equal to that of nine passenger vehicles per year. Overall, the contributions of construction, operation, and maintenance of the Corridor/Route on GHG concentrations will be low.

It is expected that approximately 113.8 forested acres will be removed for the Corridor/Route. Assuming each affected acre contains the average carbon content for the North Central Region, the net carbon footprint associated with the removal of forested area will be an estimated 8,295 metric tons of CO_2e. Given this estimate, the impact of vegetation removal on GHG emissions will be low.

5.5.3 Mitigation

- Use water on roads and disturbed areas to minimize dust.
- Re-seed vegetation in disturbed areas outside of the substation/switchyard to prevent wind-blown dust from areas void of vegetation.
- Implement vehicle idling and equipment emissions measures, such as establishing operating policies that limit idling time and mechanical modifications to the vehicles that restrict the amount of idle time.
- Encourage carpooling and the use of shuttle vans among construction workers to minimize construction-related traffic and associated emissions.
- Locate staging areas as close to construction sites as practicable to minimize driving distances.
- Locate, where possible, staging areas in previously disturbed or graveled areas to minimize soil and vegetation disturbance where practicable.
- Encourage the use of the proper size of equipment for the job to maximize energy efficiency.
- Use alternative fuels, if possible, for generators at construction sites, such as propane or solar, or use electrical power where practicable.
- Recycle or salvage non-hazardous construction and demolition debris where practicable.
- Dispose of wood debris (burning) in the local area where practicable.
- Use local rock sources for road construction where practicable.

5.6 NOISE

5.6.1 Description of Resources

Definitions. Sound is caused by the vibration of air molecules and is measured on a logarithmic scale with units of decibels (dB). Sound is composed of various frequencies, which are measured in Hertz (Hz), or the number of cycles per second. The typical human ear can hear frequencies ranging from approximately 20 Hz to 20,000 Hz. Typically, the human ear is most sensitive to sounds in the middle frequencies (1,000 to 8,000 Hz) and is less sensitive to sounds in the low and high frequencies. As such, the A-weighted scale was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighted scale emphasizes sounds in the middle

frequencies and de-emphasizes sounds in the low and high frequencies. Any sound level to which the A-weighted scale has been applied is expressed in A-weighted decibels, (dBA). For reference, the A-weighted sound pressure level and subjective loudness associated with some common noise sources are listed in Table 5.6-1.

Table 5.6-1: Typical Sound Pressure Levels Associated with Common Noise Sources

Sound Pressure Level (dBA)	Subjective Evaluation	Outdoor Environment	Indoor Environment
140	Deafening	Jet aircraft at 75 feet	
130	Threshold of pain	Jet aircraft during takeoff at a distance of 300 feet	
120	Threshold of feeling	Elevated train	Hard rock band
110		Jet flyover at 1000 feet	Inside propeller plane
100	Very loud	Power mower, motorcycle at 25 feet, auto horn at 10 feet, crowd noise at football game	
90		Propeller plane flyover at 1000 feet, noisy urban street	Full symphony or band, food blender, noisy factory
80	Moderately loud	Diesel truck (40 mph) at 50 feet	Inside auto at high speed, garbage disposal, dishwasher
70	Loud	B-757 cabin during flight	Close conversation, vacuum cleaner, electric typewriter
60	Moderate	Air-conditioner condenser at 15 feet, near highway traffic	General office
50	Quiet		Private office
40		Farm field with light breeze, birdcalls	Soft stereo music in residence
30	Very quiet	Quiet residential neighborhood	Bedroom, average residence (without TV and stereo)
20		Rustling leaves	Quiet theater, whisper
10	Just audible		Human breathing
0	Threshold of hearing		

Source: Adapted from Egan 1988 and Ramsey and Sleeper 1994

It has been found that the A-scale weighting best approximates the frequency response of the human ear. The human ear responds to noises in the audible frequencies in a similar manner in most individuals. Most humans perceive the change in a noise level as follows:

- 3-5 dBA – Barely perceptible change
- 6 dBA – Readily perceptible change
- 10 dBA – Doubling (or halving) of the apparent loudness

There are also objective factors to consider when determining the noise and how people may be affected by the noise. Noise in the environment is constantly fluctuating, such as when a car drives by, a dog barks, or a plane passes overhead. Therefore, noise metrics have been developed to quantify fluctuating environmental noise levels. These metrics include the exceedance sound level (L_x). The L_x is the sound level exceeded "X" percent of the sampling period and is referred to as a statistical sound level. The most common L_x values are L_{eq}, L_{90}, L_{50}, and L_{10}. L_{eq} is the level of a constant sound over a specific time period that has the same sound energy as the actual sound over the same period. L_{dn} is another common noise metric, which applies a 10-dB penalty to nighttime noise levels.

Ambient Conditions. Ambient sound levels are highly variable and are based on sound sources in the immediate area. For much of the Project area, which is mostly open fields/agricultural/rural residential areas, L_{dn} sound levels will typically vary between 40 and 45 dB[11]. The several communities in the Project area will typically have higher ambient noise levels. Areas adjacent to U.S. Highway 2, U.S. Highway 85, several North Dakota state highways, and numerous county and local roads will have higher ambient noise levels as well, due to vehicle traffic. And conversely, areas such as TRNP and USFS land with restricted access could be quieter than the general Project area. The development of the numerous oil wells across the Project area has introduced isolated pockets of noise during construction and during operation from the well flares, pumping activities and truck traffic.

There are no county-specific regulations for noise in the Project area.

5.6.2 Impacts

As mentioned above, much of the proposed Project area consists of open fields, agricultural areas, and rural residential areas. Ambient noise levels in these areas are expected to typically vary between 40 and 45 decibels (dB), which is generally considered as quiet. The several communities located near the proposed Project will have higher noise levels, as will areas adjacent to local roadways and highways.

[11] Figure 4 from http://www.nonoise.org/library/envarticle/index.htm accessed on 12/8/2011

This section provides a discussion of the potential noise impacts to the area as a result of construction and operation of the proposed Project.

Noise impacts resulting from construction activities are anticipated to be temporary and minor. Noise impacts during operation of the proposed Project are anticipated to be negligible. Potential noise impacts as a result of construction and operation of the proposed Project will include:

- Temporary increases in noise levels along the Corridor/Route from construction vehicles and equipment
- Temporary increase in noise levels for nearby residences during construction of the proposed substations
- Potential increase in ambient noise levels as a result of the operation of the transmission line or proposed substations

While construction noise will occur along the entire line, noise increases will only be a concern if sensitive noise receptors (such as residences, schools, churches, libraries) are located in proximity to the construction area so as to experience increases in noise exposure. Temporary and highly localized noise increases will be generated from construction vehicles and equipment. Increased traffic along roadways near construction areas will lead to a temporary increase in noise levels adjacent to these roads. However, no sensitive noise receptors are located along the vast majority of these areas due to the rural nature of the area. Only two sensitive noise receptors (all residences) will be located within 500 feet of the Corridor/Route. These receptors will only potentially be exposed to increased construction noise when construction was occurring along those sections of line in proximity to them. Construction-related noise impacts will be temporary and will only occur along small sections of the line where construction activities will actually be taking place. Only certain areas along the length of the route will experience increases in noise at any one time, with the most noise occurring during ROW clearing (which will be minimal) and the erection of transmission structures. Construction-related noise impacts will occur during normal construction hours, mainly during daylight hours. Increases in noise levels related to construction activities will cease upon completion of construction.

Noise generated from the operation of the Project is expected to be negligible. The primary source of noise as a result of operation of the transmission line will be the corona effect, which is a type of electrical conduction that generally occurs in the atmosphere near the conductor. Local atmospheric pressure changes that occur with corona may result in a hissing and cracking sound that may be audible from directly under the transmission line to within a few feet of the ROW, depending on local

atmospheric conditions. Sensitive receptors are located in the area adjacent to the proposed Project, as the Corridor/Route will pass within 500 feet of two residences. However, none of these residences are located close enough to the route to experience any changes in noise level. Based on other projects double circuited with a 345 kV and 115 kV, the L50 noise levels were predicted to be 50 dBA at 300 feet (Basin Electric, 2012) and therefore would be less at 500 feet and less because it will only be a single circuit. The transmission line will be far enough away so as not to be heard above the ambient noise produced by other sources in the area.

Proposed Substations

Increases in noise levels resulting from the construction of the proposed Judson and Tande substations are anticipated to be similar to impacts associated with the construction of the proposed transmission line with the exception that construction will occur over a more extended period of time in a specific area. Potential impacts during site construction will include temporary increases in noise levels from construction vehicles and equipment on-site and on the surrounding roads. The potential increases in sound due to construction will be temporary in nature and sound levels will return to the existing ambient levels after construction is complete.

Future sound levels in areas directly adjacent to the two proposed substations will potentially be impacted by operation of new substation facilities, particularly noise generated by transformers. The sound commonly associated with a transformer is described as a hum. This hum is created by the expansion and contraction of the core when the unit is energized (known as magnetostriction). The expansion and contraction occurs roughly twice per alternating current cycle. The cycle for the proposed transformers is 60 times per second, or 60 Hertz (HZ). The transformers will therefore oscillate at a frequency of approximately 120 Hz. Historical field work has demonstrated that transformer noise mostly occurs in the 1st, 3rd, 5th, and 7th harmonics (120, 360, 600, and 840 Hz).

In addition, the transformers will have cooling fans that will create noise at various times. These fans create noise two ways: 1) the motors' mechanical noise, and 2) by the blades disrupting the air. Predictive modeling was conducted to determine potential noise levels generated by substation operations. The results of the modeling are discussed below.

Predictive Modeling

To determine the level of impact that will be expected near the proposed substations, predictive modeling was performed for a typical substation. The separation distances that will be required to achieve L_{eq}

values of 45 dBA or quieter (a common sound level for a farm field without any local vehicular traffic or industrial noise sources) and L_{dn} values of 65 dBA or quieter (HUD standard) were calculated.

The two transformers that will be installed at the proposed substations will be 345/230 kV transformers with a rating of 600 MVA. The sound profile for the transformers was calculated using the equations found in the Electric Power Plant Environmental Noise Guide[12]. The overall source was then ratioed such that the transformer will emit the correct octave band sound power profile, but at an overall sound pressure level of 75 dBA as will be measured using IEEE C57.12.90 methodology. The expected sound power profiles created and modeled for these transformers are shown below in Table 5.6-2.

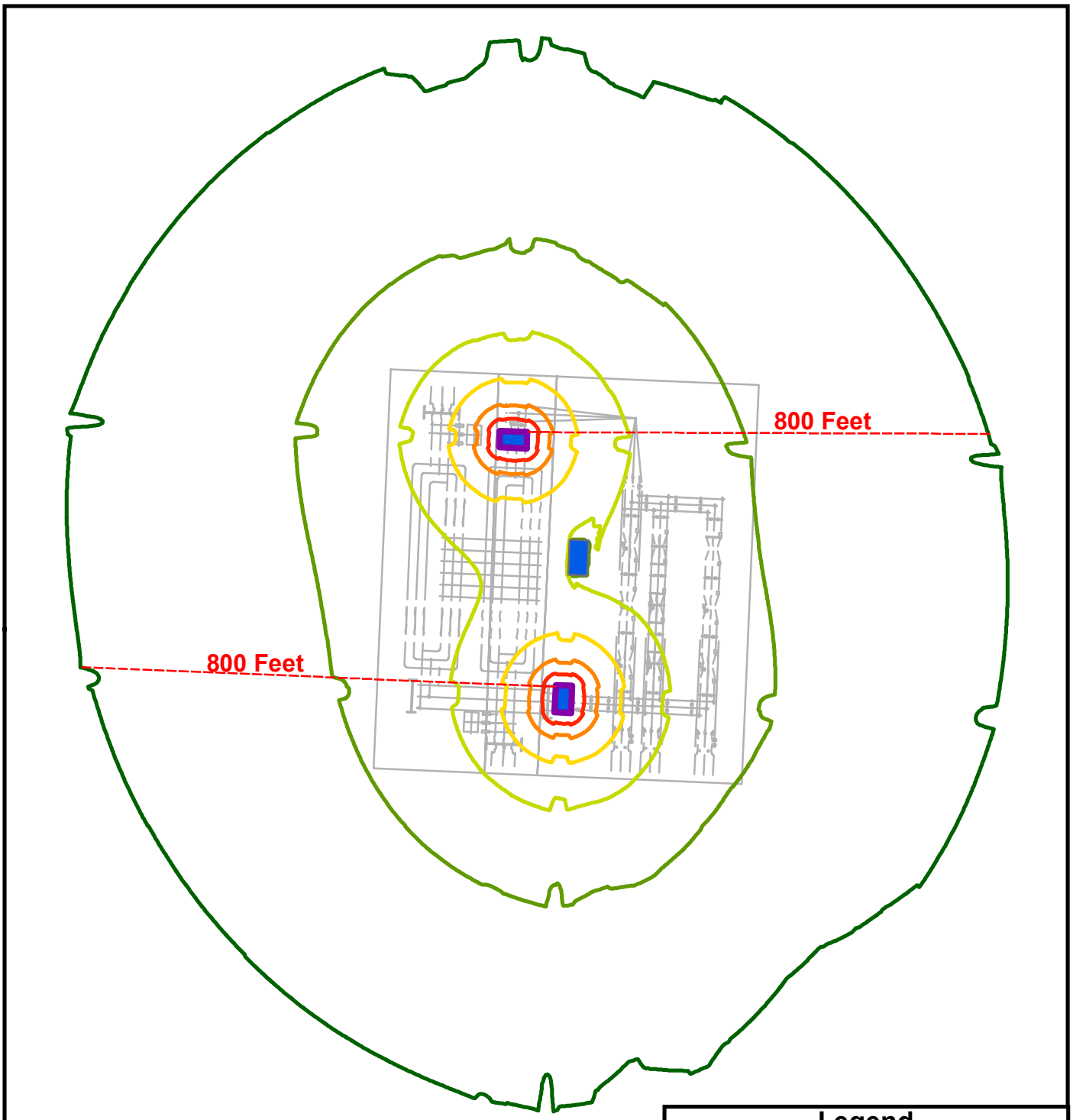
Table 5.6-2: Expected Transformer Sound Profiles

Substation	Number of Trans--formers	Maximum Trans-former Rating (MVA)	Transformer Sound Power Level (Lw) at Octave Band Frequency (Hz) (dBA)									Overall Sound Power Level (dBA)
			31.5	63	125	250	500	1000	2000	4000	8000	
Basin Electric	2	600	90.5	96.5	98.5	93.5	93.5	87.5	82.5	77.5	70.5	102.5

The model predicted sound levels over a gridded area, creating sound isopleths. Figure 5.6-1 depicts the maximum expected operational Leq sound pressure levels for an example substation (the logarithmic addition of sound levels for all frequencies from two transformers). Figure 5.6-2 depicts the maximum expected Ldn sound pressure levels for an example substation (the logarithmic addition of sound levels for all frequencies from two transformers including a 10-dB penalty applied during nighttime hours). These figures represent only the noise emitted by the two example transformers and do not include any extraneous noises (vehicular traffic, animals, etc.) that could be present during physical noise measurements. The figures display sound pressure levels as lines at 5-decibel increments. While standard ground attenuation was included in the calculations, the effects of shielding due to terrain were not included because those effects will be very site-specific (for example, a hill will block sound propagation).

These isopleths were used to determine an approximate distance that a substation of this particular layout will need to be setback from any residence and be able to operate at or below sound levels that will be considered acceptable to a sound-receiving residence. The distances to specific sound levels were visually determined by inspecting the isopleths. The distance required from the closest edge of either of the transformers to achieve L_{eq} sound levels of 45 dBA or lower is approximately 800 feet.

[12] Electric Power Plant Environmental Noise Guide, Volume 1, 2nd Edition (Edison Electric Institute, 1984)



Legend

vert sources
Structures
45
50
55
60
65
70

0 50 100 200 300 400
Feet

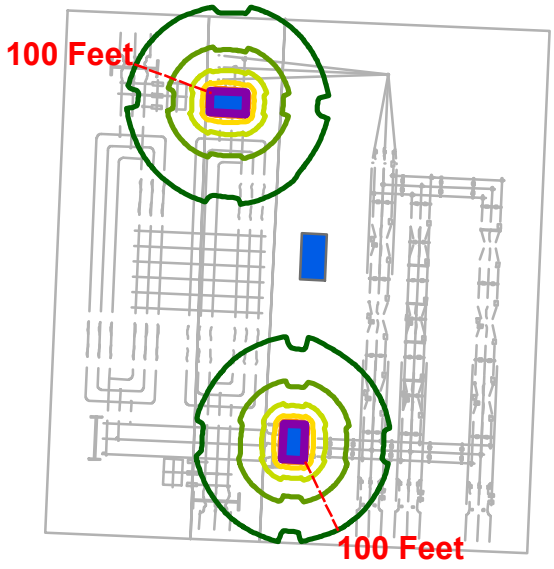
NORTH

Burns & McDonnell
SINCE 1898

Figure 5.6-1
Basin Electric Power Cooperative
Antelope Valley Station to Neset
345-kV Transmission Project
Typical Substation Leq Sound Contours

Revised: April 5, 2012

\\ESPSRV\Data\Projects\Basin\61495_AVS_345\GIS\DataFiles\ArcDocs\Example_Leq.mxd



Legend

vert sources
Structures
65
70
75
80
85
90

0 50 100 200 300 400
Feet

NORTH

Burns & McDonnell
SINCE 1898

Figure 5.6-2
Basin Electric Power Cooperative
Antelope Valley Station to Neset
345-kV Transmission Project
Typical Substation Ldn Sound Contours

Revised: April 5, 2012

\\ESPSRV\Data\Projects\Basin\61495_AVS_345\GIS\DataFiles\ArcDocs\Example_Ldn.mxd

The distance required from the closest edge of either of the transformers to achieve L_{dn} sound levels of 65 dBA or lower is approximately 100 feet. Maintaining these distances from any residence will all but assure that there will not be any noise issues related to the proposed substations. No residences will occur within 500 feet of either substation. One residence is located within 800 feet of the fence line for the proposed Tande Substation. This residence may experience L_{eq} sound levels of 449 dBA, which is still within acceptable levels. No residences are located within 800 feet of the fence line for the proposed Judson Substation (see Appendix L, Judson Noise Analysis Memo, October, 2011 and Tande Noise Analysis Memo, February, 2013).

5.6.3 Mitigation

- Use equipment with sound-control devices no less effective than those provided on the original equipment.
- Do not use equipment with an un-muffled exhaust.
- Do not conduct noise-generating construction activity within 1,000 feet of a residential structure between the hours of 10:00 p.m. and 7:00 a.m.
- During operation, if the proposed transmission line is found to be the source of radio or television interference in areas with reasonably good previous reception, measures will be taken to restore the reception to a quality as good as or better than before the interference.

5.7 VISUAL IMPACTS

5.7.1 Description of Resources

5.7.1.1 Regional Setting

This section describes existing visual resources within the Project area. Scenic quality is based on the evaluation of the overall character and diversity of the terrain, vegetation type, water, and cultural features of a particular landscape in relation to a viewer's sensitivity. Landowners within the Project area will have a different sensitivity level to changes in the landscape as opposed to motorists or tourists who are viewing the area for a limited period of time.

The Project area includes portions of two ecoregions, the Northwestern Glaciated Plains Ecoregion and the Northwestern Great Plains Ecoregion. Within these major ecoregions there are numerous smaller physiographic ecoregions (see Geology and Landforms section for further descriptions). The Northwestern Glaciated Plains Ecoregion is located north of Lake Sakakawea, while the Northwestern Great Plains Ecoregion encompasses the area south of Lake Sakakawea (Bryce et al. 1998). As a result of

these different ecoregions, the Project area contains a diversity of topographic features and associated visual landscapes.

5.7.1.2 Natural Features

Within the Project area north of Lake Sakakawea, elevations range from approximately 1700 to 3000 feet above mean sea level (amsl). Topography in this part of the Project area is gently rolling to level, with few trees and sparse wetlands. The landscape can be described as a mosaic of agricultural fields and rolling prairie, with areas of grazing along steeper slopes. Although lack of woody vegetation tends to enable long and wide views, topographical features and elevation changes provide screening and visual barriers throughout the landscape. Rural homesteads are interspersed throughout the area (Figures 5.7-1 and 5.7-2).

The portion of the Project area south of Lake Sakakawea offers a broader range of topography and elevation, with ranges of approximately 1300 to 3300 feet amsl. Areas around the Little Missouri River and Lake Sakakawea consist of deep, highly-eroded canyons and Badlands with heavily-wooded draws, while the eastern portion of the Project area exhibits more rolling terrain (Figure 5.7-3). Wide viewsheds are also available in this region, particularly from high vantage points. However, greater changes in elevation and increased topographic relief lend to greater screening of objects in the landscape.

Figure 5.7-1: Cropland and rolling prairie topography with rural farmstead visible in upper left background and recent oil development in central background.

Figure 5.7-2: Typical prairie within northern portion of Project area.

Figure 5.7-3: Typical viewshed near Little Missouri River and Badlands areas.

Fewer agricultural fields occur in these areas, with cattle grazing being more common. Large tracts of timber are uncommon within the Project area, although wooded fencerows and shelterbelts are common throughout the area, especially near farms and rural residences.

Within the Project area, TRNP and the LMNG offer designated scenic trails and views within their boundaries. Additionally, the Killdeer Mountain Four Bears Scenic Byway (North Dakota State Route 22) and the TRNP North Unit Scenic Byway (located off of U.S. Highway 85) provide scenic views of the rural landscape in the central section of the Project area.

The LMNG, located in McKenzie County, is part of the larger Dakota Prairie National Grasslands. These lands, administered by the USFS, have scenic integrity objectives.

The USFS Scenery Management System provides a tool for managing scenic resources and is incorporated into forest plans to determine the relative value and importance of scenery on National Forest System lands. The process involves classifying landscapes, and setting goals and objectives for maintaining, enhancing, restoring, and monitoring scenic integrity. Under the administration of USFS, discrete units of the National Grasslands have been assigned scenic integrity objectives (SIOs) under the Northern Great Plains Management Plans Revision. SIOs guide the amount, degree, intensity, and distribution of management activities needed to achieve desired scenic conditions. SIO classifications range from very high to unacceptably low. These SIOs are the management objectives adopted through the approval of the Forest Land and Resource Management Plan.[13] The LMNG areas within the project area are mostly classified as having low SIOs; although there are areas with both moderate and high SIOs (USFS, 2001). National Grassland areas within the project area with moderate and high SIOs are primarily found adjacent to or near TRNP North Unit.

5.7.1.3 Built Environment

Rural homesteads are visible throughout much of the eastern and northern portions of the Project area, with fewer residences occurring in the more rugged, Badlands areas around the Little Missouri River and its tributaries. Incorporated towns and unincorporated communities also occur as part of the manmade environment within the Project area. Many of these towns and small communities are experiencing rapid residential and commercial growth to support oil and gas development activities in the region.

[13] Scenic integrity levels (SILs) are the proposed management objectives presented in the alternatives development of the DEIS. SILs become SIOs when the preferred alternative is selected. The SILs define the degrees of acceptable deviation in form, line, color, and texture that may occur at any given time. SILs ranging from high to low are assigned to all management areas. Usually they are described at the management prescription level. A high SIL means human activity is not scenically evident, a moderate SIL describes a valued landscape character that is slightly altered, and a low SIL indicates that a landscape is moderately altered.

U.S. and state highways, county roads, and unpaved roads also traverse the Project area as part of the built environment. Numerous overhead transmission and distribution lines also occur within the Project area, one of which passes through TRNP and its viewshed. This transmission line crosses the far eastern edge of the national park, within the U.S. Highway 85 corridor, which also passes through the park boundary.

Recent increases in oil and gas production within the Project area have led to an increase in the number of oil and gas wells and drill rigs that are visible on the landscape (Figure 5.7-4). Each oil well pad site incorporates as much as 10 acres of surrounding land and includes a drill rig, pump jack, storage tanks, and gas flaring equipment on a gravel pad and containment berms (Figure 5.7-5). New oil well storage tank facilities, oil and natural gas pipelines, and associated industrial facilities have also been constructed within the Project area, with more of these currently under construction and projected to be built in the future to support the oil and gas industry. Oil and gas production activities have also led to the widespread development of temporary employee housing, which generally consist of clusters of mobile home or trailer units (Figure 5.7-6). These housing clusters are increasingly visible on the landscape as well, mainly on the outskirts of established communities. Temporary housing is currently giving way to more permanent apartment and other multi-family type housing, particularly in and around rural communities where access to utilities is available. Such growth and development is expanding into more rural areas, converting the visual character from undeveloped landscapes to a more suburban-type environment.

Figure 5.7-4: Typical oil and gas development activities visible on the landscape within the Project area.

Figure 5.7-5: Typical oil well pad site with pump jack, gas flaring equipment, and storage tanks.

Figure 5.7-6: Typical temporary employee housing camps in Project area

5.7.2 Impacts

As discussed above, the proposed Project area contains a diversity of visual resources and viewsheds, particularly with respect to TRNP, LMNG, Lewis and Clark National Historic Trail (Trail), and the Highway 22 scenic byway. Visual changes will also be noticeable for landowners who live near the proposed Project or residents who use roads or highways located within the viewshed of the proposed Project. This section discusses potential visual impacts to resources resulting from construction and operation of the proposed Project.

Construction and operation of the Project will introduce another feature into the visual landscape throughout the project area. Potential visual impacts to individuals or resources as a result of the proposed Project will include:

- Proximity of the transmission line and/or structures to residences and residential areas
- Proximity and changes to the visual landscape with respect to the Little Missouri River, a state-designated scenic river
- Changes to the visual landscape within or near recreational areas such as state and national parks.
- Reduction in the visual quality of scenic byways or trails crossed by the proposed Project

New transmission structures, conductors, and cleared ROW areas will change the visual characteristics in the vicinity and the viewshed of the proposed Project. However, the proposed Project will not differ from other transmission lines common throughout the region and project area. For residences located near the transmission line and local residents traveling area roads in the Project area, a new man-made feature will be present it the landscape. However, the topography and woody vegetation in forests, shelterbelts and windbreaks serve to reduce line visibility to generally small section of line for momentary glimpses.

Residents of homes along the line will be most prone to changes in the visual environment around their homes. However the visual sensitivity to the line will be highly dependent on the orientation of line to the home (in front, behind, alongside), any screening between the home and the line (trees, topography), distance, other visual components (existing lines, radio towers), and the general sensitivity of the occupants to the Project.

Based on the visual integrity objectives identified in the Northern Great Plains Management Plans Revision (2001), the majority of the LMNG tracts within the Project area have a scenic integrity level (SIL) of low. Areas within the national grasslands typically will contain less disturbance and development than private lands surrounding these areas. As a result, with the exception of small areas around the North Unit of TRNP, most the Project area will have a low SIL. A low SIL is described as a

landscape appearing heavily fragmented, with human activities strongly dominating the natural landscape. As such, the proposed project will be consistent with this SIL and not contribute to adverse changes in the visual setting throughout the majority of the Project area. The following discusses specific areas or resources of visual interest potentially impacted along the Corridor/Route.

The Project will be constructed through varying types of terrain. Distance from the line, terrain, topographical features in the area, differences in elevation, man-made features and natural features such as forest cover will all influence the level of potential impact at specific locations throughout the Project area. The Corridor/Route will have 103 road crossings along the length of the route. Many, if not most, of these roads are county section-line gravel roads that receive only very light local traffic. However, the Project will introduce a new visual element to the surrounding area for motorists at each road crossing. This addition will likely be more pronounced at road crossings of larger, well-traveled roads or at crossings where there is no existing transmission or distribution lines within view of the road.

The Corridor/Route will be located within 500 feet of two residences, one of which occurs nearby of where the route crosses the Missouri River. The impacts to these residences will be similar to those generally discussed previously (Visual Simulations 1 and 4 in Appendix M). Homes in the area of the Missouri River crossing may experience other visual concerns as discussed below. However, throughout the majority of the Project area, except in specific areas discussed below, adverse visual changes will be minimal as the transmission line is located along existing transmission lines, roads, railroads, or in areas that contain other man-made visual elements such as oil and gas facilities or communications towers. The overall low scenic integrity of the area through which the Corridor/Route will extend will not be adversely changed through the presence of the proposed line.

The Corridor/Route will cross the Killdeer Mountain Four Bears Scenic Byway (ND State Highway 22), a state-designated scenic byway, north of the town of Killdeer in western Dunn County, introducing a man-made visual element to motorists traveling along the byway. The route will cross this scenic highway adjacent to an existing oil well, and other man-made features occur along and near the highway, including a recently constructed transmission line, oil and gas development, rural farmsteads, communications structures, and service facilities (gas stations, convenience stores, restaurants). Topography and the winding nature of portions of the highway will limit views of the line to generally short sections where motorists will only have momentary view of the line. The Project will not be anticipated to adversely change the scenic designation of ND State Highway 22 or the overall scenic integrity along the overall roadway.

The Corridor/Route will also cross the Lewis and Clark National Historic Trail (Trail) and auto tour route. The Trail itself follows the Missouri River, and the Corridor/Route will cross the Trail at its crossing of the Missouri River near Williston. The crossing of the Trail at the Missouri River will occur adjacent to an existing transmission line and U.S. Highway 85. Thus, views from or of the Trail in this area are not expected to be significantly altered as a result of the construction of the Project and the existing man-made features already present nearby. The auto tour route provides motorists with an opportunity to view some of the more scenic areas in the general vicinity of the Trail although the entire trail is not particularly scenic. The Corridor/Route will cross the auto tour route three times between the AVS Substation and the Judson Substation. The crossings will include the Killdeer Mountain Four Bears Scenic Byway (ND State Highway 22, discussed previously), U.S. Highway 85 west of Watford City, and U.S. Highway 2 west of Williston. All of these crossings will occur in areas where man-made features such as oil wells and existing transmission and distribution lines are already present, and will do so in grassland or cropland areas with little scenic value.

The Corridor/Route will introduce a new man-made feature through portions of the USFS-controlled LMNG in McKenzie County. This will visually change the existing viewshed for area users and motorists traveling on U.S. Highway 85 as it passes through or in proximity to the grassland areas. However, as previously noted, most of these areas are classified as having a low SIO, and while the Corridor/Route will visually change the existing viewshed for area users and motorists traveling on U.S. Highway 85 as it passes through or in proximity to the grassland areas, the scenic integrity of these areas will not be adversely affected by the introduction of a new manmade feature. The portion of the Corridor/Route along U.S. Highway 85 through the badland areas associated with the Little Missouri River will potentially contribute to visual impacts, as certain vantage points along U.S. Highway 85 offer commanding views of the area that will be interrupted by the presence of a utility line. However, the presence of an existing transmission line parallel to U.S. Highway 85 already presents some degree of visual contrast. Further, LMNG lands adjacent to portions of U.S. Highway 85 have been specifically identified for the development of utility corridors to mitigate adverse visual effects on the natural landscape and contain infrastructure and associated facilities to an existing corridor rather than allowing disturbances to be scattered across the LMNG.

The Corridor/Route will pass within 3.1 miles of Lone Butte (Visual Simulation 2 in Appendix M), which is within a portion of the LMNG designated as Roadless that offers a scenic view of the LMNG and associated badland areas. While views from this location offer a commanding view of the area, an existing transmission line already exists parallel to U.S. Highway 85 in this area.

The existing transmission line along U.S. Highway 85 and several communications towers, rural residences, and oil development facilities are currently visible (Visual Simulation 2 in Appendix M) from the Lone Butte area. As can be seen in the visual simulation prepared for this location, the visibility of the Project will be considerably limited due to the distance, topography and vegetation in this area. It is likely that areas visible from Lone Butte within the Little Missouri River National Grasslands contain SIL levels ranging from low to high. SIL levels of moderate, moderate-high, and high scenic integrity all allow for some level of human intrusion, ranging from those that dominate the landscape (moderate SIL) to those that must repeat common attributes in the landscape but not be readily evident (high SIL).

The Corridor/Route will also pass approximately 1.2 miles to the east of TRNP and the TRNP North Unit Scenic Byway, and will cross the state-designated scenic Little Missouri River. TRNP is a Federal Class I Area airshed, which is a sensitive area that is to be protected from air pollutants, such as those found in vehicle emissions and fugitive dust, that can cause visibility impairment within the airshed. Although the Corridor/Route will pass close to TRNP, any air impacts resulting in reduced visibility will be limited to the short duration of construction near the park. Construction emissions will not cause visibility impairments to this Class I area, as emissions from fuel combustion units and fugitive dust will be controlled as much as is practicable during construction. An existing transmission line already exists across TRNP, the Byway, and the Little Missouri River just west of U.S. Highway 85, so an additional transmission line to the east of this area may not appear as intrusive as it might otherwise if an existing line was not already present. Many portions of the TRNP viewshed are experiencing man-man visual intrusions to the natural landscape such as oil and gas pumps, wells, and drill rigs. Television and radio communication towers are also visible. Overall, the distance of the Corridor/Route from TRNP, the topography, vegetation, and existing human features in the landscape will result in only minimal new visual contrast being introduced into the landscape (Visual Simulation 3 in Appendix M). As discussed above, the introduction of the Project into the landscape will be consistent with the current SILs for the project area, including the areas in and around the LMNG and TNRP.

The Corridor/Route will cross the Missouri River adjacent to U.S. Highway 85. This crossing includes a wide, flat and generally open plain on the south side of the river giving way to a steep bluff on the north side. Numerous residences have been constructed along the ridge north of the river, several oriented to provide a wide view of the river valley below. It is likely that some of these residents selected these locations and home orientations as a result of the view of the river valley they provide. Introduction of the proposed Project through this area could create concerns for residents in this area for adverse changes to the viewshed. While no designated scenic areas occur in this area, the viewshed does provide a picturesque setting, including the river, adjacent woodlands and topographic features to the south.

However, much of the setting is dominated by an overview of U.S. Highway 85 and an existing transmission line located adjacent to the highway. Oil and gas facilities are also visible within the river valley and adjacent areas above the valley to the south. Construction of the proposed Project will introduce a new man-made element to the viewshed but it will not be unlike elements already present and it will be located in close proximity to these existing features (Visual Simulations 1 and 4 in Appendix M). Consequently, adverse impacts to the visual setting of this area are not anticipated.

Proposed Substations

Visual impacts resulting from the construction and operation of the proposed Judson and Tande substations are anticipated to have similar impacts associated with the construction and operation of the proposed transmission line. Each new substation will be an added visual element in the existing landscape. The proposed Judson Substation will be constructed approximately two miles to the west of the existing Williston Substation. No residences will be located within 500 feet of the proposed substation site, but several will likely be within sight of the substation. This site is currently being used for agricultural purposes but is within and surrounded by rapidly increasing commercial, industrial, and residential development and several roads and highways. The Judson Substation will be considered a compatible component of the visual landscape.

The proposed Tande Substation will be located approximately one mile to the southeast of the existing Neset Substation, in a primarily agricultural area. No residences will be located within 500 feet of the proposed substation. Construction and operation of the proposed Tande Substation will add another man-made visual element to an existing landscape within which the proposed Project will be located, as well as other existing transmission lines connecting to the Neset Substation. These existing lines, along with the Neset Substation and industrial facilities in the Tioga area are currently visible. The Tande Substation is considered to be compatible with the current visual setting of the area.

5.7.3 Mitigation

- Use weathering single pole steel structures where steel towers are utilized, to reduce visual impacts.
- Work with the agencies to choose a structure type (weathering steel or galvanized) that will reduce visual impacts in highly visible or scenic areas, such as the Missouri and Little Missouri River crossings, the National Grasslands, and badland areas.
- Leave (where possible) plants smaller than 8 feet in height within the 150-foot-wide ROW to help reduce the effect of the ROW of visual and aesthetic resources.

- Keep the ROW free of construction debris and other litter during construction to further minimize visual intrusion to the surrounding landscape.

5.8 CULTURAL RESOURCES

5.8.1 Description of Resources

Because RUS is providing funds for the Project, the agency must comply with Section 106 of the National Historic Preservation Act (NHPA), Public Law 89-665 as amended, and its implementing regulation 36 CFR Part 800. As the lead agency, RUS is coordinating compliance with Section 106 and NEPA requirements through Western. As such, both agencies used studies and analyses conducted to comply with NEPA to comply with Section 106 as appropriate. Pursuant to 36 CFR Part 800.2(d) (3), RUS has used its NEPA procedures to meet its requirements for public involvement under Section 106.

5.8.1.1 Project Area of Potential Effects

Pursuant to 36 CFR Part 800.16(d), the undertaking area of potential effects (APE) is defined as the area within which the proposed Project has the potential, either directly or indirectly, to affect historic properties. Historic properties are defined as "…any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places [NRHP] .." (36 CFR 800.16(l)(1). For purposes of complying with Section 106, the Project APE had been defined as a 150-foot-wide corridor based on the centerline of the Corridor/Route and associated access roads; the APE also includes substations and laydown yards. Compliance also requires that the visual impacts of the undertaking on historic properties also be addressed. Given the height of the proposed structures and the requirement to maintain an alignment cleared of vegetation, the proposed Project could alter the integrity of historic properties, especially historic standing structures, with respect to their location, design, setting, materials, workmanship, feeling, and/or association. For purposes of compliance with Section 106, RUS and Western have defined the APE for visual impacts as a ½ mile corridor on either side of the Corridor/Route centerline.

The Section 106 consultation process for the Project is ongoing. The applicant has participated in consultations between RUS, Western, and the North Dakota State Historic Preservation Officer (SHPO). The USFS and the Corps have also been consulted for those portions of the Corridor/Route that will cross lands they administer. Other federal and state permitting agencies will be invited to participate in Section 106 consultation if identified and as appropriate.

Section 106 and 36 CFR Part 800 requires federal agencies such as RUS and Western must consult with federally recognized Indian tribes, as appropriate, as part of the compliance process. Western has initiated consultation with the following tribes.

- Flandreau Santee Sioux
- Santee Sioux Nation
- Fort Peck Assiniboine and Sioux Tribes
- Spirit Lake Tribe
- Fort Belknap Indian Community
- Standing Rock Sioux
- Leech Lake Band of Ojibwe
- Three Affiliated Tribes
- Lower Sioux Indian Community
- Turtle Mountain Chippewa
- Minnesota Chippewa Tribe
- Upper Sioux Indian Community
- Prairie Island Indian Community
- White Earth Nation

5.8.1.2 Class I File Search

The *North Dakota Comprehensive Plan for Historic Preservation: Archaeological Component*, (ND SHPO, 2008) divides the state into a series of study units centered on the major drainages in the state. The plan summarizes the archaeological record for each unit, the types of cultural resources likely to be encountered, and the investigations that have occurred. The plan also is a tool whereby the necessary level of inventory for a project within a study unit can be evaluated. The Corridor/Route crosses the Little Missouri Study Unit (Unit #1), the Knife River Study Unit (Study Unit #3), and the Garrison Study Unit (Unit #6). Of these units, the Little Missouri and Garrison study units have experienced more cultural resource investigations than the Knife River study unit, primarily because of oil development.

As part of the NEPA process for the Project, Metcalf Archaeological Consultants, Inc. (MAC) staff prepared a Class I review for the Project EIS in late 2011 and early 2012; the results of which are documented in the EIS. The review involved a search of the State Historical Society of North Dakota (SHSND) site and manuscripts files. The objective was to identify the cultural resources -- buildings, structures, sites, objects, or districts, or properties of traditional religious and cultural importance to

Native Americans -- that have been recorded and the cultural resource investigations that have been conducted within the transmission line planning area. The search area encompassed a 6-mile wide corridor centered on the two alternative routes evaluated in the EIS. Identification of cultural resources also included, to the extent possible, establishing whether the resource has been determined eligible for inclusion or is already included in the NRHP. Both designations are considered to be historic properties (36CFR800.16[l][1]) and afford the same considerations/protections under NHPA.

A total of 93 cultural resources were identified within or immediately adjacent to the Corridor/Route. The cultural resources included 2 multicomponent sites, 51 archaeological sites, 16 archaeological isolate finds, 4 archaeological site leads, 8 historic sites, 1 historic isolate find, 9 historic site leads, and 2 architectural resources. Multicomponent sites have evidence of a combination of prehistoric, historic, and/or architectural occupation. A total of 80 cultural resource investigations have occurred within or adjacent to the Corridor/Route. Most of these investigations are cultural resource inventories, although several testing and mitigation projects have taken place. The majority of the inventories are associated with energy development. Other inventories have been in conjunction with highway improvements, the construction of transmission lines, the construction of waterlines, the development of borrow areas, and assessment of federal lands. None encompassed the Corridor/Route.

The data sets from the files search were organized for use in consultation with and between Basin, RUS, Western, the SHPO, and tribes. These consultations addressed the need for a Class II and/or Class III cultural resource inventory. The anticipation was that some areas along the Corridor/Route may only require a Class II reconnaissance while others a Class III intensive inventory. The consultation also addressed the effects of the construction of the transmission line on cultural resources, specifically those that are included in or eligible for the NRHP or those for which eligibility has not been determined, and how to offset any adverse effects.

5.8.1.3 Class III Inventory

MAC archaeologists began the Class III cultural resource inventory of the Corridor/Route and access roads during the 2012 field season; the inventory will be completed during the 2013 field season, before construction begins. The inventory methodology conforms to *North Dakota SHPO Guidelines Manual for Cultural Resource Inventory Projects* (SHSND 2012). The field inventory activities will be in the 150-foot-wide Corridor/Route or access road centerlines, for the entire length of the Corridor/Route, providing 100 percent coverage.

During the 2012 field season MAC archaeologists recorded 102 cultural resources, using the appropriate North Dakota Cultural Resource Survey (NDCRS) archaeological, historic, and/or architectural form. This count includes resources within or adjacent to the Corridor/Route that had been recorded prior to the inventory and were revisited during the inventory. Some of these previously recorded resources could not be relocated and this fact was noted on an update for the NDCRS form.

Resources were recorded according to the three classes the SHPO recognizes: site, isolated find, or site lead. *Sites* are defined as "…a location of past human activity that took place over 50 years ago and which left physical traces of that activity in the form of (1) an intact cultural feature, (2) six or more artifacts found within about 60 meters of each other, and/or (3) an intact subsurface cultural deposit regardless of the number of artifacts." *Isolated finds* are defined as " [a] location with five or fewer artifacts and identified by the archeologist(s) as representing an area of very limited past activity." *Site leads* consist of "…locations reported by a landowner or other non-professional as containing cultural resources" or "…a location with five or fewer surface visible artifacts may, in the professional judgment [sic] of the archeologist(s), be only a limited surface expression of a former occupation area where most of the artifacts are not visible (i.e., still buried)" (SHSND, 2012:17).

MAC staff is completing the NDCRS forms for the resources encountered during the 2012 inventory and preparing an interim report that documents the results of the 2012 inventory. The report should be submitted to Basin by the first of March, 2013. Western will use this report to initiate project-specific tribal consultations. The report will include assessments of the resources as to whether they qualify as "historic properties". Avoidance will be recommended for those resources that are determined to be historic properties or for which survey data are insufficient to determine whether they qualify. If a resource that qualifies as a historic property cannot be avoided, a mitigation plan will have to be developed and executed before construction can impact the resource. If survey data are insufficient to determine whether the resource qualifies as a historic property and that resource cannot be avoided, the resource will have to be evaluated to determine if it qualifies and, if so, mitigated before construction can impact the resource.

5.8.1.4 Visual Assessment

As part of the compliance process, the visual impacts of the Project on historic properties were to be assessed. Accordingly, during November, 2012, J. Trnka Consulting, LLC, conducted a visual assessment of the impacts of the Project on historic standing structures. Following Western guidelines the Visual APE consisted of ½ mile on either side of the route centerline. The assessment involved

driving the route, and photographing and recording standing structures/structure complexes. The report documenting the results is in preparation.

A total of 103 structures/structure complexes were recorded during the visual assessment. Most of the structure/structure complexes are still occupied or in use. However, 10 are considered to qualify as possible historic properties. These 10 have been recorded as site leads as they are outside of the Corridor/Route and a lack of access permission precluded formal recording. Most of these are abandoned.

Because the 10 site leads are abandoned, the project has little potential for an adverse effect determination on any of them provided they are not a demolished or physically intruded upon, intentionally or otherwise. Views from the leads are largely not an issue because there are no humans present to enjoy the views. Furthermore, only one lead may likely once having enjoyed a commanding view as it has a porch at the front of the house (no longer extant). However, the proposed transmission line will pass behind the structure and, therefore, will not impact the view. The views to these properties from the nearest public access do not appear to be conflicted by the Project at any location. The transmission line seems to avoid all of these sites and minimization of the view of the line does not appear to be applicable. However, if Project impacts to any of these sites need to be mitigated, the recommended procedure will be to have a qualified architectural historian record their features (photographs, site plans, measurements, wood samples, etc.).

5.8.1.5 Traditional Cultural Properties

Traditional cultural properties (TCPs) are historic properties that are of "…traditional religious and cultural importance to an Indian tribe…" (36CFR800.16[l][1]). Many TCPs are associated with place (LeBeau, 2009). None of the resources recorded during the inventory have been specifically identified as TCPs. A number of stone circles and cairns were recorded. Many Native Americans consider stone circles and cairns to be TCPs as they interpret them as prayer circles. Cairns are known to have served a variety of functions, including trail markers, burials, buffalo drives, among others. Tribal consultations will need to address whether such features are considered to be TCPs and, if so, the appropriate avoidance or mitigation measure(s).

5.8.1.6 Substation Sites

In the summer and fall of 2011, Basin requested that MAC conduct a Class III intensive pedestrian inventory of the proposed Tande Substation site (Metcalf, 2012b) and the Judson Substation site (Metcalf

2012c). The APE/inventory area consisted of 60 acres and 10 acres for the second. No cultural resources were identified in either project area and MAC recommended a finding of *No Historic Properties Affected*.

5.8.2 Impacts

The construction of Project facilities could affect recorded and as yet unrecorded cultural resources - archaeological, historic and/or architectural – and TCPs. The transmission line, with its pole installation and substation construction and/or modifications, has the potential to disturb cultural resources and TCPs. Construction could alter the integrity of location, design, setting, materials, workmanship, feeling, and/or association of cultural resources or TCPs and, on federal lands, access to TCPs. In areas not previously disturbed and where the potential for cultural resources or TCPs is considered high such as near large lakes and river crossings or areas having a good viewshed, resources or TCPs – both recorded and unrecorded - may be affected during construction or modifications of transmission structures, substations, or access roads. The viewshed for resources, especially historic buildings, or TCPs, also may be impacted through the intrusion of modern transmission structures. Archeological resources could be impacted by 1) subsurface excavations to install structures; 2) disturbance to surface soils by the operation of heavy construction equipment; and 3) disturbance to surface soils through site grading and preparation.

Impacts to cultural resources will be considered significant if they adversely affect historic properties - those cultural resources eligible for listing or included on the NRHP (36 CFR Part 60.4). If a cultural resource is identified as an historic property, the eligibility of the property is determined by evaluating whether it meets one or more of the NRHP criteria (36 CFR 800.4 (c)(1)). A cultural resource that meets one or more of the criteria is considered a historic property and is entitled to consideration afforded under Section 106 of the NHPA and its implementing regulations (36 CFR 800). Potential impacts to historic property are evaluated on an individual basis. Evaluation is in terms of the effect of project on the eligibility criteria (36 CFR Part 60.4) applicable to the resource.

It is possible that the vertical height of the proposed project may diminish the integrity of a historic property by altering its setting and feeling, when those aspects are applicable. New transmission lines will result in a change in the existing viewshed of a historic property or could be seen from that property. Mitigation for visual impacts is discussed in greater detail in Section 5.7, Visual Impacts.

5.8.3 Mitigation

- If necessary, develop a Memorandum of Agreement that will establish procedures to guide the identification and evaluation of historic properties, the assessment of adverse effects on them, and

the development of appropriate mitigation of any adverse effects for cultural resources within the Corridor/Route.

- Finish the Class III cultural resource inventory of the Project APE prior to construction and develop mitigation measures where required.
- Span and protect known archaeological sites within the Corridor/Route from disturbance during construction.
- Prevent construction workers from collecting or disturbing discovered cultural resources.
- Develop an Unanticipated Discovery Plan to provide guidance on how to proceed if a previously unknown archaeological or historic resource or human remains are encountered during construction or operation of the Project, including contact of the SHPO, participating tribes as appropriate, and designated representatives of Western, and RUS for further evaluation.

5.9 RECREATIONAL RESOURCES

5.9.1 Description of Resources

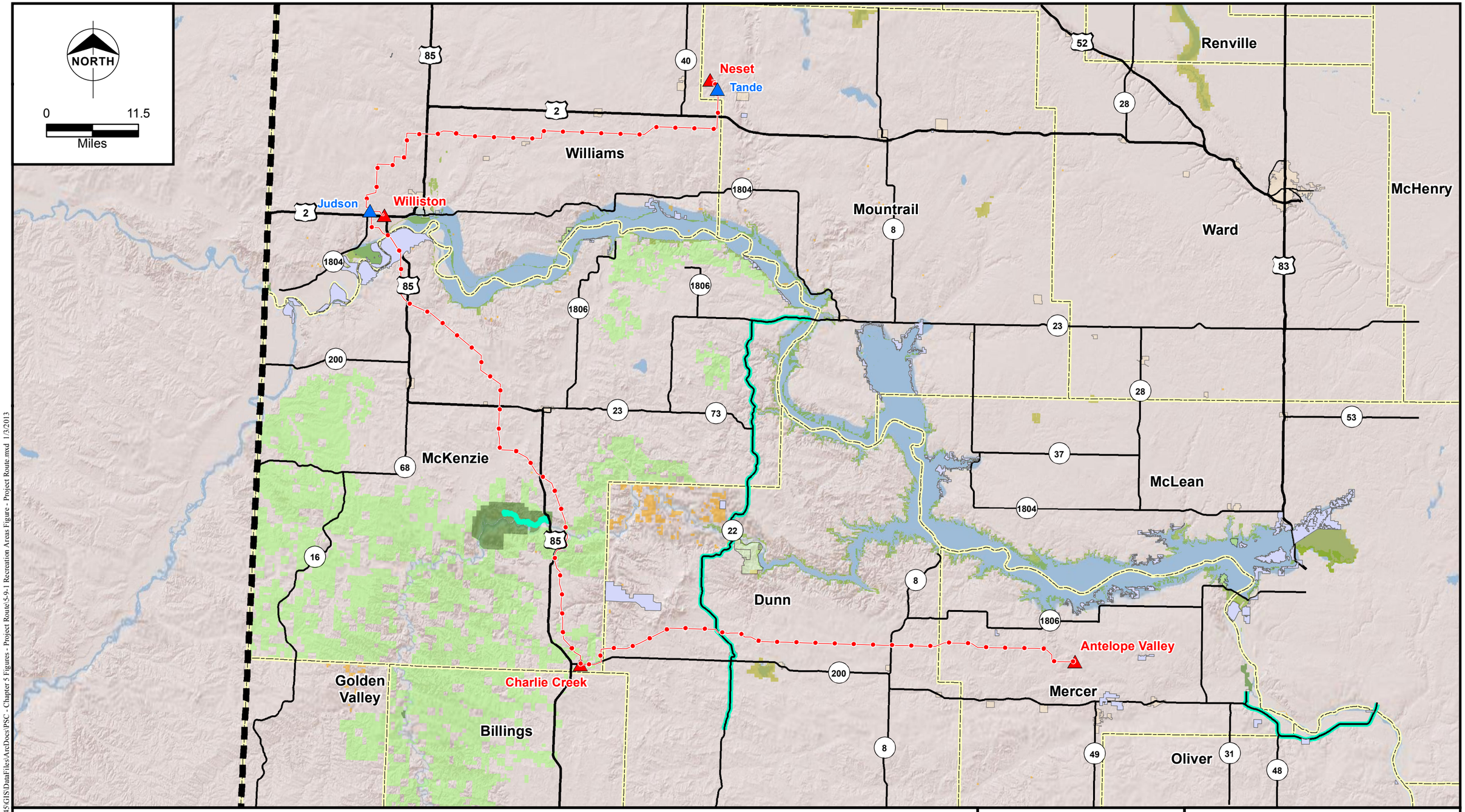
5.9.1.1 Regional Setting

The area consists of rolling prairies, agricultural lands, steep and rough terrain, lakes, rivers, and streams. Various outdoor recreational facilities and opportunities, such as hunting, fishing, hiking, and camping, are available throughout the Project area

5.9.1.2 Facilities

Lake Sakakawea. Lake Sakakawea is a large, man-made impoundment of the Missouri River located in West/central North Dakota. Lake Sakakawea's headwaters initially start as the Missouri River crosses U.S. Hwy 85 near Williston, ND. The counties bordering the north side of Lake Sakakawea from west to east are Williams, Mountrail, and McLean. The southern boundary of Lake Sakakawea from west to east is McKenzie, Dunn and Mercer Counties. Lake Sakakawea is the largest USACE reservoir in the United States. The USACE oversees the management of the public lands and water of Lake Sakakawea, which is 178 miles long with 1,884 miles of shoreline at normal pool elevation. Lake Sakakawea is 14 miles wide at its widest point, with a normal pool storage capacity of nearly 23,000,000 acre-feet of water (USACE 2011).

Lake Sakakawea and its surrounding public lands, predominately operated by the USACE, provide the public with fishing, boating, hunting, and camping opportunities. Thirty-five recreational areas are located around Lake Sakakawea to provide these outdoor recreational opportunities (see Figure 5.9-1). Many of these recreational areas offer campsites, water, restroom facilities, boat ramps, and electricity



LEGEND

- Project Route
- Existing Substation
- Proposed Substation
- State Boundary
- County Boundary
- Municipal Areas
- Wildlife Management Areas
- Scenic Byway
- State Park
- Army Corps of Engineers
- National Grassland
- National Park
- National Wildlife Refuge
- BLM Lands

Burns & McDonnell SINCE 1898

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

Figure 5.9-1
Basin Electric Power Cooperative
Antelope Valley Station to Neset
345-kV Transmission Project
Recreation Areas

Source: North Dakota GIS; Esri; Basin Electric; Burns & McDonnell.

Revised January 03, 2013

\\esprsrv\data\Projects\Basin\6149_AVS_345\GIS\DataFiles\ArcDocs\PSC - Chapter 5 Figures - Project Route\5-9-1 Recreation Areas Figure - Project Route.mxd 1/3/2013

hookups. The lake also provides irrigation, flood damage reduction, municipal and industrial water supply, and hydropower for the area. The proposed Project crosses the Missouri River at the upper portion of Lake Sakakawea near the town of Williston.

Little Missouri River. Similar outdoor recreational opportunities exist on and near the Little Missouri River, which passes through the Project area in McKenzie and Dunn counties and empties into Lake Sakakawea.

TRNP. The TRNP North Unit, managed by the NPS, is located in McKenzie County, south of Watford City and west of U.S. Highway 85. The North Unit of this national park encompasses roughly 24,000 acres of wilderness and provides numerous outdoor activities such as camping, canoeing, fishing, horseback riding, and hiking (NPS 2011). A variety of wildlife species occur within the park boundaries, making it a popular wildlife viewing area.

LMNG. Another area popular for outdoor recreation within the Project area is the LMNG, which is comprised of numerous blocks of natural grasslands in McKenzie County. These grasslands are administered by the USFS and consist of over one million acres of grassland, making it the largest grassland in the United States. These grasslands provide opportunities for hiking, hunting, wildlife viewing, camping, and horseback riding (USFS 2010). The LMNG's many tracts are broken up into smaller management planning units that are managed for a particular emphasis. These management planning areas can consist of very small to very large acreages, with each area containing specific guidelines and standards for that area. Each management area is assigned a rating from one of six categories, with a Category 1 rating being the most land-use restrictive and generally assigned to Wilderness areas and backcountry settings. Category 6 ratings are the least restrictive and are managed to meet a variety of ecological and human needs (USFS 2001).

Two sensitive LMNG management planning areas are located within the Project area. Long X Divide Area, which encompasses roughly 10,100 acres, is located immediately to the south of TRNP, and is listed as being suitable for a recommendation for Wilderness designation. Lone Butte Area consists of approximately 11,400 acres and is located immediately to the east of the Long X Divide Area, across U.S. Highway 85. This area is designated as a Roadless Area, meaning that vehicular traffic is prohibited within this area of the LMNG.

WMAs. Much of the hunting within the Project area is done on private tracts of land, although there are numerous WMAs occurring within North Dakota that provide opportunities for hunting and fishing on

public land. WMAs are managed by the North Dakota Game and Fish Department (NDGFD) and are generally managed for various types of hunting, fishing, and nature viewing. Lewis and Clark WMA is located approximately six miles southwest of the town of Williston in McKenzie County along the banks of the Missouri River and Lake Sakakawea. This WMA consists of 8,138 acres and is crossed by the Corridor/Route.

Private Lands Open to the Public. In addition to public WMAs, NDGFD manages many privately-owned tracts of land open to public hunting under the PLOTS (Private Land Open To Sportsmen) program. Several of these tracts of privately-owned land occur within the Project area, and serve as walk-in hunting areas for sportsmen (NDGFD 2011).

Other Facilities. Other recreational opportunities exist in and around the Project area. Many nearby communities offer recreational and cultural opportunities such as golfing, shopping, and dining. Additionally, many of these communities maintain city parks that provide outdoor recreational opportunities, and also maintain complexes to host leagues for team sports such as softball, baseball, football, and soccer.

5.9.1.3 Hunting and Fishing

Outdoor recreational opportunities such as hunting and fishing are very popular in the counties within the Project area and provide a substantial source of revenue for these counties. Prior to recent oil and gas development activities, hunting and fishing was a significant, if not primary, source of income for many residents within the Project area. Many out-of-state hunters and fishermen visit western North Dakota every year to take advantage of hunting and fishing seasons, and the communities within the Project area benefit financially from these sportsmen. According to the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation for North Dakota, there were 128,000 resident and nonresident hunters in North Dakota in 2006, and these hunters spent nearly $130,000,000 related to hunting (USFWS 2008).

Species such as deer, pronghorn, moose, and elk are found within the Project area and provide big game hunting opportunities. Hunting for various species of waterfowl is also popular for resident and non-resident hunters alike. Pheasant hunting is also very popular throughout the Project area, attracting numerous non-resident hunters and providing an additional source of revenue for many landowners during the pheasant hunting season each year.

Fishing is also a popular outdoor recreational opportunity within the Project area and provides revenue for the Project area and the State of North Dakota as well. In 2006, 106,000 resident and non-resident anglers spent nearly $94,000,000 on fishing within the State. Lake Sakakawea provides opportunities for

fishing for numerous species of game fish, such as northern pike, walleye, smallmouth bass, yellow perch, and lake trout (NDGFD 2010c). In Williams County, there are several small, public lakes available to anglers. Tioga Dam (82 acres) is located near Tioga, Kota-Ray Dam (26 acres) is located approximately seven miles south of Ray, and McLeod Lake (54 acres) and McCloud Lake (38 acres) are located on the outskirts of Ray. Epping Dam (128 acres) is located approximately 1.5 miles east of Springbrook, and Olson Fish Dam (29 acres) is located approximately three miles east of Epping. In McKenzie County, Sather Dam (37 acres) is located approximately 25 miles southwest of Watford City. The Missouri, Little Missouri, Knife, and Little Muddy rivers also provide opportunities for fishing, as do numerous smaller lakes, ponds, and streams located throughout the region. Several of the WMAs mentioned previously provide opportunities for fishing as well, as do many ponds and streams located on private lands throughout the Project area.

5.9.2 Impacts

As discussed above, the proposed Project area consists of rolling prairies, badland areas with steep and rough terrain, lakes, rivers, and streams. These areas provide various outdoor recreational activities such as hunting, fishing, hiking, and camping. State and Federally-owned lands including WMAs, USFS grasslands, school trust lands, and a national park are present within the proposed Project area, and offer a variety of recreational opportunities. Recreational opportunities generally found near or within municipal areas include parks, golf courses, and sports complexes. This section discusses potential impacts to these resources resulting from construction and operation of the proposed Project.

Direct impacts to recreational activities resulting from the construction and operation of the proposed Project are anticipated to be minor and primarily temporary. Potential impacts to recreation will occur from construction workers engaging in recreational activities and using recreational facilities as well as construction activities restricting recreational use or diminishing the recreational experience on lands along and adjacent to the proposed project. These impacts will include:

- Diminishment of scenic resources within and from recreational areas by the addition of man-made elements to the natural landscape
- Introduction of noise/air pollution to recreational areas
- Disturbance and inconvenience to individuals recreating on lands adjacent to the proposed project
- Loss of natural areas and game species habitat
- Restrictions on access to recreational lands and waters during construction
- Reduction in availability of water and woodland resources used for recreation
- Temporary increases in campground and RV park use

- Temporary increases in local hunting and fishing pressure
- Temporary increased use of outdoor recreational areas (i.e. state and national parks)

Additional use to recreational facilities such as golf courses, municipal parks, and other developed recreational facilities are expected to also be minor and temporary, and will result from the increase in worker population during construction of the transmission line. Although additional construction workers will be present, they will typically have limited available time for recreational activities, limiting the increases in use that could result to recreation in the area.

Also during project construction, lands within and adjacent to the Corridor/Route will be disturbed and restricted from use for safety and security reasons. To the extent that these areas are used for hunting and other outdoor recreational activities, they could be temporarily restricted. Such restrictions will occur on both public and private lands affected by the construction of the transmission line due to the operation of heavy equipment, removal of vegetation within the ROW, access requirements and other construction activity. These restrictions may also diminish the recreational experience to users in proximity to the line due to visual disturbance along the ROW, construction noise and activity, and access restrictions. Following completion of construction, these impacts will largely cease and lands within and adjacent to the ROW will again be available for recreational activities. There could be a greater demand for recreational use on other areas should previous uses of the lands within and along the Corridor/Route no longer be found attractive by some for recreational use. However, such increases in demand will be minor due to the generally low density of recreational users and abundance of recreational lands and opportunities in the area.

Implementation of the Project will have minor impacts on recreational activities. Impacts resulting from the construction of the Corridor/Route will include the potential clearing of trees and other vegetation within the transmission ROW, thus reducing suitable habitat for game species utilizing these areas, possibly causing these species to re-locate, and reducing opportunities for hunting these species in these areas. Direct impacts to fishing, boating, or other water-related activities are expected to be minimal and temporary, since construction and operation of the Project will not prevent access to lakes or rivers. The Corridor/Route will span the Missouri River near Williston. No structures will be placed in the river. The Corridor/Route will also cross the Little Missouri River to the east of TRNP. The Little Missouri is a designated State Scenic River and offers canoeing opportunities typically only during the brief snow melt periods over a 3 to 5 week period.

The Corridor/Route will cross approximately 325 acres of state or Federally-owned property, which includes USFS land as part of the LMNG. Permanent impacts to recreation within these lands will most likely be aesthetic in nature, since the construction of a transmission line will add a new, man-made element into a natural area that already contains existing man-made elements such as transmission and distribution lines, oil and gas facilities, and roads. Temporary impacts such as increased noise levels from construction, increased construction traffic, and land use restrictions for safety reasons during construction may occur within state- or Federally-owned recreational properties impacted by the transmission line. A USFS campground (Summit Campground), located adjacent to U.S. Highway 85 approximately 3.5 miles south of TRNP, may incur temporary impacts such as noise, traffic, dust, and access restrictions as the line is constructed in the vicinity of the campground. The Corridor/Route is aligned outside of the Lone Butte and Long X Divide Management Areas and immediately alongside and parallel to U.S. Highway 85 ROW (see Figure 5.2-2). Recreational impacts to this facility will be minimal due in part to the small number of camp sites (4-6) available at this location and the current activity associated with the Bakken development.

The Corridor/Route will cross USACE property along the Missouri River near Williston. This property is managed by the North Dakota Department of Game and Fish as the Lewis and Clark WMA. Of the 8,138 acres comprising the WMA, approximately 57.7 acres will be incorporated within the Corridor/Route. Impacts to recreation in this area are expected to be minimal since the Corridor/Route will be located adjacent to the existing U.S. Highway 85 in a utility corridor alongside the existing Western 230-kV transmission line, and a rural water pipeline resulting in generally limited current use of these lands for recreation. Further, it is anticipated that the construction through this area will be performed in the winter months to facilitate construction in floodplain and high groundwater areas. As such, the amount of conflict with recreational opportunities will be lessened.

Proposed Substations

Construction and operation of the proposed Judson and Tande substations are expected to result in minor impacts to recreation. Conversion of land for substations will convert it from agricultural to industrial use limiting further recreational use of the area. However, as the proposed substations are located in privately owned agricultural areas, recreation at these locations is likely limited. During construction, noise, ground disturbance, access restrictions, and human activity may impede hunting activities around the substation sites. However, following completion of construction, these disturbances will cease and as game species return to the area, hunting opportunities on these adjacent lands will return. Only the 12 acres developed for the substations will be lost for future recreational activity.

5.9.3 Mitigation

- Impacts on recreation will largely be associated with changes in viewsheds and general recreational experiences from the presence of the proposed transmission line. Mitigation measures for viewsheds are described under Aesthetics and Visual Resources.
- Recreation will also be impacted in the short term by noise and dust from construction activities, equipment, and vehicles; construction-related traffic; and the presence of construction crews. Mitigation measures for these impacts are described under Geology and Soils; Infrastructure and Transportation; and Noise.

5.10 SOILS AND FARMLANDS

5.10.1 Description of Resources

5.10.1.1 Soils

The dominant soil order in this area is Mollisols, which developed under grassland vegetation, and tends to be classified as prime farmland. The soils in the area have a soil temperature regime reflecting their northern location, a soil moisture regime reflecting a moist climate, and mixed mineralogy (USDA-NRCS, 2006). They generally are very deep, well drained to very poorly drained, and loamy with mixed or smectitic mineralogy.

The soils in the Project area are comprised of three main groups based on their geological history: loess (wind-blown sediment derived from finely ground rocks associated with glaciers) which lies on the ridge-tops, residual material that formed in glacial plains and moraines, and alluvial material that lies in stream terraces and glacial outwash plains. Some soil types in the Project area are hydric, meaning that they contain standing water or are saturated most of the year; the hydric soils are associated with swales/potholes, floodplains, and outwashes. However, these soil types also contain drier areas and are extensively used for agriculture. Table 5.10-1 shows the soil orders and soil series found within the Project area, by county.

Table 5.10-1: Soil Orders and Series within the Project Area

County	Williams	Mountrail	McKenzie	Mercer	Dunn
Soil Order	Mollisols, Entisols, Aridisols, Vertisols, Inceptisols	Mollisols, Entisols, Aridisols, Vertisols, Inceptisols	Mollisols, Entisols, Aridisols, Vertisols, Inceptisols	Mollisols, Entisols, Aridisols, Vertisols, Inceptisols	Mollisols, Entisols, Aridisols, Vertisols, Inceptisols
Soil Series	Williams, Bowbells, Zahl, Sansarc, Opal, bullock, Cabba, Amor, Flasher, Vebar, Temvik, Mandan, Cherry, Chama, Lallie, McKeen	Williams, Bowbells, Zahl, Sansarc, Opal, bullock, Cabba, Amor, Flasher, Vebar, Temvik, Mandan, Cherry, Chama, Lallie, McKeen	Sansarc, Opal, Bullock, Cabba, Amor, Flasher, Vebar, Temvik, Mandan, Cherry, Chama, Zahl, Lallie, McKeen, Williams, Rhoades, Belfield, Reeder, Regent, Parshall, Glova	Sansarc, Opal, Bullock, Cabba, Amor, Flasher, Vebar, Temvik, Mandan, Cherry, Chama, Zahl, Lallie, McKeen, Williams, Rhoades, Belfield, Reeder, Regent, Parshall, Glova	Sansarc, Opal, Bullock, Cabba, Amor, Flasher, Vebar, Temvik, Mandan, Cherry, Chama, Zahl, Lallie, McKeen, Williams, Rhoades, Belfield, Reeder, Regent, Parshall, Glova

Source: Bryce et al. 1998

More than one-half of the area supports native grasses and shrubs that are grazed. About one-third of the area is used for dry-farmed small grains such as wheat, barley, oats, rye, and flax. There are some localized areas of irrigation for crop production in the northern portions of the Project area with the pre-dominate locations on the bottomland along the Missouri River. Major soil resource concerns are wind erosion, water erosion, maintenance of the content of organic matter and productivity of the soils, and management of soil moisture. Conservation practices on cropland generally include systems of crop residue management, especially no-till or other conservation tillage systems that conserve moisture and contribute to soil quality. Other practices include terraces, vegetative wind barriers, grass waterways, and nutrient management, and wind strip cropping (Brady 1996).

5.10.1.2 Farmland

Based on the 2007 Census of Agriculture, 89.8 percent (39,674,586 acres) of the total land area in the State of North Dakota is farmland, with an average farm size of 1,241 acres (USDA, 2009b). North Dakota ranked 18th in the U.S. in total value of agricultural products sold ($6.1 billion), with crop sales accounting for 83 percent and livestock sales accounting for 17 percent. The top crops in terms of acreage in the state include wheat (8,428,462 acres), soybeans (3,073,981 acres), forage (2,525,213 acres), and corn (2,348,171 acres). The top livestock items in terms of inventory in the state include cattle and calves (1.8 million), turkeys (444,274), colonies of bees (390,421), hogs and pigs (181,679), and

layers (109,344). Land enrolled in the Conservation Reserve Program (CRP), including the Wetlands Reserve Program, Farmable Wetlands Program, and Conservation Reserve Enhancement Program, in North Dakota totaled 3,434,036 acres in 2007, or 8.7 percent of farmland in the state.

Compared to the state as a whole, the Project counties have either a similar or slightly lower percentage of land in farms, with McKenzie County having the lowest percentage (Table 5.10-2). Average farm sizes in the Project counties were larger than the state average in all counties except Mercer County. In terms of the total value of agricultural products sold, Williams County had the highest value and Mercer County had the lowest value. In the state as a whole, crop sales comprised a majority of the total value of agricultural products sold, as was also the case for all but one of the Project counties, in which livestock sales comprised the majority. Williams County had the highest percentage of crop sales, while Dunn County had the highest percentage of livestock sales.

Table 5.10-2: Characteristics of Agriculture in Project Area Counties

	Dunn	McKenzie	Mercer	Mountrail	Williams
Land area in farms (percentage of total land area in county)	1,043,932 acres (81.2%)	1,074,656 acres (60.8%)	509,552 acres (76.3%)	1,036,572 acres (88.7%)	1,144,868 acres (86.1%)
Average farm size	1,854 acres	1,937 acres	1,120 acres	1,573 acres	1,336 acres
Total value of agricultural products sold (crop sales / livestock sales)	$68,712,000 (46% / 54%)	$78,120,000 (64% / 36%)	$40,068,000 (61% / 39%)	$108,002,000 (86% / 14%)	$127,333,000 (91% / 9%)
Top crops in terms of acreage	wheat (135,485) forage (128,388) barley (13,005) corn (8,891)	wheat (175,989) forage (83,135) barley (20,540) peas (16,844)	wheat (81,964) forage (68,287) barley (14,612) canola (7,003)	wheat (291,590) forage (60,393) peas (56,409) canola (55,224)	wheat (379,685) peas (52,527) lentils (52,401) forage (47,181)
Land enrolled in CRP (percentage of farmland in county)	17,774 acres (1.7%)	21,359 acres (2.0%)	19,021 acres (3.7%)	57,898 acres (5.6%)	58,255 acres (5.1%)

Source: USDA, 2009b

Wheat was the top crop in terms of acreage in all the Project counties as well as in the state as a whole. Forage, peas, and barley were also top crops in several of the Project counties. The top livestock inventory item included cattle in calves in all Project counties and the state. The Project counties differed from the state in that horses and ponies were a top livestock inventory item in the Project counties but not in the state as a whole. The Project counties all had lower percentages of farmland enrolled in CRP as compared to the state.

5.10.1.3 Prime Farmland

Prime farmland, as defined by the USDA, is land that has been determined to have the best combination of physical and chemical properties for agricultural production and is available for farming (USDA-NRCS, 2011e). In addition to prime farmland, land may be classified as prime farmland if drained, prime farmland if irrigated, or farmland of statewide importance, as determined by the state.

In Williams County, three soils are classified as prime farmland, eight soils are prime farmland if drained, and 23 soils are classified as farmland of statewide importance. In Mercer County, 17 soils are listed as prime farmland, two soils are prime farmland if drained, and 41 soils are classified as farmland of statewide importance. In McKenzie County, one soil is classified as prime farmland, one soil is prime farmland if drained, and 65 soils are classified as farmland of statewide importance. In Dunn County, eight soils are classified as prime farmland, one soil is prime farmland if drained, and 57 soils are classified as farmland of statewide importance. In Mountrail County, two soils are classified as prime farmland, three soils are prime farmland if drained, and two soils are classified as farmland of statewide importance.

Dunn County contains 376,903 acres of prime and important farmland, McKenzie County contains 306,703 acres of prime and important farmland, Mercer County contains 274,047 acres of prime and important farmland, Mountrail County contains 46,122 acres of prime and important farmland, and Williams County contains 770,521 acres of prime and important farmland. Table 5.10-3 shows a breakdown of the total important farmland acres by classification, by county. Figure 5.10-1 visually illustrates important farmland soils found within the Project area.

Table 5.10-3: Prime and Important Farmland by County

County	Farmland Classification	Acres
Dunn	All areas are prime farmland	54,170
Dunn	Farmland of statewide importance	322,261
Dunn	Prime farmland if drained	472
	Dunn County Total	376,903
McKenzie	All areas are prime farmland	1,763
McKenzie	Farmland of statewide importance	304,244
McKenzie	Prime farmland if drained	697
	McKenzie County Total	306,704
Mercer	All areas are prime farmland	69,919
Mercer	Farmland of statewide importance	202,752
Mercer	Prime farmland if drained	1375
	Mercer County Total	274,046
Mountrail	All areas are prime farmland	10,221
Mountrail	Farmland of statewide importance	5,445
Mountrail	Prime farmland if drained	30,456
Mountrail County Total		46,122
Williams	All areas are prime farmland	24,040
Williams	Farmland of statewide importance	667,991
Williams	Prime farmland if drained	10,448
Williams	Prime farmland if irrigated	68,043
	Williams County Total	770,522

NORTH

0 11.5

Miles

Neset

Tande

Judson

Williston

Antelope Valley

Charlie Creek

Williams

Mountrail

Renville

McHenry

Ward

McKenzie

Dunn

McLean

Mercer

Oliver

Golden Valley

Billings

CANADA

Montana

North Dakota

South Dakota

LEGEND

- Project Route
- Existing Substation
- Proposed Substation
- State Boundary
- County Boundary
- Prime Farmland
- Farmland of Statewide Importance
- Prime Farmland if Drained
- Prime Farmland if Irrigated

Burns & McDonnell SINCE 1898

BASIN ELECTRIC POWER COOPERATIVE

A Touchstone Energy® Cooperative

Figure 5-13
Basin Electric Power Cooperative
Antelope Valley Station to Neset
345-kV Transmission Project
Prime and Important Farmland

Source: North Dakota GIS; Esri; Basin Electric; Burns & McDonnell.

Revised January 03, 2013

\\esjsrv\data\Projects\Basin\61495_AVS_345\GIS\DataFiles\ArcDocs\PSC - Chapter 5 Figures - Project Route\5-10-1 Prime and Important Farmland - Project Route.mxd 1/3/2013

5.10.2 Impacts

Most of the soils within the proposed Project area were developed under grassland vegetation, and many are classified as prime farmland. Agricultural activities are common throughout the proposed Project area, and soil resource concerns include wind and water erosion. This section discusses potential impacts to these resources resulting from construction and operation of the proposed Project.

Potential effects on soils and farmlands from the proposed Project will include:

- Soil movement and displacement
- Soil erosion and compaction
- Loss of farmland due to structure placement
- Interference with agricultural activities
- Prime farmland taken out of production

5.10.2.1 Soils

Construction activities along the Corridor/Route and at the substation locations will cause disturbance to soils. Potential impacts include soil erosion, soil compaction and rutting, and the introduction of noxious weeds on the soil surface. Construction activities such as vegetation clearing, excavating, grading, topsoil segregation and back-filling may also increase erosion potential by destabilizing the soil surface. Soil compaction and rutting can result from the movement of heavy construction vehicles along the Corridor/Route. The degree of compaction and rutting will depend on the moisture content and texture of the soil. These impacts will be short-term in nature and minimized as much as possible.

For the transmission structures, construction activities will be confined to the ROW and around structure locations. Any topsoil removed during any required leveling of structure sites will be stockpiled nearby and replaced following construction. Disturbed ground will be re-graded to as close to pre-construction condition as appropriate for stabilization and revegetated or approved for tillage depending on pre-construction land use.

The construction laydown areas required for the proposed Project will likely be located at previously-disturbed or developed locations, such as vacant lots or agricultural lands, where feasible. Construction materials will be placed on pallets or cribbing within the designated laydown areas. No topsoil will be removed and no re-grading is expected to take place. Laydown areas will be returned to pre-construction condition upon completion of the Project.

Stormwater runoff and erosion control best management practices (BMPs) will be developed for the proposed Project under National Pollutant Discharge Elimination System (NPDES) stormwater pollution prevention plan (SWPPP) permit requirements for construction activities. Typical BMPs that will be part of a SWPPP include, but are not limited to, silt fencing, dust control measures, check dams, erosion control blankets, and seeding of exposed soil surfaces to minimize the potential for wind and water erosion.

Approximately 3,589.8 total acres of surface soil will be incorporated into the Corridor/Route, although the acreage that will actually be disturbed will be far less. Permanent impacts to soils will include the disturbance of approximately 1.03 acres of soil where the approximately 1,161 transmission structures will be placed. Up to as much as approximately 113.8 acres of woodland occur within the Corridor/Route, and the clearing of trees will disturb the soil within these acres and expose it to erosional forces. Some of the Corridor/Route will also likely be located along areas of steeper slopes, and will incorporate approximately 19.5 acres of land that has experienced landslides in the past, making these areas especially susceptible to soil erosion. The development of access roads during construction will potentially disturb areas of soil as well, although these areas are anticipated to be minimal since most access to the ROW will occur at locations where the ROW crosses existing roads and by utilizing the ROW itself for access along the line.

5.10.2.2 Farmland

Construction and operation of the proposed Project will result in both temporary and long-term impacts to agricultural land. During construction, potential temporary impacts within the Corridor/Route will include crop damages (depending on the time of year for construction across specific fields), soil disturbance, and potential loss of production for one growing season as a result of construction activities and the transport of construction equipment and vehicles restricting or preventing planting of lands within or adjacent to the ROW.

Long-term, direct loss of agricultural land will occur as a result of transmission line structure placement. After construction is complete, however, landowners will be able to resume farming activities around the transmission line structures. Basin Electric has a policy of allowing agricultural practices within its ROW as long as they do not interfere with, or jeopardize, the operation of its lines. Indirect impacts to agriculture as a result of the proposed Project will include interference with certain agricultural activities, such as interference with the movement of machinery and equipment, obstacles for aerial spraying, or interference with the movement of cattle or other livestock for grazing. At the proposed Judson and Tande substation sites, agricultural land will be permanently converted to utility use.

Approximately 1,392.2 acres of cultivated cropland will be incorporated into the Corridor/Route. It is likely that impacts will not occur across the entire 1,392.2 acres, with most impacts being temporary and occurring during construction. Permanent impacts, requiring the removal of cropland from production, will occur only at the structure locations. The remaining acreage within the ROW will be allowed to return to cropland upon completion of construction. Approximately 1,829 combined acres of grassland, pasture, or hayland occur within the Corridor/Route, and construction activities will have a temporary impact on cattle grazing activities. Cattle may need to be moved temporarily during construction in areas where the ROW will cross grass, pasture or hayland. Additionally, cattle will need to be restricted from grazing within the ROW upon completion of construction until the re-establishment of grass within the ROW was complete.

At the proposed Judson and Tande substation sites, any agricultural land within the approximately 12 acres at each site will be permanently converted to utility use.

5.10.2.3 Prime Farmland

The construction activities associated with the proposed Project will potentially have short-term effects on prime farmland soils depending upon the time of year that construction takes place. Portions of these soils within the Corridor/Route will be temporarily lost to production for one growing season due to the nature of the construction activity and the ingress and egress of construction equipment and vehicles. However, after construction is complete, these soils will be returned to production. Prime and important farmland soils will only be permanently lost to agricultural practices as a result of transmission line structures being placed within the ROW.

The Corridor/Route will traverse areas containing prime or other important farmland soils. Approximately 2.3 percent of the Corridor/Route consists of prime farmland, 37.8 percent is farmland of statewide importance, and 1.6 percent is prime farmland if drained or irrigated (Table 5.10-4). However, only a minimal amount of prime farmland will be taken out of production permanently due to transmission line structures being placed within the ROW (approximately 1.03 acres). Alternatively, areas cleared within the ROW on prime farmland could be converted to agricultural use. The reduction in prime farmland availability will represent a small fraction of one percent of the nearly 1.8 million total prime farmland acres within Williams, Mountrail, Mercer, McKenzie, and Dunn counties. Based on this, it is expected that alternatives will not need to be considered under the Farmland Protection Policy Act. However, the Farmland Conversion Impact Rating for Corridor Type Projects documentation (Form NRCS-CPA-106) will be completed and coordinated with the NRCS.

Table 5.10-4: Acres of Prime Farmland within Corridor/Route

Farmland Classification	Corridor/Route
Not prime farmland (acres)	2,091.9
All areas are prime farmland (acres)	82.7
Farmland of statewide importance (acres)	1,356.1
Prime farmland if drained (acres)	5.8
Prime farmland if irrigated (acres)	53.3
Total (acres)	**3,589.8**

For construction of the proposed Judson and Tande substations, approximately 12 acres of prime farmland at each location will be permanently taken out of production.

5.10.3 Mitigation

Soils:

- Confine construction activities to the Corridor/Route and around structure locations for placement of the transmission structures.
- Stockpile any topsoil removed during any required leveling of structure sites nearby and replace it following construction.
- Re-grade disturbed ground to as close to pre-construction condition as appropriate for stabilization and revegetated or approved for tillage depending on pre- construction land use.
- Locate the construction laydown areas required for the proposed Project at previously-disturbed or developed locations, such as vacant lots or agricultural lands, where feasible.
- Place construction materials on pallets or cribbing within the designated laydown areas.
- Return laydown areas to pre-construction condition upon completion of the project.

Farmland:

- Compensate landowners for any crop damage that may occur as a result of construction and operation of the proposed project.
- Redress any compaction or other construction-related issues that could affect soil productivity and agricultural operations.

5.11 GEOLOGY AND LANDFORMS

5.11.1 Description of Resources

5.11.1.1 Regional Setting

The Project area lies within the Northwestern Glaciated Plains and Northwestern Great Plains ecoregions within the Great Plains Province (Bryce et al. 1998). The Northwestern Glaciated Plains encompasses the westernmost extent of continental glaciation, with high concentrations of wetlands. The Northwestern Great Plains encompasses the Missouri Plateau section of the Great Plains, and is a semi-arid region with rolling plains, buttes, and badlands.

The Northwestern Glaciated Plains and Northwestern Great Plains are further divided into smaller ecoregions with specific geologic, topographic, or soil features. The Project area contains four of these unique ecoregions, and these are discussed further in the General Geology section. The Project area is also located in the Union Formation and the Fox Hill and Hell Creek units that are underlain by calcareous shales, siltstones, and sandstones which are nearly all covered in glacial till plains. Kettle holes, kames, moraines, and small glacial lakes occur within the Project area as well. Alluvial deposits lie along the Missouri River.

5.11.1.2 Terrain

A majority of the Project area is unglaciated, but the eastern and northern edges have been glaciated. The area is on an old, moderately dissected, rolling plain with badlands, buttes, and isolated hills. Terraces are adjacent to broad flood plains along most of the major drainages. Elevation is 1,650 feet in the east with a gradual slope to about 3,600 feet in the west. Maximum local relief is about 330 feet, but relief is considerably lower in most of the area (USDA-NRCS 2011d).

5.11.1.3 General Geology

North of Lake Sakakawea the Project area contains the Glaciated Dark Brown Prairie along with the River Breaks adjacent to Lake Sakakawea (Figure 5.11-1). The Glaciated Dark Brown Prairie consists primarily of glacial till over Tertiary sandstone and shale (Bryce et al. 1998). The River Breaks, located adjacent to Lake Sakakawea, the Missouri River, and its tributaries, contain broken terraces and uplands with dissected topography. These areas are unglaciated and consist of Tertiary sandstone and shale.

NORTH

0 11.5

Miles

Neset

Tande

Judson

Williston

Antelope Valley

Charlie Creek

Glaciated Dark Brown Prairie

Northern Dark Brown Prairie

Northern Missouri Coteau

Northern Black Prairie

Glacial Lake Deltas

Glacial Lake Basins

Renville

McHenry

Ward

Drift Plains

Collapsed Glacial Outwash

Williams

River Breaks

Mountrail

McKenzie

Missouri Plateau

Missouri Coteau

McLean

Collapsed Glacial Outwash

Dunn

Little Missouri Badlands

Golden Valley

Billings

Missouri Plateau

Mercer

Oliver

River Breaks

River Breaks

CANADA

Montana

North Dakota

South Dakota

LEGEND

- Project Route
- Existing Substation
- Proposed Substation
- State Boundary
- County Boundary
- MissouriRiver/Lake Sakakawea

Burns & McDonnell SINCE 1898

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

Figure 5.11-1
Basin Electric Power Cooperative
Antelope Valley Station to Neset
345-kV Transmission Project
Ecoregions within the Study Area

Source: North Dakota GIS; Esri; Basin Electric; Burns & McDonnell.

Revised January 03, 2013

\\espsrv\data\Projects\Basin\61495_AVS_345\GIS\DataFiles\ArcDocs\PSC - Chapter 5 Figures - Project Route\5-11-1 Study Area Ecoregions - Project Route.mxd 1/3/2013

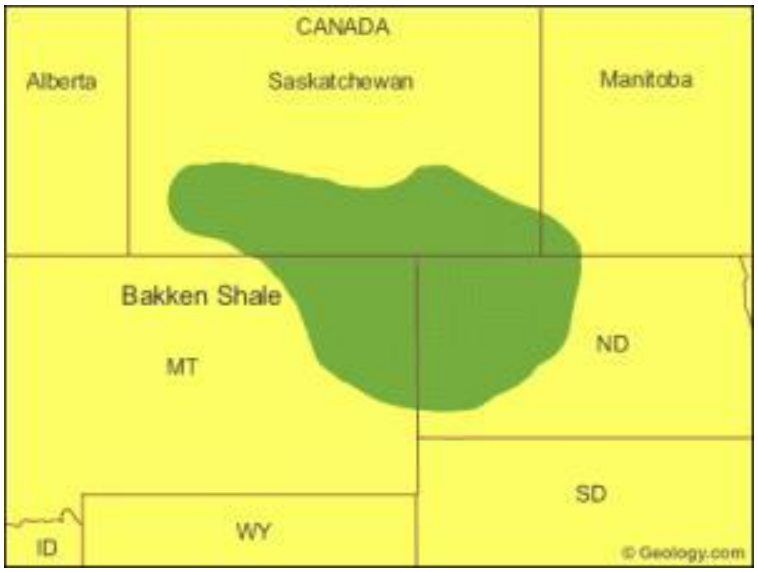
South of Lake Sakakawea, the Project area, not including the River Breaks, contains the Little Missouri Badlands and the Missouri Plateau (Figure 5.11-1). The Little Missouri Badlands are similar to the River Breaks, with highly-dissected topography prone to erosion. This area is also unglaciated, with Paleocene sediments of the Bullion Creek and Sentinel Butte Formations (Bryce et al. 1998). The Missouri Plateau is unglaciated and consists of Tertiary sandstone, shale, and coal.

5.11.1.4 Oil Shale

Oil and gas development activities have been occurring in the region since the 1950's. Early oil production consisted of deep vertical drilling and peaked in the late 1970's and early 1980's. Shortly thereafter, the region's oil and gas activity decreased dramatically. After a stagnant oil production period between 1990 and 2000, the region again experienced an increase in oil and gas production in the mid-2000s, as oil companies began to take advantage of newly-developed technology advances in drilling and extraction techniques. As a result, the region has seen rapid oil and gas development due to the implementation of horizontal hydraulic fracturing processes that are able to access a previously-untapped oil bearing feature of the Bakken Formation.

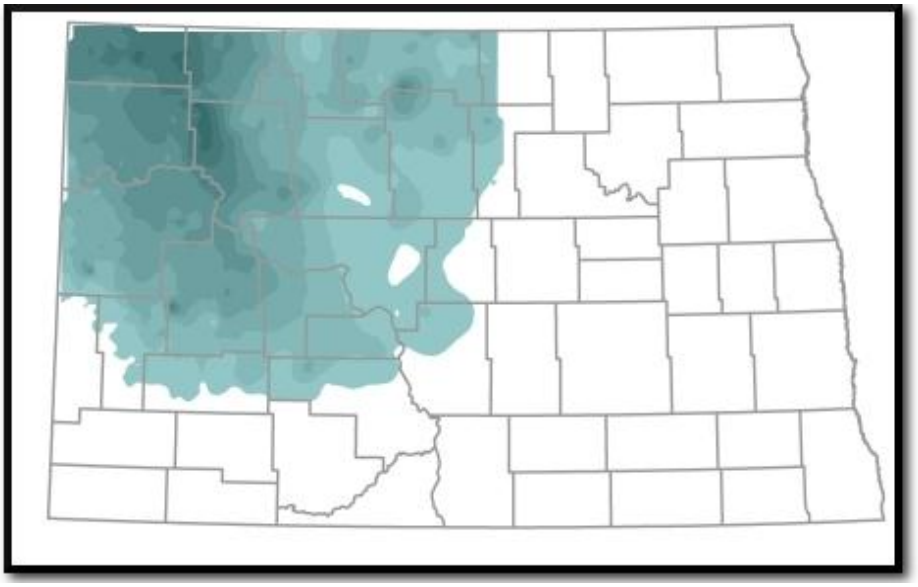
The Bakken Formation is a thin, widespread geologic formation consisting of oil-generating shale and sandstone layers that extends through portions of Montana, North Dakota, and the Canadian Provinces of Saskatchewan and Manitoba (USGS, 2008). Figure 5.11-2 depicts the extent of the Bakken Formation, and Figure 5.11-3 illustrates where the formation occurs within the State of North Dakota.

Figure 5.11-2: Bakken Shale Formation



(image source: www.geology.com)

Figure 5.11-3: Bakken Formation in North Dakota



(image source: http://www.ndoil.org/?id=74)

The formation consists of three members: (1) lower shale member, (2) middle sandstone member, and (3) upper shale member. Each succeeding member is of greater geographic extent than the underlying member. Both the upper and lower shale members are organic-rich marine shale of fairly consistent lithology; they are the petroleum source rocks and part of the continuous reservoir for hydrocarbons produced from the Bakken Formation (USGS 2008). The middle sandstone member varies in thickness, lithology, and petrophysical properties, and local development of matrix porosity enhances oil production in both continuous and conventional Bakken reservoirs.

According to the North Dakota Petroleum Council (2011), there are 17 oil-producing counties in North Dakota, all of which are located in the western third of the state. North Dakota currently is the 4th largest oil producing state in the U.S. Top-producing counties within North Dakota for 2010 were Mountrail, McKenzie, Dunn, and Williams, all of which are within the Project area. Oil production in North Dakota increased from 62.8 million barrels of oil in 2008 to 79.7 million barrels in 2009 and 113 million barrels in 2010 (NDPC, 2011). Production is expected to continue to increase in the region with an estimated 1,100 to 2,700 new wells expected per year and 26,000 new wells expected over the next 10 to 20 years (NDDMR, 2011). Additionally, 114 billion cubic feet of natural gas was produced in 2010 in North Dakota, with 80 billion cubic feet being processed within the state. Using a geology-based assessment methodology, the U.S. Geological Survey estimated mean undiscovered volumes of 3.65 billion barrels of oil, 1.85 trillion cubic feet of associated/dissolved natural gas, and 148 million barrels of natural gas liquids in the Bakken Formation of the Williston Basin Province within Montana and North Dakota.

5.11.1.5 Mineral Resources

Several mineral resources are mined within the Project area. Bedrock clays can be found from silty clay in the lower part of the Golden Valley Formation near Hebron. Lignite coals can be found mainly in the Tertiary, Bullion Creek and Sentinel Butte Formations within the Project area in western North Dakota.

Salts in the Project area consist of three main types of deposits within the Williston Basin of North Dakota: halite, potash, and Glauber salt or mirabolite. Halite (sodium chloride or table salt) and potash occur in thick deposits in the deep subsurface in the western part of the basin, while Glauber salt occurs at or within 70 feet of the surface throughout North Dakota.

Sand and gravel deposits, which are formed from glacial deposits, contain sand and gravel as either outwash or as isolated lenses of sand and gravel within till. Beach ridges and deltas that formed along glacial lakes Agassiz and Souris are also important sources of sand and gravel. Pliocene to Holocene-age sand and gravel deposits also occur as terrace deposits, and less commonly as pediments, in the western part of the state. Sand and gravel is the third largest mineral industry found within the Project area, trailing only oil and gas and lignite (NDGS 2011).

The largest single deposit of lignite known in the world is found in western North Dakota within the Project area, at an estimated 351 billion tons. North Dakota also contains an estimated 25 billion tons of economically mineable coal found within the lower Fort Union Group in western and central North Dakota. Mining within the Project area dates back to the late 1800's, and by 1920 there were approximately 250 mines operating within North Dakota. These mines consisted of underground mines and surface strip mines. Eventually, surface strip mining became more profitable, and the last underground mine closed in 1966. Currently, there are six operations that mine approximately 32 million tons of coal annually within western North Dakota. Four of these operations mine coal to feed electric generating plants in North Dakota, and two operations mine lignite that is used in soil stabilization and as drilling fluid additive (NDGS 2011). Figure 5.11-4 Illustrates oil fields and coal deposits present within the Project area.

5.11.1.6 Landslides

The North Dakota Geologic Survey (2011) has identified landslide areas within the Project area. These areas have experienced landslides in the past, or may be subject to landslide activity due to geologic shifting or unstable soils. Within the Project area, landslide-prone areas are primarily confined to the badland areas and river breaks areas surrounding the Missouri River and Little Missouri River. These areas exhibit steep terrain and exposed soils, which contribute to landslide activity (Figure 5.11-5).

NORTH

0 11.5

Miles

Neset

Tande

Judson

Williston

Charlie Creek

Antelope Valley

Williams

Mountrail

Renville

Ward

McHenry

McKenzie

Dunn

McLean

Mercer

Oliver

Golden Valley

Billings

85 40 2 52 28 1804 8 83 1806 23 200 73 53 37 68 16 22 49 31 48

CANADA

Montana

North Dakota

South Dakota

LEGEND

- Project Route
- Existing Substation
- Proposed Substation
- Coal Fields
- State Boundary
- OilFields
- County Boundary

Burns & McDonnell SINCE 1898

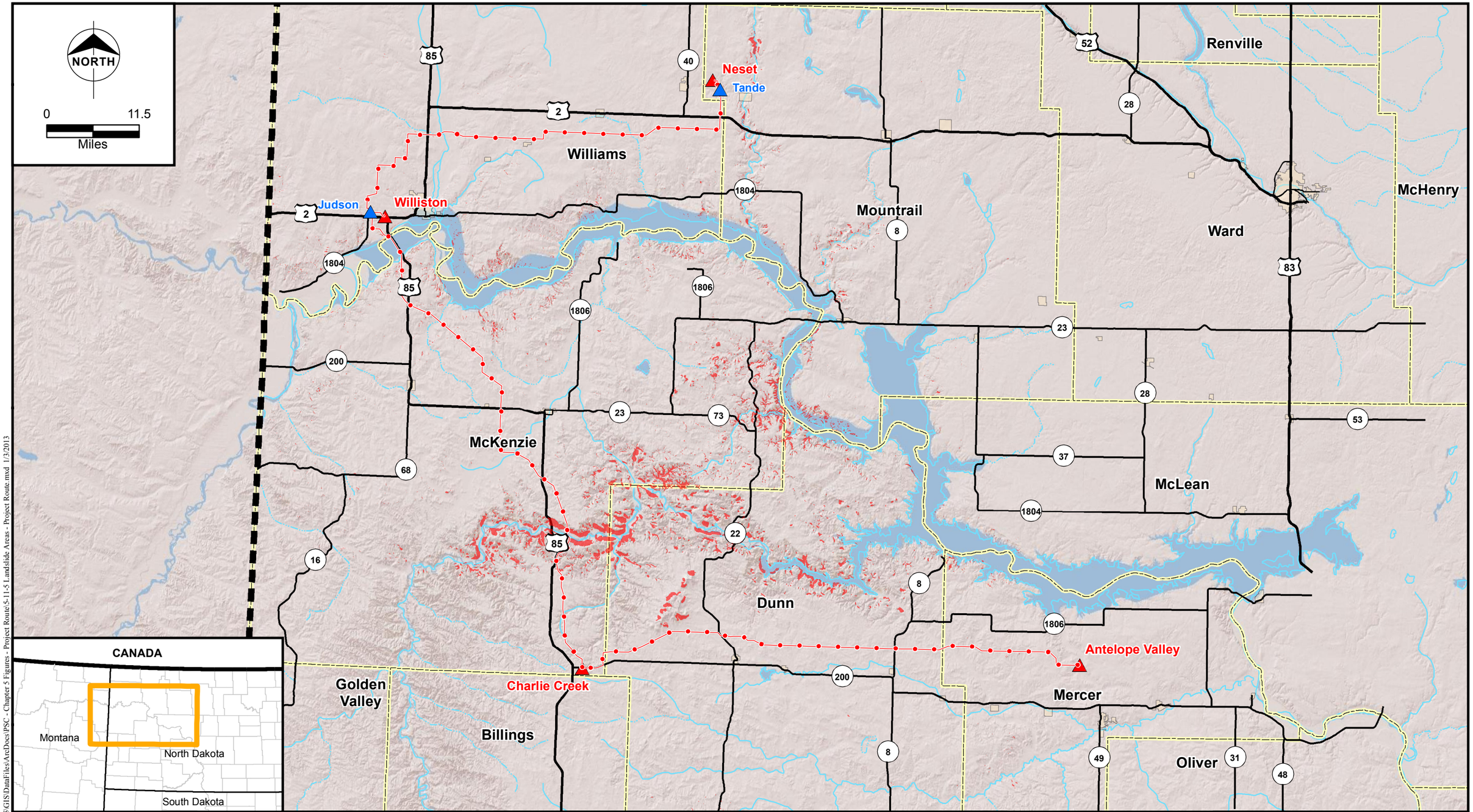
BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

Figure 5.11-4
Basin Electric Power Cooperative
Antelope Valley Station to Neset
345-kV Transmission Project
Oilfields and Coal Deposits

Source: North Dakota GIS; Esri; Basin Electric; Burns & McDonnell.

Revised January 03, 2013

\\esprsrv\data\Projects\Basin\61495_AVS_345\GIS\DataFiles\ArcDocs\PSC - Chapter 5 Figures - Project Route\5-11-4 Oilfields and Coal Deposits Figure - Project Route.mxd 1/3/2013



LEGEND

- Project Route
- Existing Substation
- Proposed Substation
- State Boundary
- County Boundary
- Landslide Deposits

Burns & McDonnell SINCE 1898

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

Figure 5.11-5
Basin Electric Power Cooperative
Antelope Valley Station to Neset
345-kV Transmission Project
Landslide Areas

Source: North Dakota GIS; Esri; Basin Electric; Burns & McDonnell.

Revised January 03, 2013

\\espsrv\data\Projects\Basin\61495_AVS_345\GIS\DataFiles\ArcDocs\PSC - Chapter 5 Figures - Project Route\5.11-5 Landslide Areas - Project Route.mxd 1/3/2013

5.11.2 Impacts

Northwestern North Dakota's unique geology has resulted in rapid increases in activities associated with the extraction of oil from the Bakken shale. Oil and gas wells and associated equipment, as well as unique surface landforms within the proposed Project area, may present obstacles during the construction and operation of the proposed Project. This section discusses potential impacts to the geology and landforms within the region as a direct result of the construction and operation of the proposed Project.

As a general rule, Project construction will require little disturbance to surface soil and will neither be large enough or deep enough to have any type of effects to geologic formations throughout the region. Soil impacts will be limited to the sites for structure erection, with geologic impacts limited to minimal disturbance to subsurface rock during drilling and use of augers to prepare foundation holes. Potential impacts include:

- Disturbance to existing oil and gas activity in the area
- Displacement of soil and rock during construction activities
- Alteration of geologic features due to earth-moving activities during construction
- Increased likelihood of landslide caused by construction activities in areas of steep terrain and unstable soils
- Increased erosion potential

The overall impact of the Project on geology, geologic resources, and surface landforms within the proposed Project area will be minor. The Corridor/Route is located within 500 feet of 11 existing oil and gas wells along the length of the route, but it is probable that this number will increase due to the continuing development of oil and gas development activities in the area. However, it is anticipated that the Project will not directly affect any wells or drill rigs since the final design and placement of structures along the Corridor/Route will be designed to avoid these areas, span collector systems, and provide sufficient clearance for well maintenance and operation.

The Corridor/Route crosses an active lignite mining area. However, the Project will not affect any current lignite mining operations. Basin Electric coordinated with the mine operations in the Project area to identify active and future mining locations. The Corridor/Route will not cross any active mines, and it is not anticipated to impact future mining operations.

Direct impacts resulting from the construction of the Project will consist of the displacement of soil and rock during construction of structure foundations. Borings for structure foundations will extend approximately 25-30 feet below the surface and will be approximately eight feet in diameter, resulting in a maximum volume of displaced soil and rock of approximately 1500 cubic feet per structure location.

With approximately 1,161 structures used for the construction of the Corridor/Route, a total of approximately 1.74 million cubic feet of displaced soil and/or rock will be anticipated. This displaced soil and rock will be used for backfilling around structure foundations with excess material removed from the site to locations directed by landowner or disposed of at another location.

Overall, the Project will not affect the geology of the area. However, the various geologic characteristics of the area will need to be considered during construction to provide for a safe and reliable project. Erosion and the potential for landslides will be possible in select areas along the length of the Corridor/Route, primarily during the construction phase of the proposed Project until restoration of disturbed areas can be completed. Badland areas along the Corridor/Route consist of steep, sparsely-vegetated terrain with a greater likelihood of landslide occurrences than other, more gently-sloped areas along the route. The Corridor/Route will cross approximately 5,618.3 feet of terrain (19.5 acres within the Corridor/Route) where landslides have occurred previously (as mapped by the North Dakota Geological Survey). At one location, south of the Little Missouri River, the Corridor/Route was selected to avoid a residence that was not in a landslide area but this placed the route over landslide areas that occurred on either side of the residence. A majority of these areas will be spanned by the transmission line, with no structures being placed within susceptible landslide areas. The exact locations of the structures will be developed to avoid construction in the landslide areas based on additional geotechnical studies. Care will be taken to minimize disturbance in these areas both to reduce landslide potential and protect construction workers and equipment from slides and falls. In some specific areas, Basin Electric may use helicopter construction to minimize ground disturbance in badlands areas, particularly any grading or excavating that could be necessary to develop vehicle access to structure locations. Construction-related impacts along the Corridor/Route may also consist of erosion in badland areas where vegetation is removed within the ROW along steep slopes and rugged terrain. The Corridor/Route will cross approximately 5,238.8 feet of terrain with a slope greater than 10 percent (18.0 acres within the Corridor/Route). Increased erosion could lead to increased landslide potential in these areas.

Impacts to geologic features, resources, or surface landforms resulting from the construction and operation of the proposed Judson and Tande substations are anticipated to be negligible. Both the Judson and Tande substation sites are located primarily on terrain with little slope, and impacts to geological

resources related to construction and operation of these substations is not anticipated. Some surface grading and subsurface excavation and trenching will be necessary but will be relatively shallow and not expected to encounter significant bedrock.

5.11.3 Mitigation

- Conduct geotechnical assessments at structure locations to develop a process or approach to minimize the potential development of landslides in susceptible areas during construction.
- Span identified landslide areas with no structures being placed within susceptible landslide areas.
- Prepare a stormwater pollution prevention plan for construction activities prior to construction.

5.12 WATER RESOURCES

5.12.1 Description of Resources

5.12.1.1 Regional Setting

The Project area contains several major surface water and groundwater features. Surface waters located within and adjacent to the Project area include the Knife River, Spring Creek, Little Missouri River, Lake Sakakawea (Upper Missouri River), and Little Muddy River. Isolated wetlands, smaller creeks and tributaries, and unnamed intermittent and ephemeral streams also occur within the Project area. Groundwater within the Project area includes Paleozoic aquifers, lower and upper Cretaceous aquifers, lower Tertiary aquifers, and unconsolidated-deposit aquifers.

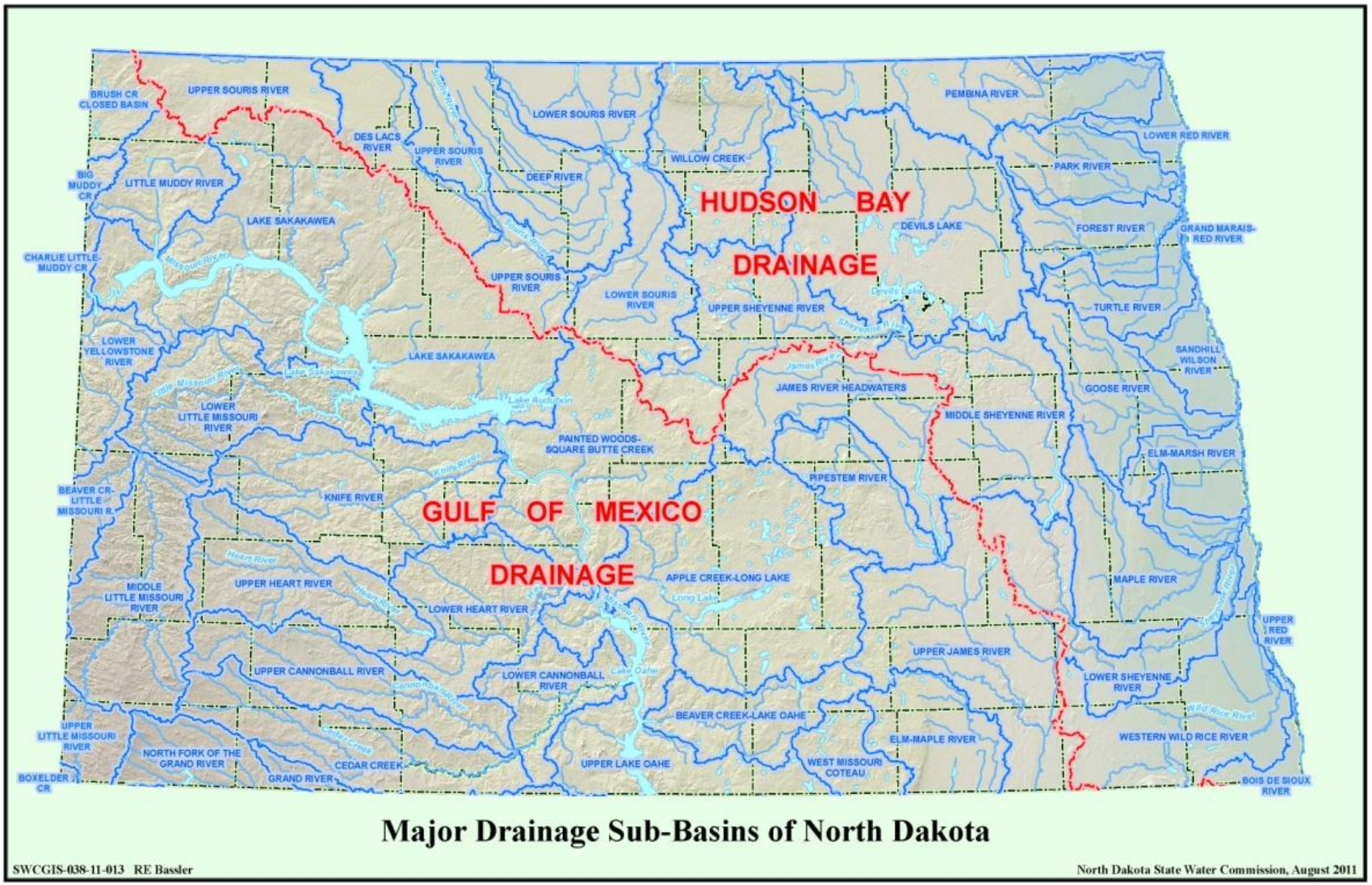
5.12.1.2 Surface Water

Lake Sakakawea is a major water feature in the area, and was formed by the construction of the Garrison Dam on the Missouri River near the community of Pick City. Lake Sakakawea spans all of the affected counties within the Project area, serving as the county boundary in many locations. Lake Sakakawea generally flows from northwest to southeast, and the Corridor/Route crosses the upper end of the lake southwest of the town of Williston. Major drainage sub-basins within the Project area are depicted in Figure 5.12-1, and are discussed in further detail below.

The Upper Missouri/Lake Sakakawea Basin drains the extreme northern portions of Mercer and Dunn counties within the Project area, the northern half of McKenzie County, and all of the portions of Williams and Mountrail counties included within the Project area.

The Knife River Basin drains a majority of Mercer County and the southern portion of Dunn County within the Project area. The Knife River flows generally from west to east and empties into the Missouri River below Lake Sakakawea. Spring Creek is a tributary of the Knife River, and it too travels in a

Figure 5.12-1: Major Drainage Sub-Basins within the Project Area



generally west to east direction before joining the Knife River near the town of Zap. Both the Knife River and Spring Creek are located just outside the Project area to the south.

The Little Missouri River Basin drains the central portion of Dunn County within the Project area, and also the southern portion of McKenzie County (USGS, 2009). The Little Missouri River also flows generally north to south and then turning easterly across the Project area. The Little Missouri River flows into Lake Sakakawea after passing through the Project area.The Little Muddy River flows from north to south through Williams County, and empties into Lake Sakakawea on the east side of Williston. The Corridor/Route crosses the Little Muddy River approximately 10 miles north of Williston.

As required under section 303(d) of the Federal Clean Water Act (CWA), the Environmental Protection Agency (EPA) has identified and created a list of impaired water bodies that require the development of Total Maximum Daily Limits (TMDLs). A TMDL is the amount of pollution a water body can receive and still maintain water quality standards established by the EPA. The main cause of impairment within the three river basins draining the Project area is fecal coliform, resulting mostly from livestock operations and grazing near riparian areas. Rivers and lakes within the Knife, Little Missouri, and Upper Missouri/Lake Sakakawea basins which are impaired include portions of the Knife River, Little Missouri River, and Lake Sakakawea (EPA, 2011).

5.12.1.3 Floodplains

Mercer, Dunn, Williams, and Mountrail Counties participate in the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program, which allows residents to purchase special insurance at subsidized rates. Flood data derived from FEMA Flood Insurance Rate Maps (FIRM) were used to identify areas within the Project area that are designated as 100-year floodplains. Within the counties affected by the proposed Project, designated 100-year floodplains are not mapped county-wide, but include those areas near communities or other populated areas (ND GIS 2011). FEMA floodplains identified within the Project area include several unnamed tributaries to Spring Creek, located approximately 10 miles west of the Antelope Valley Station in Mercer County, unnamed tributaries to Lake Sakakawea located approximately 10 miles north of the community of Zap in Mercer County, and portions of Spring Creek located approximately two miles northeast of the community of Killdeer in Dunn County. Identified floodplains also occur along the upper regions of Lake Sakakawea, approximately six miles southwest of the community of Williston in Williams and McKenzie counties. Additional floodplain areas not listed on FIRMs are likely present within the Project area. These areas include, but are not limited to, the Knife River, Little Missouri River, Little Muddy River, and associated tributaries.

5.12.1.4 Groundwater

Deep Paleozoic aquifers extend throughout the Project area, but generally contain highly-mineralized water due to their depth. Cretaceous aquifers are found throughout the Project area, and provide a valuable source of water for farms, ranches, and communities. Lower Tertiary aquifers are found closer to the surface, are composed primarily of sandstone and lignite, and also provide a source of water for various uses (Whitehead, 1996). Aquifers comprised of unconsolidated rocks are generally very productive, but are smaller and more scattered in nature throughout the Project area, occurring primarily around river valleys and lakes. Figure 5.12-2 shows the distribution of bedrock formations and associated aquifers within North Dakota. These formations and associated aquifers are discussed at length in the following section.

5.12.1.5 Hydrogeology

5.12.1.5.1 Formations - General

Although Figure 5.12-2 shows where the various formations occur (crop out or sub crop) at land surface, one needs to examine the geologic section in order to visualize their occurrence beneath the land surface. A large number of individual bedrock formations have been formally identified and described in North Dakota, but for the purpose of defining bedrock aquifers these formations can be grouped into four major units, which are labeled A-D in descending order. The relationship of the bedrock formations to the aquifer units is given in Table 5.12-1.

Table 5.12-1: Relationship of Bedrock Formations to Aquifer Units

Bedrock Formations		Thickness (feet)	Aquifer Units
Rocks of Tertiary Age	White River Group Golden Valley Formation Fort Union Formation	250 300 2,300	A
Rocks of Cretaceous Age	Hell Creek Formation Fox Hills Sandstone Undifferentiated rocks Dakota Sandstone	600 400 3,000 400	B C
Rocks of Jurassic Age		1,000	
Rocks of Triassic Age		600	
Rocks of Paleozoic Age		7,000	D

Unit A, the uppermost unit, includes a series of aquifers composed of sandstone and lignite beds that occur mainly in the Fort Union Formation in the western one-half of the State. Generally these aquifers are quite variable in horizontal extent and thickness. Consequently, the aquifers in unit A are less reliable

Figure 5.12-2: Bedrock Formations and Associated Aquifers within North Dakota

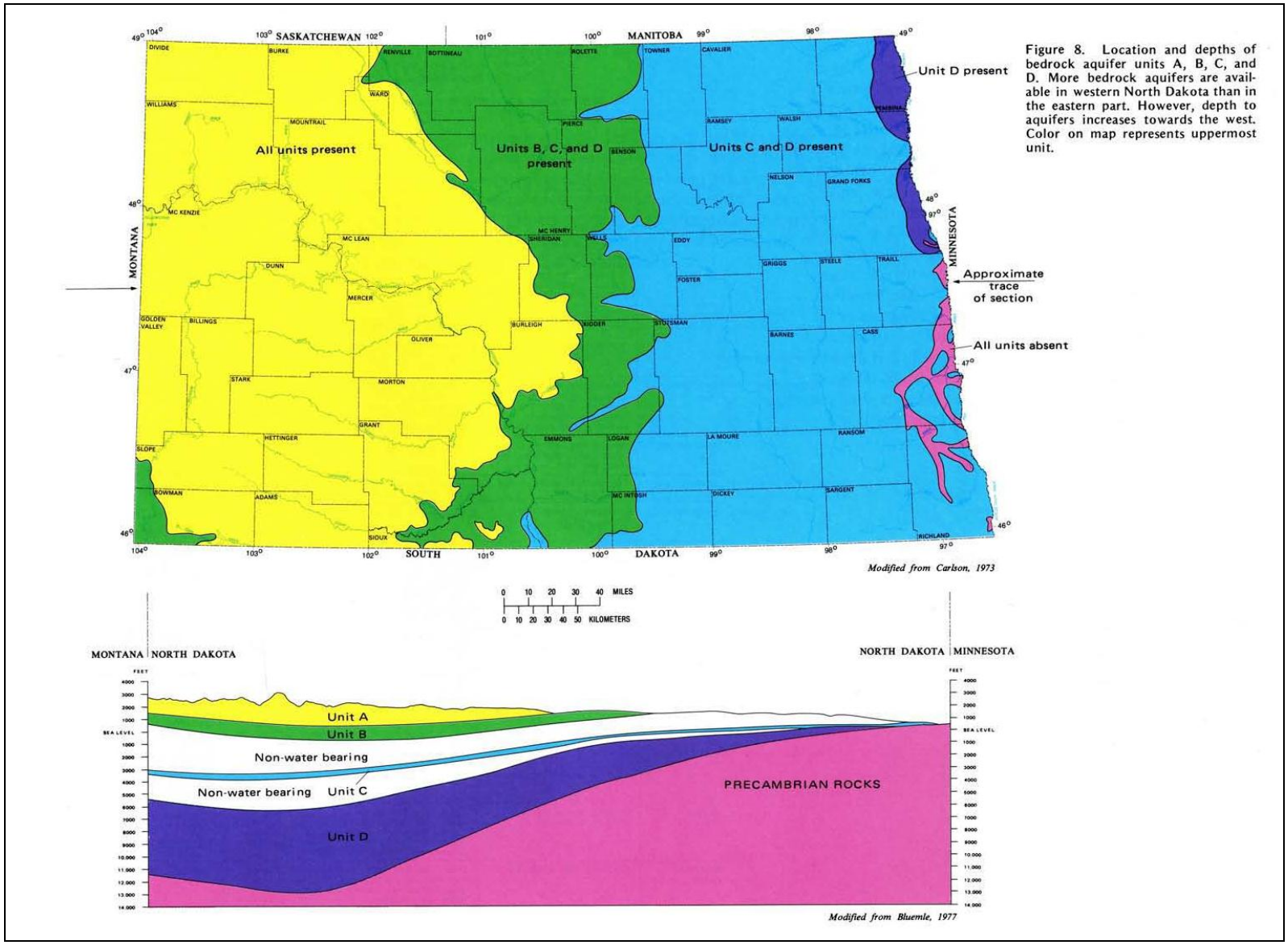


Figure 8. Location and depths of bedrock aquifer units A, B, C, and D. More bedrock aquifers are available in western North Dakota than in the eastern part. However, depth to aquifers increases towards the west. Color on map represents uppermost unit.

sources for development than the deeper aquifers. Nevertheless, most farms and ranches and many small communities are able to obtain sufficient quantities of water for most purposes from these aquifers. Water in unit A, although commonly more mineralized than desirable, is used for most purposes except for irrigation.

Unit B is an extensive sandstone aquifer, which underlies all except the eastern one-third of the State. The aquifer is a relatively dependable source of water because of its wide extent and uniform character. It supplies water to many farms and ranches and several small cities in central and western North Dakota. Water from unit B is similar in quality to that of unit A and generally is used for the same purposes.

Unit C, which underlies most of the State, consists of several sandstone layers that are commonly referred to as the Dakota Sandstone aquifer, or simply the Dakota aquifer. It was probably the availability of a free-flowing water supply that made the Dakota Sandstone such an attractive source. Certainly it was not the water quality, which generally is unsuitable for many uses because of salinity. However, in many areas it was the only readily available source. Water from the Dakota was particularly valued, and still is, for watering livestock during the winter because of the relatively warm temperature of the water. In western North Dakota the aquifer is used both as a source and a sink in connection with oil-field operations. Water is pumped from the aquifer for use in re-pressurizing depleted oil reservoirs, and waste brine from the reservoirs is injected into the aquifer.

Unit D, the deepest and thickest of the aquifer units, underlies the entire State except a small area near the North Dakota-Minnesota boundary. The top of this unit is only a few hundred feet below land surface near the eastern edge of the State, from where it slopes westward to depths of about 9,000 feet. Very little is known about the water-bearing properties of the rocks in this unit. In most parts of North Dakota it will not be practical to drill wells this deep to obtain water. In addition, data from oil wells completed in rocks of this unit indicate that the water is saline and not usable for most purposes (Unites States Geological Survey, 1983).

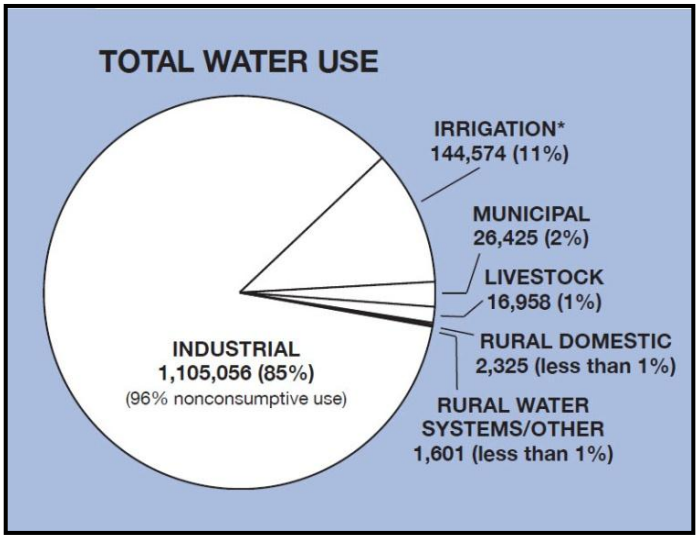
5.12.1.6 Missouri River Basin Water Supply and Water Use Information

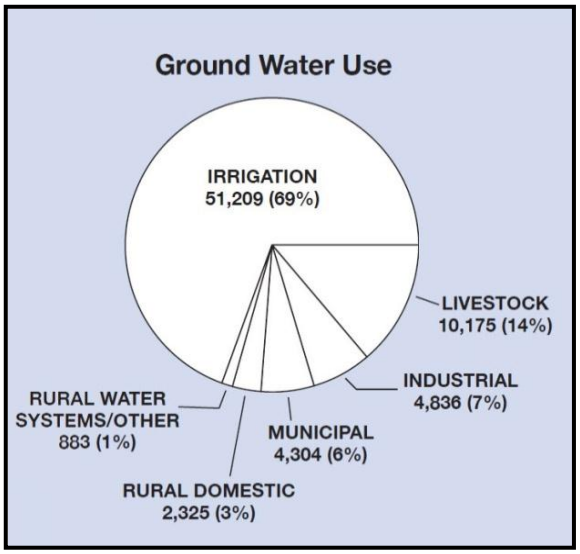
The Project area fits wholly within the northwestern portion of the Missouri River Basin which includes seven major sub-basins. The Project area fits mostly within the Lake Sakakawea, Little Muddy River, Lower Little Missouri River, and Knife River sub-basins.

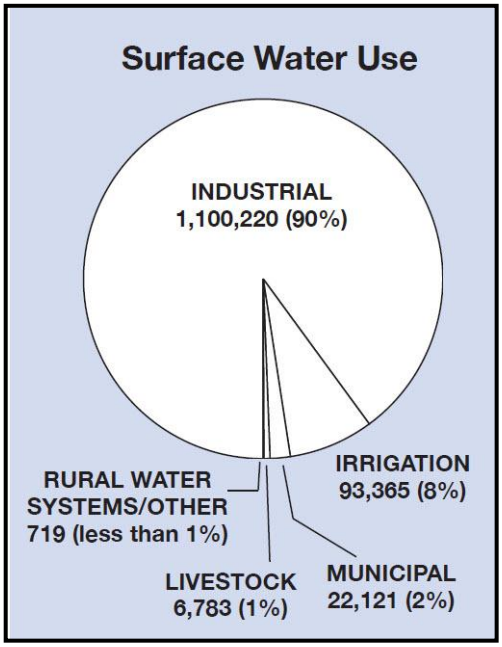
Water Use

Based on a 2005 report issued by the ND State Water Commission (NDSWC), 85% of the water used in the Basin is used for industry, 11% irrigation, 2% municipal, and the remaining 2% is distributed between

livestock, rural domestic, rural water systems, and other uses. Of groundwater being used 69% is irrigation, 14% livestock, 7% industrial, 6% municipal, 3% rural domestic, and 1% rural water systems and other uses. This data is shown the pie chart below. In addition, of the available groundwater being pumped 69% was used for irrigation, but 90% of the surface water pumped was used for industrial purposes. Additional information is provided below showing a breakdown of the other uses of the water supply (NDSWC, 2005).







Concerns highlighted by the North Dakota State Water Commission (NDSWC) within the Missouri River Basin included: declining reservoir levels on Lake Sakakawea during years of prolonged drought have

caused problems for municipal and industrial water supply intakes; periodic flooding of agricultural land and some communities (communities most seriously affected in the Project area include Williston, Beulah, and White Earth); expected growth in electrical generation facilities fueled by lignite coal will require large amounts of water for processing, and cooling purposes; some water users have an inadequate supply of good quality water to meet municipal, rural domestic, irrigation and livestock needs. In 2004, 45 communities exceeded secondary water quality standards. Expansion of rural water systems will improve water quality and quantity for many cities and farms; and agriculture, real estate development, and recreational uses are often at odds in the Missouri River corridor. In order to encourage coordinated water and related land resource management and development along the Missouri River, a coalition comprised of local governments and residents of the counties bordering the river has been formed (NDSWC, 2005).

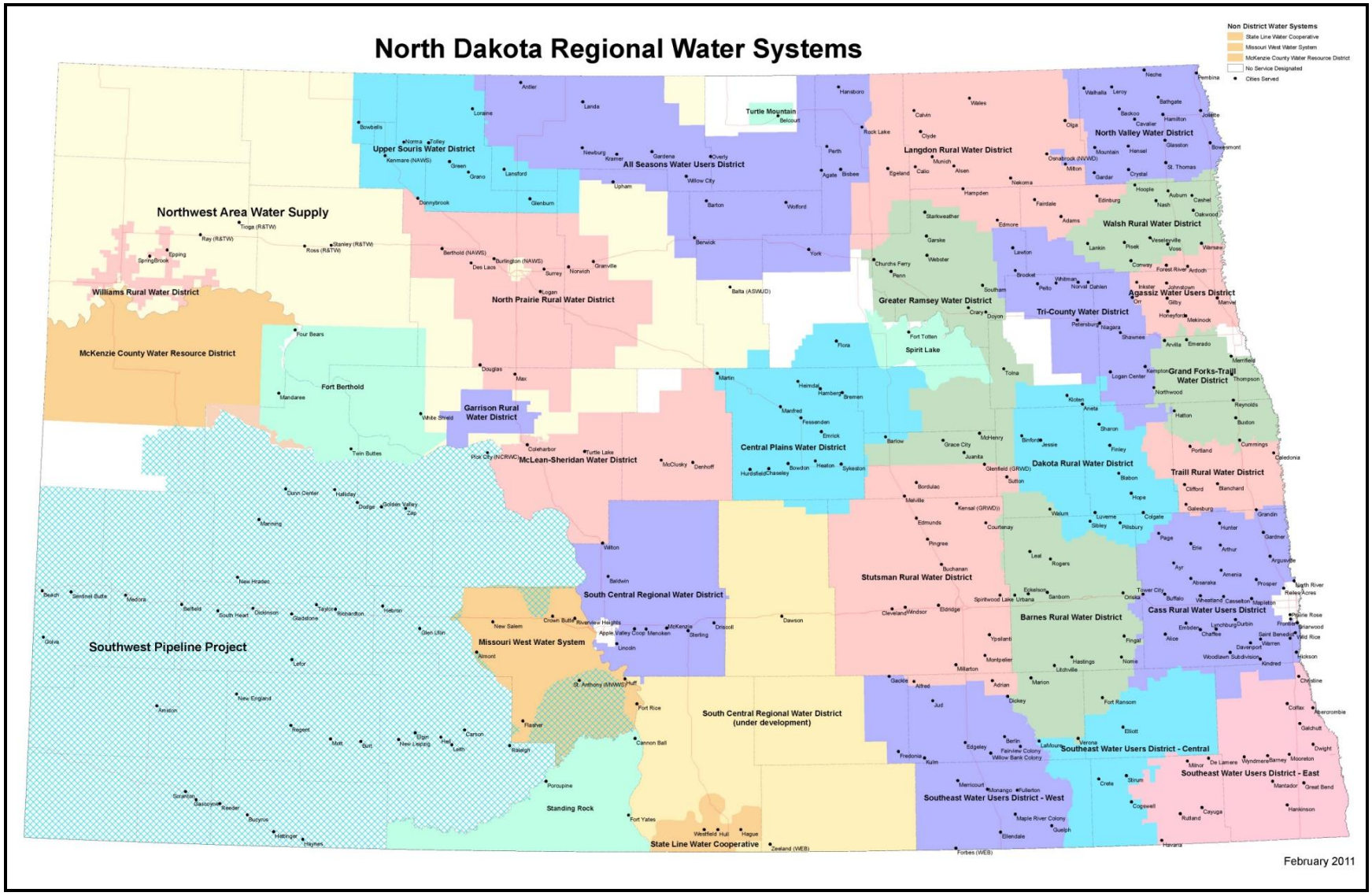
5.12.1.7 Water Supply Development Initiatives within the Project Area

In December 2010, the NDSWC completed the *2011-2013 North Dakota Water Development Report*, providing an update to the 2009 State Water Management Plan. In this report, the NDSWC discusses Regional Water System development and funding sources. Figure 5.12-3 shows the locations and labels for the various state water systems (NDSWC, 2011).

The Northwest Area Water Supply (NAWS) project is a regional water supply project that will eventually supply much of northwestern North Dakota with Missouri River water. The NDSSWC began construction of the NAWS project in April 2002. The first four contracts involving 45 miles of pipeline from the Missouri River to Minot were completed in the spring of 2009. Water from the project is currently serving Berthold, Kenmare, Burlington, West River Water District, Upper Souris Water District, and Minot (serving the North Prairie Water District). NAWS and Minot are pursuing a 10-year water supply contract which will expire in 2018. State funding of $12 million for the NAWS project will go toward: completion of the pipeline project to Mohall, Sherwood, and All Seasons Water District, completion of the pipeline from Minot to the Air Force base and continuing to Upper Souris District and Glenburn; assistance to the BOR with preparation of a supplemental EIS to address the court's May 2009 order; and any necessary court filings.

The Southwest Pipeline Project is a regional water supply system that draws water from Lake Sakakawea and serves over 35,000 people in southwest North Dakota, including 28 communities, and about 4,000 rural hookups – with plans to expand. The $25 million budgeted for the Southwest Pipeline will be used to: complete the Oliver, Mercer, North Dunn Water Treatment Plant; construct main transmission facilities in the Zap and Center Service Areas; construct the Zap Service Area rural distribution pipeline;

Figure 5.12-3: North Dakota Regional Water Systems



design and bid the Center Service Area rural distribution pipeline; and begin construction on the transmission facilities in the Dunn Service Area.

As the oil industry continues to grow in the northwest portion of North Dakota, so does the need for water development projects to support that growth both for drilling processes, and a growing workforce. Even with current drilling activity in that region, existing water supplies are being stretched to their limits. And, with future drilling expected to expand substantially in the coming years, the strain on water supplies is only expected to intensify. This is particularly true of areas that are relying heavily on groundwater resources. For that reason, developments of water supply systems that utilize abundant Missouri River water have become a priority in the region.

The Western Area Water Supply project is a collaborative effort between the city of Williston, Williams Rural Water District, McKenzie Water Resource District, and R&T Water Supply Association (including the communities of Ray, Tioga, and Stanley). Its focus has been to develop a regional water supply system that will deliver Missouri River water from the Williston Regional Water Treatment plant to areas throughout the northwest, oil-producing region of the state.

The total estimated cost of the project is approximately $150 million, with $25 million budgeted as a grant from the state, through the NDSWC. The remaining balance will come from local project sponsors, likely through bond proceeds.

5.12.2 Impacts

As discussed above, the proposed Project area contains several major surface water and groundwater features. Surface waters potentially affected by the proposed Project include Spring Creek, Little Missouri River, Lake Sakakawea (Upper Missouri River), and Little Muddy River. Smaller creeks, tributaries, and unnamed intermittent and ephemeral streams also occur within the proposed Project area. Groundwater sources include Paleozoic aquifers, lower and upper Cretaceous aquifers, lower Tertiary aquifers, and unconsolidated-deposit aquifers. This section discusses potential impacts to these resources resulting from construction and operation of the proposed Project.

Impacts to water resources resulting from the construction or operation of the proposed Project will include:

- Possible disruption of floodwaters due to structures in floodplain areas
- Increased sedimentation into surface waters from storm-water runoff

- Increased sedimentation into EPA-classified Impaired Waters from storm-water runoff or construction activities
- Possible introduction of contaminants into surface and groundwater resources

The Corridor/Route contains a total of 13.5 acres of FEMA-designated floodplain along the length of the route. These designated areas consist of many small, narrow floodplains associated with rivers and streams within the proposed Project area. All FEMA-designated floodplain areas within the Corridor/Route including the Missouri River floodplain[14] will be spanned and no impacts to these areas are expected during construction or operation of the proposed Project. The Corridor/Route will cross 12 perennial waterways (including the Little Missouri River and Missouri River) and numerous intermittent streams.

The Corridor/Route will cross three water bodies classified by the EPA as impaired waters. The Corridor/Route will cross a section of Antelope Creek shortly after exiting the AVS Substation. The Corridor/Route will cross the Little Missouri River east of TRNP, and cross the Little Muddy River north of Williston. All of these waters are listed as impaired due to high fecal coliform levels resulting from nearby agricultural activities. All stream crossings, including the impaired waters, will be spanned by the Project, and no transmission structures will be placed in the streambed. Because of the use of standard BMPs, no impacts to water resources during operation of the proposed Project are anticipated.

No impacts to water resources resulting from the construction and operation of the proposed Judson or Tande substations are expected because of the use of BMPs to prevent soil erosion and sedimentation. No streams or other water bodies are present within either substation site, and the substation sites will not be located within FEMA-designated floodplains. The Tande Substation will be located within a larger parcel of land being acquired by Basin Electric, but the actual site location is yet to be determined. An existing stream is located on the eastern portion of this property, but the substation site will be constructed on the western side of the property and, with the use of BMPs, impacts to this stream will not occur.

5.12.3 Mitigation

- Clean up any spills or equipment leaks promptly to prevent materials entering surface water.
- Contain and store appropriately any materials such as fuel, lubricants, and solvents.

[14] Considerable area at the Missouri River crossing is subject to regular flooding. However, very little is designated as floodplain on the FEMA Federal Insurance Rate Maps (FIRM) which designate floodways and 100 and 500 year flood areas.

- Schedule construction in the area of the Missouri River crossing in low water periods or during winter to minimize impacts to the geographical floodplain. Coordinate construction timing with USACE.
- Span floodplains to the extent possible to avoid potential impacts.
- Plant or seed non-agricultural areas that were disturbed during construction. Use native seed mixes from the indigenous plants and plant indigenous species located in the immediate disturbed soil area; ensure seeding and/or plantings are done in a time congruent with seeding and growth of the area, not during a time that will preclude germination or rooting.
- Remove excavated material and other debris from flood prone areas to maintain storage volumes and prevent introduction of debris that may lead to clogged culverts or bridges, resulting in changes to water flow and flood patterns.
- Locate structures and disturbed areas away from rivers and lakes, where practicable.
- Install sediment control measures prior to construction in accordance with plans and permits including: mulch produced through the chipping of removed trees; soil berms; and partially burying logs along the ROW.
- Use wastewater and stormwater control measures to meet the effluent limits prior to discharging from construction sites to surface waters.
- Avoid the use of fertilizers, pesticides, or herbicides in or near surface waterbodies.
- Fuel construction vehicles away from surface waterbodies and use appropriate spill prevention and containment procedures.

5.13 BIOLOGICAL RESOURCES

5.13.1 Description of Resources

5.13.1.1 Regional Setting

The Corridor/Route extends across four physiographic ecoregions: Missouri Plateau, Little Missouri Badlands, River Breaks, and Glaciated Dark Brown Prairie (Bryce et al. 1998). Physiographic regions generally characterize areas by their topography and geologic features. The Glaciated Dark Brown Prairie ecoregion is confined to the north of the Missouri River/Lake Sakakawea. The River Breaks ecoregion encompasses the area immediately adjacent to the Missouri River/ Lake Sakakawea and its tributaries. The Missouri Plateau and Little Missouri Badlands ecoregions occur south of the Missouri River/Lake Sakakawea (see Geology and Landforms section for further discussion of these ecoregions).

The Project area contains a variety of biological resources within diverse landscapes consisting of rolling prairies, badland areas, cultivated farmlands, and riparian areas. These landscapes contain diverse vegetative communities that serve as habitat to many species of wildlife. Riparian areas and wetlands within the Project area also provide habitat for plant and animal species dependent on these areas. Additionally, several special status species are known to utilize selected habitats found within the Project area. The following is a discussion of the vegetative, wildlife, wetland, and special status species resources found within the Project area. Figure 5.13-1 through Figure 5.13-4 illustrates the various types of landscapes in the Project area that support vegetation and wildlife.

Figure 5.13-1: Typical Prairie

Figure 5.13-2: Typical Badland Area

Figure 5.13-3: Cultivated Farmland

Figure 5.13-4: Wetland/Riparian Area

5.13.1.2 Vegetation

Natural vegetation within areas of rolling topography in the Missouri Plateau and Little Missouri Badlands ecoregions consists of shortgrass prairie plants, including blue grama (*Bouteloua gracilis*), needleleaf sedge (*Carex duriuscula*), threadleaf sedge (*Carex filifolia*), needle-and-thread (*Hesperostipa comate*) wheatgrass (*Elymus smithii*), little bluestem (*Schizachyrium scoparium*), big sagebrush (*Artemisia tridentata*), buffalograss (*Bouteloua dactyloides*), and prairie sandreed (*Calamolvilfa longifolia*). Forbs include white wild onion (*Allium textile*), buffalo-bean (*Thermopsis* spp.), silverleaf (*Astragalus* spp.), moss phlox (*Phlox subulata*), white beardtongue (*Penstemon* spp.), and fringed sage (*Artemesia frigida*) (Western 2010). Within the steeper slopes and draws of the Missouri Badlands and River Breaks ecoregions, Rocky Mountain juniper (*Juniperus scopulorum*) is common. Cottonwood (*Populus deltoides*), willow (Salix spp.), chokecherry (*Prunus virginiana* var. *interius*), buffaloberry (*Shepherdia* spp.), skunkbush (*Rhus aromatic* var. *trilobata*) and green ash (*Fraxinus pennsylvanica*) are found in riparian areas, which typically serve as transition areas between wetlands and uplands (Bryce et al. 1998). These areas are common along the banks of the Little Missouri River and Missouri River, and provide important wildlife habitat. Cultivated and irrigated areas within these regions include wheat, alfalfa, and sunflowers.

North of the Missouri River/Lake Sakakawea, the topography of the Glaciated Dark Brown Prairie ecoregion is generally more gently sloping with more acres of native grassland converted to cultivated cropland. Spring wheat, barley, alfalfa, lentils, peas, and silage corn are common crops in cultivated areas (Bryce et al. 1998). Land that is not cultivated is often managed for pasture or rangeland for grazing by cattle or horses. Most pasture forage is native, especially blue grama grass, western wheatgrass, big sagebrush, green needlegrass (*Nassella viridula*), and prairie junegrass (*Koeleria macrantha*).

North Dakota state law requires all landowners to make every effort to control the spread of noxious weeds on their property. Federal agencies are also directed to prevent the introduction of invasive species and ensure that its actions are not likely to cause or promote the introduction or spread of invasive species (USDA, 2011). Noxious weeds can be detrimental for a number of reasons. They threaten wildlife by replacing natural vegetation and nesting habitat, threaten native plant species, and reduce crop productivity and increase soil erosion (NDDOA 2003).

North Dakota has a state-level noxious weeds list that includes all counties and cities. Table 5.13-1 shows those species appearing on the state list. In addition, individual counties have the option of including additional species to their respective county lists. Within the Project area, McKenzie County has added black henbane (*Hyoscyamus niger*), common burdock (*Arctium minus*), houndstongue (*Cynoglossum officinale*), halogeton (*Halogeton glomeratus*), and baby's breath (*Gypsophila* spp.) to its noxious weeds list. Mountrail County has added common tansy (*Tanacetum vulgare*) and houndstongue to its noxious weeds list (NDDOA 2011).

Table 5.13-1: North Dakota State-Listed Noxious Weeds

Common Name	Scientific Name
Absinth wormwood	*Artemisia absinthium*
Canada thistle	*Cirsium arvense*
Diffuse knapweed	*Centaurea diffusa*
Leafy spurge	*Euphorbia esula*
Musk thistle	*Carduus nutans*
Purple loosestrife	*Lythrum salicaria*
Russian knapweed	*Acroptilon repens*
Spotted knapweed	*Centaurea stoebe* spp. *Micranthos*
Yellow toadflax	*Linaria vulgaris*
Dalmatian toadflax	*Linaria genistifolia* spp. *Dalmatica*
Saltcedar	*Tamarix* spp.

Source: North Dakota Department of Agriculture (2003), Retrieved August 2011

5.13.1.3 Wildlife

The Corridor/Route lies within the Great Plains-Palouse Dry Steppe Province and the Great Plains Steppe Province, which are similar to physiographic ecoregions but include biological characteristics (Bailey 1995). These regions are characterized by rolling plains, valleys, canyons, and buttes, with the more gently rolling plains found north of the Missouri River and Lake Sakakawea. The diverse landscape is home to many species of wildlife. The primary habitat types that occur in the counties within the Project area are short and mixed-grass prairie, badland areas, shelterbelt woodland areas, agricultural lands (rangeland and cropland), wetlands, and riparian areas. Appendix O includes a representative list of some of the birds, mammals, reptiles, fish, and amphibians that may occur near or within the Project area. The following is a discussion of common wildlife species that may be found within the Project area.

5.13.1.3.1 Big Game

Several species of big game are known to occur within the Project area. Whitetail deer (*Odocoileus virginianus*) are found throughout the area, while mule deer (*Odocoileus hemionus*) are less common. Mule deer occur primarily in the western portion of the Project area in McKenzie County, although they are occasionally found further to the east in the badland areas along Lake Sakakawea and the Little Missouri River.

Pronghorn antelope (*Antilocapra americana*) are also found primarily in the southwestern portion of the Project area in open prairie habitat, but have been known to occur throughout the Project area. Pronghorn antelope wintering range occurs primarily to the south and west of the Corridor/Route, and because current populations of pronghorn antelope are declining in North Dakota due to recent harsh winters, a closed hunting season for this species is currently in effect.

Elk (*Cervus canadensis*) and bighorn sheep (*Ovis canadensis*) are less numerous and prefer the more rugged terrain associated with the badlands surrounding the Little Missouri River, Missouri River, and TRNP (NDGFD 2010a). Bighorn sheep, within the Project area, are primarily found near the Little Missouri River and its associated badlands. Bighorn sheep are sensitive to human disturbance during their lambing season, and prefer isolated, undisturbed badland areas for these purposes. Elk are also associated with the Little Missouri River badlands and adjacent areas, and use lower-elevation areas with dense cover within the badlands during winter months.

5.13.1.3.2 Mammals

Coyote (*Canis latrans*), mountain lion (*Felis concolor*), porcupine (*Erethizon dorsatum*), badger (*Taxidea taxus*), striped skunk (*Mephitis mephitis*), and bobcat (*Felis rufus*) are some of the larger mammals known

to occur within the Project area. These mammals use a variety of habitats including mixed-grass prairie, pastureland, forested areas, and riparian areas (USGS-NPWRC, 2006). Mountain lions are generally found in more isolated areas, mainly within the badland areas associated with the Little Missouri River, Missouri River, and TRNP, although they have been found throughout the Project area. Many smaller mammals, including several species of mice, voles, squirrels, bats, and rabbits are found within the Project area (see Appendix O).

5.13.1.3.3 Migratory and Resident Birds

Typical migrant bird species that may occur within the Project area include western meadowlark (*Sturnella neglecta*), yellow warbler (*Dendroica petechial*), black-headed grosbeak (*Pheucticus melanocephalus*), chipping sparrow (*Spizella passerine*), grasshopper sparrow (*Ammodramus savannarum*), northern oriole (*Icterus galbula*), loggerhead shrike (*Lanius ludovicianus*), brown thrasher (*Toxostoma rufum*), bobolink (*Dolichonyx oryziv*), upland sandpiper (*Bartramia longicauda*), western kingbird (*Tyrannus verticalis*), American robin (*Turdus migratorius*), and mourning dove (*Zenaida macroura*). Typical resident bird species that may occur within the Project area include horned lark (*Eremophila alpestris*), black-capped chickadee (*Parus atricapillus*), white-breasted nuthatch (*Sitta carolinensis*), blue jay (*Cyanocitta cristata*), American crow (*Corvus brachyrhynchos*), and American goldfinch (*Carduelis tristis*) (NDGFD 2010b). All of the birds listed above as well as hundreds more are migratory birds and are protected by the Migratory Bird Treaty Act (MBTA), which makes it illegal to kill, harass, or possess migratory birds. Executive Order (EO) 13186 was enacted to ensure that environmental evaluations of Federal actions takes into account the effects of those actions on migratory birds.

5.13.1.3.4 Raptors

Raptor species that may occur within the Project area include bald eagle (*Haliaeetus leucocophalus*), golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo Jamaicensis*), American kestrel (*Falco sparvenius*), prairie falcon (*Falco mexicanus*), great horned owl (*Bubo virginianus*), northern harrier (*Circus cyaneus*), and other birds of prey including the turkey vulture (*Cathartes aura*) (NDGFD 2010b). These species occur throughout the Project area and range over large areas when foraging for food. Many of these species also breed within the Project area. Raptors are protected under the MBTA. Bald and golden eagles are protected by the Bald and Golden Eagle Protection Act (BGEPA). The BGEPA prohibits anyone, without a permit issued by the Secretary of the Interior, from taking bald or golden eagles, including their parts, nests, or eggs. The BGEPA defines “take” as pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb.

5.13.1.3.5 Gamebirds, Waterfowl, and Shorebirds

Common upland game birds found within the Project area include ring-necked pheasant (*Phasianus colchicus*), gray partridge (*Perdix perdix*), sharp-tailed grouse (*Tympanuchus phasianellus*), and wild turkey (*Meleagris gallopavo*). Upland game bird species are not protected under MBTA. Many species of waterfowl can also be found during the breeding season within the Project area; these species include mallard (*Anas platyrhynchos*), gadwall (*Anas strepera*), Canada goose (*Branta canadensis*), northern shoveler (*Anas clypeata*), and blue-winged teal (*Anas discors*), among others. In addition, various species of shorebirds are found near wetland areas and riparian corridors within the Project area. Some of these species include great blue heron (*Ardea Herodias*), American bittern (*Botaurus lentiginosus*), American coot (*Fulica Americana*), killdeer (*Charadrius vociferous*), common tern (*Sterna hirundo*), and spotted sandpiper (*Actitis macularia*) (see Appendix O).

5.13.1.3.6 Reptiles and Amphibians

Several species of reptiles and amphibians can be found within the counties affected by the proposed Project. Lizards and snakes are found in various habitats in the region, while amphibians are more likely to be found in wetland areas or near riparian corridors associated with rivers, lakes, and streams. Reptiles and amphibians that may be found within the Project area include common garter snake (*Thamnophis sirtalis*), plains garter snake (*Thamnophis radix*), smooth green snake (*Opheodrys vernalis*), sagebrush lizard (*Sceloporus graciosus*), short-horned lizard (*Phrynosoma douglassi*), common snapping turtle (*Chelydra serpentina*), bullsnake (*Pituophis catenifer*), prairie rattlesnake (*Crotalus viridis*), plains spadefoot toad (*Scaphiopus bombifrons*), northern leopard frog (*Rana pipiens*), and tiger salamander (*Ambystoma tigrinum*) (Hoberg and Gause 2006).

5.13.1.3.7 Native and Introduced Gamefish Species

Rivers and lakes within the Project area provide habitat for various species of fish. Gamefish species that may be found within the Project area include walleye (*Sander vitreus*), northern pike (*Esox lucius*), Chinook salmon (*Oncorhynchus tshawytscha*) (Lake Sakakawea only), American paddlefish (*Polyodon spathula*), bluegill (*Lepomis macrochirus*), white crappie (*Pomoxis annularis*), smallmouth bass (*Micropterus dolomieu*), and rainbow trout (*Oncorhynchus mykiss*) (NDGFD 2010c). Chinook salmon, smallmouth bass, and rainbow trout are introduced species, but have greatly increased recreational fishing opportunities within the Project area. Numerous non-game fish species also occur within the Project area (see Appendix O).

5.13.1.4 Wetlands

Wetlands are scattered throughout much of northwestern North Dakota, including the Project area. These natural communities provide filtration of sediments and pollutants from surface water runoff, flood water retention, erosion control, resting, foraging, and nesting habitat for waterfowl and mammals, fish spawning and nursery, and amphibian habitat.

Wetlands are defined, for regulatory purposes, in the Clean Water Act. This definition is used by the Environmental Protection Agency (EPA) and the USACE to administer the permit program outlined in Section 404 of the Act. Wetlands under USACE jurisdiction are defined as follows:

> "Wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions (Environmental Laboratory 1987). Wetlands generally include swamps, bogs and similar areas (40 CFR 230.3 and 33 CFR 328.3).

In order to be classified as a wetland, a site must possess three characteristics: hydric soils, a dominance of hydrophytic vegetation, and wetland hydrology.

Wetlands found within the Project area are generally classified in three categories based on the vegetation occurring in the area; forested, scrub/shrub, and emergent. Most of the wetlands within and near the Project area consist of small prairie potholes or other small ponds. Larger, forested and shrub/scrub wetland areas associated with Lake Sakakawea and the Little Missouri River also occur within the affected area, and will be crossed by the Corridor/Route. National Wetland Inventory (NWI) digital data of the Project area were reviewed to provide information on existing conditions within the affected area. Figure 5.13-5 shows existing wetland areas within the Project area, as determined by NWI digital data.

Forested wetlands are characterized by woody vegetation that is greater than 6.0 meters tall (Cowardin et al. 1979). The dominant trees found in forested wetlands within the Project area are eastern cottonwood (*Populus deltoides*), Missouri River willow (*Salix eriocephala*), American elm (*Ulmus americana*), balsam poplar (*Populus balsamifera*), water birch (*Betula occidentalis*), and boxelder (*Acer negundo*) (USDA-NRCS, 2011a). These wetlands occur along the major river systems and their tributaries within the Project area, primarily the Little Missouri River, Missouri River, Little Muddy River, Spring River, Knife River, and associated tributaries. Additionally, these wetlands are often only seasonally flooded during the spring and during heavy run-off periods.

Scrub/shrub wetlands are characterized by woody vegetation less than 6.0 meters in height. These wetlands consist of a mixture of shrubs and small trees and are also associated with rivers and tributaries

NORTH

0 11.5

Miles

Neset
Tande
White Earth
Tioga
Ray
Epping
Spring Brook
Williams
Judson
Williston
Williston
Donnybrook
Renville
Carpio
Ross
Stanley
Palermo
Berthold
Des Lacs
Burlington
Minot
McHenry
Mountrail
Ward
Plaza
New Town
Parshall
Makoti
Ryder
Douglas
Max
Alexander
Arnegard
Watford City
McKenzie
McLean
Garrison
Pick City
Riverdale
Dunn
Killdeer
Dunn Center
Halliday
Antelope Valley
Charlie Creek
Golden Valley
Billings
Dodge
Golden Valley
Zap
Beulah
Mercer
Hazen
Stanton
Oliver

LEGEND

- Project Route
- Existing Substation
- Proposed Substation
- State Boundary
- County Boundary
- Municipal Areas
- NWI Wetlands

Burns & McDonnell SINCE 1898

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

Figure 5.13-5
Basin Electric Power Cooperative
Antelope Valley Station to Neset
345-kV Transmission Project
NWI Wetlands

Source: North Dakota GIS; Esri; Basin Electric; Burns & McDonnell.

Revised January 03, 2013

\\espsrv\data\Projects\Basin\61495_AVS_345\GIS\DataFiles\ArcDocs\PSC - Chapter 5 Figures - Project Route\5-13-5 NWI Wetlands - Project Route.mxd 1/3/2013

within the Project area. Common species found in scrub/shrub wetlands include Bebb willow (*Salix bebbiana*), Missouri River willow (*Salix eriocephala*), saltcedar (*Tamarix ramosissima*), prairie willow (*Salix humilis*), Russian olive (*Elaeagnus angustifolia*), silverberry (*Elaeagnus commutata*), and skunkbush sumac (*Rhus trilobata*).

Emergent wetlands found within the Project area include wet meadows, prairie potholes, and aquatic bed wetlands. Common species found in emergent wetlands include reed canarygrass (*Phalaris arundinacea*), prairie cordgrass (*Spartina pectinata*), bald spikerush (*Eleocharis erythropoda*), American vetch (*Vicia americana*), quill sedge (*Carex tenera*), Sartwell's sedge (*Carex sartwellii*), broadleaf cattail (*Typha latifolia*), bog yellowcress (*Rorippa palustris*), and smooth horsetail (*Equisetum laevigatum*).

The NRCS oversees the Wetlands Reserve Program (WRP), which is a voluntary program that provides financial incentives and technical assistance for landowners who wish to protect, restore, and enhance wetlands on their property while helping to achieve the National goal of no net loss of wetlands. Landowners participating in the program either sell a conservation easement (30 years) or enter into a cost-share restoration agreement (10 years) with the USDA to protect and restore wetlands (USDA-NRCS, 2011b). The WRP is gaining popularity with landowners in North Dakota, as this program consisted of 109 easements totaling 24,726 acres in North Dakota in 2009, increasing to 205 easements totaling 33,625 acres in North Dakota in 2010 (USDA-NRCS, 2011c). Within the Project area, McKenzie County has 1,464 acres enrolled in WRP, Mountrail County has 621 acres enrolled, Mercer County has 48.2 acres enrolled, and Dunn and Mercer Counties have no acres enrolled in WRP (Hagel 2011).

Wetland and grassland easements administered by USFWS also occur within the Project area. Wetland and grassland easements are part of the National Wildlife Refuge System and are managed to protect wetlands and the grass uplands around wetlands. Wetland and grassland easements are located throughout Williams and Mountrail Counties, with a majority of these easements occurring outside the Project area. The easements in Williams County are managed by the Crosby Wetland Management District, and the easements in Mountrail County are managed by the Lostwood Wetland Management District.

5.13.1.5 Special Status Species

5.13.1.5.1 Endangered Species Act Species and Critical Habitat

County lists from the U.S. Fish & Wildlife Service (USFWS) were used to determine which protected species have the potential to occur in the Project area (USFWS, 2011a, Towner, 2011). According to the

USFWS, the Project counties may contain suitable habitat for, or have known occurrences of, five federally-listed endangered animal species, the whooping crane (*Grus Americana*), interior least tern (*Sterna antillarum*), pallid sturgeon (*Scaphirhynchus albus*), black-footed ferret (*Mustela nigripes*), and gray wolf (*Canis lupus*); one federally-listed threatened species, the piping plover (*Charadrius melodus*); and two candidate species, the Sprague's pipit (*Anthus spragueii*) and Dakota skipper (*Hesperia dacotae*). These species, along with their federal designations and counties of possible occurrence, are shown in Table 5.13-2. Suitable habitats for the interior least tern, pallid sturgeon, and piping plover within the Project area are illustrated on Figure 5.13-6, along with the whooping crane migration corridor through North Dakota. No federally-listed endangered or threatened plant species are known to occur within the Project area.

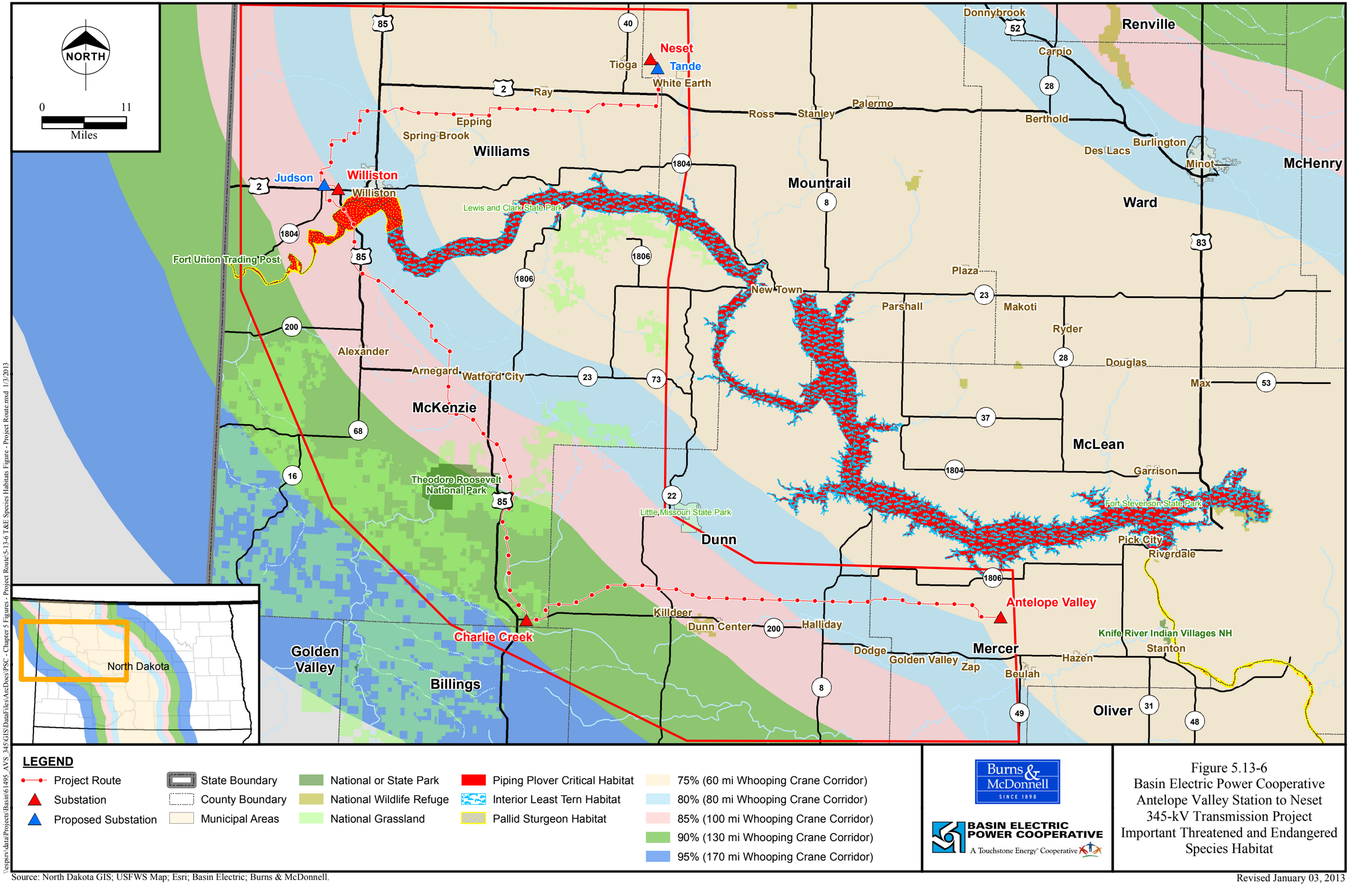
Table 5.13-2: Federally-listed Threatened, Endangered, and Candidate Species

Name	Scientific Name	Dunn	Mercer	McKenzie	Williams	Mountrail
Whooping Crane (E)	*Grus americana*	X	X	X	X	X
Piping Plover (T)	*Charadrius melodus*	X	X	X	X	X
Interior Least Tern (E)	*Sterna antillarum*	X	X	X	X	X
Sprague's Pipit (C)	*Anthus spragueii*	X	X	X	X	X
Pallid Sturgeon (E)	*Scaphirhynchus albus*	X	X	X	X	X
Dakota Skipper (C)	*Hesperia dacotae*	X		X		X
Black-footed Ferret (E)	*Mustela nigripes*	X	X	X		
Gray Wolf (E)	*Canis lupus*	X	X	X		X

E – Endangered, T – Threatened, C – Candidate
Source: USFWS, 2011a; Towner, 2011

Black-Footed Ferret

Black-footed ferrets are a federally listed endangered species that depend on prairie dog (*Cynomys* spp.) colonies as a source of food and shelter (USFWS, 1989). The black-footed ferret historically inhabited black-tail and white-tailed prairie dog colonies throughout the Great Plains, but was thought to be extirpated in the wild from 1987 until 1991. In 1991, 49 captive animals were reintroduced into the wild in Wyoming. Since then, ferrets have been reintroduced into Montana, South Dakota, Colorado, and Arizona and are reproducing in the wild. Unconfirmed sightings from other areas continue to be reported. In North Dakota, the majority of the reports come from the southwest part of the state (USFWS, 2011c).



\\espsrv\data\Projects\Basin\61495_AVS_345\GIS\DataFiles\ArcDocs\PSC - Chapter 5 Figures - Project Route\5-13-6 T&E Species Habitats Figure - Project Route.mxd 1/3/2013

Figure 5.13-6
Basin Electric Power Cooperative
Antelope Valley Station to Neset
345-kV Transmission Project
Important Threatened and Endangered Species Habitat

Source: North Dakota GIS; USFWS Map; Esri; Basin Electric; Burns & McDonnell.

Revised January 03, 2013

The black-footed ferret inhabits short grass prairies, always within close proximity to prairie dog towns. Black-footed ferrets are sexually mature at 1 year of age, and breeding usually takes place between March and May, with three to four young per litter. Juvenile male ferret mortality rates are high as a result of their dispersing to new areas. Life expectancies for black-footed ferrets are considered to be less than 5 years. Prairie dogs comprise 90 percent of the diet of black-footed ferrets. Ferrets also utilize prairie dog burrows for shelter and raising young (USFWS, 2011c).

Black-footed ferrets are 20 to 24 inches long and weigh up to 2.5 pounds. They have a yellowish, brown body with a distinctive black mask across the face, black on the feet and the tip of the tail. The decline of black-footed ferrets has been linked to the eradication of prairie dogs, which now occupy less than 1 percent of their historic range. Black-footed ferrets are also susceptible to predation by golden eagles, great-horned owls, and coyotes (USFWS, 2011c).

Dakota Skipper

The Dakota skipper is a small butterfly with a 1-inch wingspan. Dakota skippers historically range from southern Saskatchewan, across the Dakotas and Minnesota to Iowa and Illinois. Dakota skippers now occur no further east than western Minnesota and are believed to be extirpated in Illinois and Iowa. They occur in scattered remnants of native prairie, with their population distribution straddling the border between tall-grass prairie ecoregions to the east and mixed-grass prairie ecoregions to the west. The most significant remaining populations of Dakota skippers occur in western Minnesota, northeastern South Dakota, and north-central and southeastern North Dakota (USFWS, 2012d). Despite native prairie conservation efforts, the species still faces many threats to its habitat including over-grazing, conversion to cultivated agriculture, inappropriate fire management and herbicide use, woody plant invasion, road construction, gravel mining, invasive plant species, and in some areas, historically high water levels (USFWS, 2012d). The Dakota skipper is a candidate species for listing under ESA. Review of the listing petition for the Dakota Skipper has been ongoing since 2003 (USFWS, 2011f). USFWS released its Dakota Skipper Conservation Guidelines in September 2007 (USFWS, 2007a).

Dakota skippers have four basic life stages: egg, larva, pupa, and adult. During the brief adult period in June and July, female Dakota skippers lay eggs on the underside of leaves close to the ground. These eggs take about 10 days to hatch into larvae. The larvae build shelters at or below the ground surface and emerge at night to feed on grass until late summer or early fall when they become dormant. They overwinter as mid-stage larvae in shelters at or just below ground level, typically in the bases of native bunchgrasses. The larvae emerge the following spring and continue development. Pupation occurs

primarily in June and takes about 10 days. Males emerge as adults about 5 days before females. The maximum life span as adults is about 3 weeks and represents the entire reproductive period of the individual (USFWS, 2012d).

The Dakota skipper occurs in two types of habitat. The first is relatively flat and moist native bluestem prairie in which three species of wildflowers are usually present and in flower when Dakota skippers are in their adult (flight) stage: wood lily (*Lilium philadelphicum*), harebell (*Campanula rotundifolia*), and smooth camas (*Zygadenus elegans*). The second habitat type is upland (dry) prairie that is often on ridges and hillsides. Bluestem grasses and needlegrasses dominate these habitats and three wildflowers are typically present: pale purple (*Echinacea pallida*), upright (*E. angustifolia*) coneflowers, and blanketflower (*Gaillardia sp*.) (USFWS, 2002). Of the 38 existing or possibly existing sites in North Dakota, 19 occur within two complexes: Towner-Karlsruhe in McHenry County (13 sites) and Sheyenne Grasslands (6 sites) in Ransom County, over 100 miles to the southeast of AVS. The other 19 sites that are presumed existing are isolated. The largest complex in North Dakota is located within McHenry County (USFWS, 2002), approximately 70 miles east of the Tande and Neset substations. According to USFWS, Dakota skipper may be found within Dunn, McKenzie, and Mountrail counties.

Gray Wolf

Historically, the gray wolf occurred throughout the lower 48 states except for the Southeast and the deserts of the Southwest (USFWS, 2011d). Today, sustainable populations can be found in habitats with low road and human densities in the following states: Minnesota, Michigan, Wisconsin, Idaho, Montana, and Wyoming (USFWS, 2011d). The gray wolf was listed as endangered on March 9, 1978, in the lower 48 states (except Minnesota) (USFWS, 1987). In North Dakota, the gray wolf has been recently de-listed in the region east of the Missouri River from the South Dakota border to Lake Sakakawea and east of the center line of U.S. Highway 83 to the Canadian border. Gray wolves west of this line however are still federally endangered (USFWS, 2012c). The closest wolf pack to North Dakota is in northwestern Minnesota (Licht and Fritts, 1998). Wolves seen in North Dakota are likely animals dispersing from established populations in Minnesota and Canada (USFWS, 2012c).

Gray wolves live in packs consisting of a breeding pair, their young, and other non-breeding adults. The average size litter of five pups is born in late spring and young reach adult size in 8 months. Once reaching sexual maturity in 2 to 3 years, young wolves may leave the pack in search of a mate to establish a new pack. The average life span of the gray wolf is 10 years (USFWS, 2011d). The diet of the gray wolf consists mainly of large ungulates such as deer and elk. However, they are opportunistic and will

take smaller animals and domestic livestock. They usually hunt in packs but can make kills of large prey on their own (Montana Natural Heritage Program and Montana Fish, Wildlife and Parks, n.d.).

Due to the lack of a known breeding population in North Dakota, it is unlikely that gray wolves will be encountered in the project area. Although dispersing gray wolves may be spotted anywhere in North Dakota, and therefore in the project area, they will mostly likely be seen in the forested areas of north-central (Turtle Mountains) and northeast North Dakota as these areas provide better cover and hunting (Pembina Hills) (USFWS, 2012c).

Interior Least Tern

Historically, the least tern was found on the Atlantic, Gulf of Mexico, and California coasts and on the Mississippi, Missouri, and Rio Grande River systems. It was found throughout the Missouri River system in North Dakota. The interior population of the least tern presently breeds in the Mississippi, Missouri, and Rio Grande river systems. The birds usually stay in close proximity to the rivers. Decline of the interior population of the least tern is due to loss of habitat from dam construction and river channelization on major rivers throughout the Mississippi, Missouri, and Rio Grande River systems. Dams allow for river flows to be managed in a fashion that is not conducive to the creation and maintenance of sandbars with sparse vegetation, which is needed by the interior least tern for nesting (USFWS, 2011e).

The interior population of least terns was listed as endangered on June 27, 1985 (USFWS, 1990). The population estimate for the interior least tern at that time was approximately 5,000 individuals (USFWS, 1990). Almost 17,600 adult least terns were recorded during a 2005 range-wide census of the interior least tern population (Lott, 2006). The majority (11,281) of individuals were observed on the lower Mississippi River, while 2,044 individuals were recorded on the Missouri River (Lott, 2006). USFWS states that approximately 100 pairs breed in North Dakota (USFWS, 2012a).

Nesting least terns mainly utilize sandbars within the free flowing sections of the Missouri and Yellowstone rivers in North Dakota, and to a lesser extent islands and shorelines of both Missouri River reservoirs (Lake Sakakawea and Lake Oahe) in North Dakota (USFWS, 1990, 2012). Nests are built on the ground on a sand or small rocky substrate that is devoid of vegetation (USFWS, 1990, 2012a). Breeding least terns will utilize the river and wetlands adjacent to the nest for foraging (USFWS, 2012a).

Interior least terns begin arriving at nesting sites as early as late April with peak nesting occurring from mid-June to mid-July (USFWS, 1990, 2012a). Least terns are colonial to semicolonial nesters, and may

be found at times with piping plovers, with their nests being shallow depressions in sandy/pebbly substrate. Habitat for this species will be limited to the area of the crossing of the Missouri River west of Williston. It is not known if interior least terns have previously utilized this area for nesting.

Pallid Sturgeon

The historic range of the pallid sturgeon included the Missouri River from Fort Benton, Montana, to St. Louis, Missouri; the Mississippi River from above St. Louis to the Gulf; the lower reaches of other large tributaries, such as the Yellowstone, Platte, Kansas, Ohio, Arkansas, Red, and Sunflower; and the first 60 miles of the Atchafalaya River (USFWS, 2011b). The pallid sturgeon was considered uncommon and historic population estimates on the upper Missouri River were unknown (USFWS, 1993). The pallid sturgeon was listed as endangered on September 6, 1990 (USFWS, 1993). In 2004, there was estimated to be 158 wild adult pallid sturgeon in the Fork Peck and Yellowstone reaches of the species' range (Klungle and Baxter, 2005). Due to ongoing stocking efforts, populations have been increasing on the lower Missouri River (Missouri River Recovery Program, 2010).

Adult pallid sturgeon typically utilize the bottom of large, turbid, fast flowing rivers. However, their life-cycle requires a wide array of aquatic habitats from floodplain backwaters to main river channels (USFWS, 1993). Pallid sturgeon is a long lived species (up to 40 years), with estimated sexual maturity reached in 7 to 9 years for males and 15 to 20 years for females (USFWS, 1993). Females may spawn only every 3 to 10 years (USFWS, 1993). Overall, the life history of pallid sturgeon is not well understood. Spawning is thought to occur between June and August and historically in the upper reaches of the range coinciding with an increase in river flow from mountain runoff. The feeding ecology of pallid sturgeon is not well understood. It is thought that the diet of young fish is mainly aquatic invertebrates with an increase in small fish consumption as pallid sturgeon age (USFWS, 1993). Habitat for this species is limited to the crossing of the Missouri River west of Williston in areas of open water in the main channel and floodplain backwaters.

Piping Plover

The piping plover is small shorebird that historically was widely distributed across the Great Plains. The piping plover was listed as threatened across its range in 1985, except in the Great Lakes region where it is listed as endangered (50 Federal Register 50733; December 11, 1985). In the Great Plains, piping plovers inhabit barren sand and gravel shores of rivers and lakes and the shores of alkali wetlands and lakes. Plovers avoid dense vegetation. Habitat destruction and poor breeding success are major reasons for the population decline (USFW, 2012b).

North Dakota is the most important state in the Great Plains region for nesting piping plovers. The state's population of piping plovers was 496 breeding pairs in 1991 and 399 breeding pairs in 1996. More than three-fourths of piping plovers in North Dakota nest on prairie alkali lakes, while the remainder use the Missouri River. Almost all natural lakes used by piping plovers in North Dakota are alkaline and have salt-encrusted, white beaches with sparse vegetation. Beaches used by piping plovers generally are 10 to 40 yards wide. Piping plovers also use barren river sandbars. In North Dakota, barren river sand bars are found on the Missouri and Yellowstone rivers (USFWS, 2012b).

The breeding season in North Dakota extends from mid-April through August. Pairs are territorial and defend their nest area from other piping plovers. A 4-egg clutch is laid in a shallow depression in open, sand/gravel substrate. Both sexes share in incubation, which lasts about 28 days. Plover chicks can walk and feed within hours of hatching and can fly in about 21 days. Piping plovers feed in open beach areas on insects and crustaceans (USFWS, 2012b).

Habitat for this species will include the area of the crossing of the Missouri River west of Williston and any beach areas associated with alkaline lakes. The area of the Missouri River west of U.S. Highway 85 has been designated critical habitat for the piping plover by USFWS. Designated elements of critical habitat include prairie alkali wetlands and surrounding shoreline; river channels and associated sandbars and islands; and reservoirs and inland lakes and their sparsely vegetated shorelines, peninsulas, and islands. While the Corridor/Route will travel through the area identified as critical habitat, no structures will be placed within the primary constituent elements listed above.

Sprague's Pipit

The Sprague's pipit is a small, grassland bird. It migrates from breeding grounds in the northern prairies of southern Canada and northern United States to the wintering grounds in southern United States and northern Mexico. The Sprague's pipit was designated as a candidate for listing under ESA on September 15, 2010 (Federal Register, 2010). Historically, Sprague's pipit was found throughout the native prairie grasslands of North America; now they are only common in large remnant grassland patches in the northern mixed-grass native prairie of North America.

Native grassland is used extensively by Sprague's pipits throughout their life cycle. Typical nest sites are dominated by native grasses and sedges with forbs and shrubs, litter, and bare ground present in lesser amounts. Larger tracts of native grassland in landscapes dominated by grasslands are thought to influence the abundance of Sprague's pipits on their breeding grounds. Sprague's pipits have not been documented nesting in Conservation Reserve Program grasslands, dense nesting cover (waterfowl nesting habitat), or

cropland (USFWS, 2010). Large tracts of grassland are also preferred habitat of wintering Sprague's pipits but they may use non-native grasslands to a greater extent. Little if any data is available for habitat preferences during migration.

Sprague's pipits breed in the historic prairie regions of the northern United States, including central and western North Dakota, and Canada and winter from central Texas south into central Mexico. They arrive on the breeding grounds from mid-April to mid-May with nest initiation anywhere from the second week of May to early August. Four to five eggs are laid on the ground in a cup--shaped nest made of grass. The nest may also be covered with a grass canopy. Incubation is usually 12 to 14 days and mostly done by the female. Generally, Sprague's pipits leave the breeding grounds in late September and arrive on their wintering grounds by early November. The diet of Sprague's pipits consists mostly of arthropods throughout the year (Jones, 2010). Habitat for Sprague's pipit occurs within the Project area in areas of native grasslands.

Whooping Crane

Whooping cranes are the tallest North American bird. They are omnivorous, nest in marshes, and make long winter and spring migrations from their breeding areas in and around Wood Buffalo National Park in Canada and their winter grounds in and around the Aransas National Wildlife Refuge (USFWS, 2007b). They were listed as "threatened with extinction" in 1967 and "endangered" in 1970, then listed as federally endangered after the passing ESA. They are also listed as endangered in Canada. The natural population of whooping cranes came to an all-time low of 15 individuals in 1941. Since then, the wild population of whooping cranes (of which only one is known to exist) has grown steadily to 279 individuals in 2011 (USFWS, 2012e). The total population of wild and captive whooping cranes, as of 2011, was 437 (USFWS, 2012e).

There is no designated critical habitat for whooping crane habitat in North Dakota (USFWS 2012c). Whooping cranes feed and roost in wetlands, riparian areas, and croplands (USFWS, n.d.). Habitat for whooping crane in the form of various sized wetlands for roosting and agricultural lands for foraging are found throughout much of the project area, with the exception of the badlands area north and south of the Little Missouri River crossing. The whooping crane migration corridor does traverse through North Dakota, and the Corridor/Route is within the 90 percent migration corridor (Figure 5.13-6).

5.13.1.5.2 USFS Sensitive and Management Indicator Species

There are 19 animal species known to occur in the Dakota Prairie National Grasslands (Little Missouri, Sheyenne, Cedar River, and Grand River National Grasslands) that are considered by USFS to be

sensitive species in North Dakota (Appendix P). In addition, there are 38 sensitive/watch plant species identified for LMNG (Appendix Q). Range, habitat, and life history information for the 19 sensitive animal species is presented below. Habitat information for the sensitive/watch plant species is contained in Appendix Q. The plains sharp-tailed grouse (*Tympanuchus phasianellus jamesii*) is identified as a Management Indicator Species (MIS) in the Land and Resource Management Plan for the Dakota Prairie National Grasslands Northern Region 2001 (USFS, 2001) and was addressed in the DEIS at the request of USFS (USFS, 2012a).

Baird's Sparrow

Baird's sparrow (*Ammodramus bairdii*) is a smallish bird that lives almost exclusively in native prairie areas within the northern Great Plains. Baird's sparrows prefer native prairie and forbs that is relatively clear of grass litter and heavy brush. They spend summers in the Great Plains region of North Dakota, Montana and the Canadian provinces of Saskatchewan, Alberta and Manitoba. Winters are spent in Arizona and Mexico, with birds arriving in October and November. Females lay one brood a year of 3 to 6 eggs that they incubate for 11 to 12 days. Young will stay in the nest for 8 to 10 days before leaving the nest (while still flightless) to forage. Young Baird's sparrows eat only spiders and insects, while adults feed on seeds and insects. Baird's sparrow numbers have declined due to loss or degradation of prairie habitat. However, portions of North Dakota continue to provide good habitat for Baird's sparrows, including the northwestern and the east-central parts of the state (Missouri Coteau) (USFWS, 2012f). Baird's sparrows can also be found nesting east of the Lake Sakakawea/Missouri River area. In addition to being a USFS sensitive species, Baird's sparrow is also a ND Level 1 Species of Conservation Priority (NDGFD, 2010d; Appendix R).

Bald Eagle

Bald eagles historically occurred throughout the United States and Canada but experienced a dramatic population decline between the 1870s and the 1970s. Populations have since rebounded and there are breeding populations in all of the lower 48 states and Alaska. Bald eagles are capable of breeding at 4 or 5 years of age, but in healthy populations they may not start breeding until much older. Breeding bald eagles occupy "territories" that they will typically defend against intrusion by other eagles. In addition to the active nest, a territory may include one or more alternate nests (nests built or maintained by the eagles but not used for nesting in a given year). Bald eagles generally nest near coastlines, rivers, large lakes or streams that support an adequate food supply. They often nest in mature or old-growth trees; snags (dead trees); cliffs; rock promontories; rarely on the ground; and with increasing frequency on manmade

structures such as power poles and communication towers. In forested areas, bald eagles often select the tallest trees with limbs strong enough to support a nest that can weigh more than 1,000 pounds. Nesting activity begins several months before egg-laying. Egg-laying dates vary throughout the United States, ranging from October in Florida, to late April or even early May in the northern United States. Incubation typically lasts 33 to 35 days, but can be as long as 40 days. Eaglets make their first flights about 10 to 12 weeks after hatching, and fledge within a few days after the first flight. However, young birds usually remain in the vicinity of the nest for several weeks after fledging because they are almost completely dependent on their parents for food until they disperse from the nesting territory approximately 6 weeks later (USFWS, 2007c).

The bald eagle is also a ND Level II Species of Conservation Priority (NDGFD, 2010d; Appendix R) and was formerly listed under ESA. The first bald eagle nest in North Dakota since 1975 was documented along the Missouri River in 1988. At the time of delisting in 2007, at least 20 active bald eagle nests were located in various parts of the state (USFWS, 2012l).

Burrowing Owl

The western burrowing owl (*Athene cunicularia hypugaea*) is a grassland specialist distributed throughout western North America, primarily in open areas with short vegetation and bare ground in desert, grassland, and shrub-steppe environments. Burrowing owls are dependent on the presence of fossorial mammals (prairie dogs, ground squirrels), and tortoises primarily, whose burrows are used for nesting and roosting. Burrowing owls historically bred from south central and southwest Canada southward through the Great Plains and western U.S. and south to central Mexico. Courtship and pair formation occur in March and April in most areas. Incubation lasts 28 to 30 days and is performed by the female. The young begin feathering out at 2 weeks of age, run and forage by 4 weeks of age, and are capable of sustained flight by 6 weeks. Burrowing owl families often switch burrows every 10 to 15 days when the young are 3 to 4 weeks old and remain as a loose-knit group until early fall when the young may begin to disperse to nearby burrows. Burrowing owls are opportunistic feeders, primarily taking insects, small mammals, birds, amphibians and reptiles. Foraging occurs in a variety of habitats, including cropland, pasture, prairie dog colonies, fallow fields, and sparsely vegetated areas. Populations of burrowing owls are believed to have declined in several large regions, notably in the Great Plains and Canada. Primary threats across the North American range of the burrowing owl are habitat loss due to land conversions for agricultural and urban development, and habitat degradation and loss due to reductions of burrowing mammal populations (USFWS, 2003).

The burrowing owl is also a ND Level II Species of Conservation Priority (NDGFD, 2010d; Appendix R and is known to occur in the LMNG (USFS, 2002).

Greater Prairie-chicken

Greater prairie-chickens (*Tympanuchus cupido*) are endemic to the grassland habitats of the central and eastern United States. Prior to settlement by Europeans, populations inhabited the tallgrass prairies of the eastern states, with the core of the distribution centered near the intersection of Missouri, Illinois, and Iowa. Range expansion of greater prairie-chickens to the north and west during the 1800s shifted the distribution into suitable grasslands as far north as central Alberta, and westward to northeastern Colorado. Greater prairie-chickens are currently distributed in remnant tallgrass prairie in the eastern portions of their range, and in mixed, midtallgrass prairies in the western portions. Greater prairie-chickens have a lek mating system, which includes a booming display by males. Several behaviors are performed to produce the booming display; males extend their eye combs, lower their head, erect pinnae feathers on their neck, point their tail somewhat forward, stamp their feet on the ground, click their tail, stiffen, shake, and drop their wings until the tips of the primaries touch the ground, expand their esophageal air sacs, and produce a booming vocalization. Male greater prairie-chickens generally display on leks from early March to June, with peak display activity occurring from April to mid-May. Lek sites are considered to be traditional as they are often used by birds year after year. Leks are typically located on elevated sites in open areas where the vegetation is short and sparse. Female greater prairie-chickens construct shallow, bowl-shaped depressions in the substrate for nests then line their nests with small amounts of dried grass, leaves, and feathers. The average clutch size for greater prairie-chickens is 11 to 12 eggs, with females incubating clutches for 23 to 25 days. Hatching of the clutch may take 1 to 2 days, and broods leave the nest within 24 hours following hatching. Chicks become more solitary and scattered during late August and early September, and dispersal is generally completed in September and October. Composition of greater prairie-chicken diet varies among regions, seasons, and age classes, but is primarily comprised of cultivated grains, leaves, seeds, buds, and insects. Greater prairie-chicken population declines are attributed to habitat loss (USFS, 2005a).

In addition to being a USFS sensitive species, the greater prairie-chicken is also a ND Level II Species of Conservation Priority (NDGFD, 2010d; Appendix R). Breeding populations of greater prairie-chicken are known from Grand Forks County and Sheyenne National Grasslands in North Dakota (USFWS, 2012g).

Plains Sharp-tailed Grouse

Sharp-tailed grouse closely resemble prairie chickens, except that sharp-tails have a pointed tail, and the air sacs on the neck of the male are purple. They are resident from Alaska east to Hudson Bay and south to Utah, northeastern New Mexico and Michigan. During the breeding season in March to June, sharp-tailed males congregate on dancing grounds or leks in the early morning to impress nearby female grouse. The male performs a dance in which the wings are extended, the tail is raised vertically, the head is lowered and the entire body is horizontal to the ground. The bird's feet move rapidly and the tail feathers make a clicking noise. As an invitation to the females, the sharp-tailed mail cackles loudly and jumps 3 to 4 feet in the air rapidly beating its wings. This display is called the flutter-jump. Female plains sharp-tailed grouse typically lay 10 to 13 buff-brown eggs in a grass-lined depression in tall grass or brush. The diet of plains sharp-tailed grouse includes a variety of forbs, grasses and insects. In winter, sharp-tailed grouse also feed on buds, catkins, or berries of deciduous trees and shrubs.

The plains sharp-tailed grouse is a MIS for high-structure grasslands in the LMNG. High structure grasslands contain scattered shrubs and diverse vegetative structure. High-structure vegetation, such as shrubs, provide nesting cover for plains sharp-tailed grouse and other bird species. High-structure vegetation also provides brood escape cover and winter food sources (buds and fruits of buffaloberry, rose, snowberry, and juniper) (USFS, 2001).

In addition to being a MIS for LMNG, the plains sharp-tailed grouse is also a ND Level II Species of Conservation Priority (NDGFD, 2010d; Appendix R).

Greater Sage-grouse

The greater sage-grouse (*Centrocercus urophasianus*) is a large, ground-dwelling bird. Sage-grouse depend on a variety of shrub steppe habitats throughout their life cycle, and are considered obligate users of several species of sagebrush (e.g., Wyoming big sagebrush, mountain big sagebrush [*Artemisia tridentata* ssp. *vaseyana*], and basin big sagebrush). Locally important sagebrush species, such as low sagebrush (*Artemisia arbuscula*), black sagebrush (*Artemisia nova*), fringed sagebrush (*Artemisia frigida*), and silver sagebrush can also be used by sage-grouse. Sage-grouse exhibit strong site fidelity to breeding, nesting, brood rearing, and wintering areas. Adult sage-grouse rarely move from these habitats once they have been selected, which limits their ability to adapt to change. During the spring breeding season, male sage-grouse gather together to perform courtship displays on leks, which are relatively bare areas surrounded by greater shrub steppe cover, which is used for escape, nesting and feeding cover. The proximity, configuration, and abundance of nesting habitat are key factors influencing lek location. High-

quality nesting areas are typically characterized by sagebrush with an understory of native grasses and forbs, with horizontal and vertical structural diversity that provides an insect prey base, herbaceous forage for pre-laying and nesting hens, and cover for the incubating hen. Hens lay an average clutch of seven eggs. Hens and chicks use shrub and grass cover for concealment and forbs and insects are an essential dietary component for chicks. Most sage-grouse gradually move from sagebrush uplands to more mesic (moist) areas, such as streambeds or wet meadows), during the late brood-rearing period (3 weeks posthatch) as vegetation dries out in the summer. Summer use areas can include sagebrush habitats as well as riparian areas, wet meadows and alfalfa fields. As vegetation continues to dry out and die off through the late summer and fall, sage-grouse shift their diet entirely to sagebrush, eventually depending entirely on sagebrush throughout the winter for both food and cover. Many populations of sage-grouse migrate between seasonal ranges in response to habitat distribution. Migration can occur between winter and breeding and summer areas, between breeding, summer and winter areas, or not at all. Estimating an "average" home range for sage-grouse is difficult due to the large variation in sage-grouse movements both within and among populations related to the spatial availability of seasonal habitats. Annual recorded home ranges for sage-grouse have varied from 4 to 615 square kilometers (1.5 to 237.5 square miles) (USFWS, 2012j).

Prior to European settlement in the 19th century, sage-grouse inhabited 13 western states and three Canadian provinces. Sage-grouse have declined across their range and now occupy 56 percent of their historic range. They currently occur in 11 states and two Canadian provinces.

Factors implicated in sage-grouse population decline include loss of habitat due to increased surface disturbance and general fragmentation of the landscape, and the spread of the West Nile Virus. On March 23, 2010, USFWS determined that the greater sage-grouse warranted the protections of ESA. However, USFWS also found that listing was precluded due to other higher priority actions, thereby making the sage-grouse a candidate under ESA. Subsequently, USFWS entered into a court-approved settlement agreement with environmental groups that set a schedule for making listing determinations on over 200 candidate species nationwide, including the sage-grouse. The schedule indicated that a decision (proposed listing rule or withdrawal) on the sage-grouse range-wide was due by September 2015 (USFWS, 2012j).

USFWS does not report the sage-grouse as occurring in Dunn, McKenzie, Mercer, Mountrail, and Williams counties (USFWS, 2011g). Sage-grouse is only known or believed to occur in North Dakota in Bowman, Golden Valley, and Slope counties in North Dakota, but it is not reported from any of the

counties crossed by the Project (USFWS, 2012h). The greater sage-grouse is also a ND Level II Species of Conservation Concern (NDGFD, 2010d; Appendix R).

Loggerhead Shrike

Loggerhead shrikes breed throughout a large portion of central and southern North America. Although historically common in most areas of their range, shrike abundance has declined nearly continent-wide. Loggerhead shrikes winter throughout the southern portion of the United States, with the northern limits being in California, Nevada, Utah, Colorado (primarily west and south), southern Kansas, Arkansas, Tennessee, and Virginia. The migratory behavior of loggerhead shrikes has not been well studied. Some southern shrike populations are resident, while other breeding populations are migratory. Loggerhead shrikes breed in a wide variety of open habitats including native and non-native grasslands, sage scrub, and other areas with a sparse coverage of bushes and trees and bare ground. The presence of thorny trees/bushes or barbed-wire fences for impaling prey is also thought to be an important component of nesting habitat. Nests are typically placed in trees or thick shrubs within pastures and grasslands, with isolated trees or shrubs being preferred. Loggerhead shrikes lay one egg per day, with a typical clutch of five to seven eggs. Females incubate the eggs for an average of 16 days and then brood the nestling for 4 to 5 days. Fledglings typically remain in loose company. Loggerhead shrikes feed primarily on insects and small vertebrates. The availability of suitable perches is an important component of foraging habitat as shrikes are sit-and-wait predators, and thus spend the majority of their foraging time perched. Factors limiting loggerhead shrike population growth include habitat loss and degradation; lack of good nesting sites; mortality of adults and recently fledged young due to collisions with motor vehicles; and low survival on wintering grounds (USFS, 2005b).

The loggerhead shrike is also a ND Level II Species of Conservation Concern (NDGFD, 2010d; Appendix R). It is known to breed throughout North Dakota and is fairly common throughout the state, except in the Red River Valley (USGS, 1995).

Long-billed Curlew

The long-billed curlew (*Numenius americanus*) is the largest North American shorebird. The historical breeding range of the long-billed curlew was the western U.S. and the southern Canadian Prairie Provinces from California north to British Columbia and east to southern Manitoba and Wisconsin, northern Iowa and eastern Kansas. This breeding distribution has contracted and long-billed curlews have lost about 30 percent of their historical range. The eastern edge of the current breeding range is the western Great Plains from the Texas panhandle north throughout southwestern and south central

Saskatchewan. Long-billed curlews currently winter along the southwestern U.S. coast from central California, southern Texas and Louisiana south along both of Mexico's coasts to Guatemala, and are casual along the Atlantic coast north to New Brunswick, the southeastern South Carolina and Florida coasts, and the West Indies. Nesting long-billed curlews typically avoid trees, tall weedy vegetation, and tall dense shrubs during the breeding season, and nest on the ground in the simplest, most open habitat available. Water availability, minimum block size, vegetation height, density, and structure and species composition are characteristics whose importance has been debated. Spring and summer crop fields are typically used during brood rearing, while coastal sandy beaches, intertidal mudflats, salt marshes, coastal and inland pastures and farmlands, freshwater wetlands, salt ponds, and agricultural pastures are used by wintering long-billed curlews (USFWS, 2009a). Wintering curlews forage on earthworms, marine worms, and shrimp, while summering curlews feed on grasshoppers, beetles, spiders, and caterpillars. Females usually lay four beige or light green eggs, densely marked with brown or purple. Both parents incubate the eggs for about 28 days. Long-billed curlew chicks are precocial and within a few hours they leave the nest for denser, taller grasses, and begin to feed themselves within a day. Both parents defend chicks from crows, coyotes, hawks, and people until the young curlews fledge in 38 to 45 days (National Audubon Society, 2012). Initial long-billed curlew population declines were attributed to overhunting and plowing of the native prairies for agriculture. Current range-wide threats include habitat loss and destruction due to urban and energy development, grassland conversion for agricultural purposes, changes in the natural fire regime, and the spread of exotic invasive plants (USFWS, 2009a).

In addition to being a USFS sensitive species, the long-billed curlew is also a ND Level I Species of Conservation Concern (NDGFD, 2010d; Appendix R). The long-billed curlew is known to breed in southwestern North Dakota, but is considered uncommon (USGS, 2006a).

Sprague's Pipit

See the description for Sprague's pipit under Section 5.13.1.5.1, Endangered Species Act Species and Critical Habitat. In addition to being a candidate for listing under ESA and a USFS sensitive species, Sprague's pipit is also a ND Level I Species of Conservation Priority (NDGFD, 2010d; Appendix R).

Black-tailed Prairie Dog

The black-tailed prairie dog (*Cynomys ludovicianus*) is a small, stout ground squirrel with a characteristic black tail. Black-tailed prairie dogs are diurnal, burrowing animals that do not hibernate like other prairie dog species. The historic range of the black-tailed prairie dog included portions of 11 States, Canada, and Mexico. Today it occurs from extreme south-central Canada to northeastern Mexico and from

approximately the 98th meridian west to the Rocky Mountains. The species is currently present in Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming. A range-wide estimate of historically occupied habitat for the black-tailed prairie dog is 80 to 100 million acres, while current occupied habitat is estimated to be 2.1 million acres. Factors influencing black-tailed prairie dog populations range-wide include conversion of prairie grasslands to croplands, large-scale poisoning, recreational shooting, and sylvatic plague. The black-footed ferret is a federally listed endangered species that depends upon prairie dogs as a source of food and uses its burrows for shelter. Other species such as the swift fox, mountain plover, ferruginous hawk, and burrowing owl are dependent on prairie dogs to varying degrees (USFWS, 2011h).

Black-tailed prairie dogs are highly social animals. They live in colonies or towns, which cover from 1 acre to thousands of acres of grassland habitat. A family group is made up of an adult male, one to four breeding females and their offspring younger than 2 years of age. Breeding season varies with latitude, starting in January in the southern parts of its range and continuing into April in the northern part. Females normally have one litter per year that ranges in size from one to eight young. Due to mortalities, on the average, only three individuals survive and come above ground. Pups emerge at about 41 days and stay with their family group for a minimum of 2 years. Black-tailed prairie dogs are herbivores and feed on a variety of grasses and forbs, and to a lesser extent seeds and insects (USFWS, 2009b).

In addition to being a USFS sensitive species in North Dakota, the black-tailed prairie dog is also a MIS for low structure grasslands in the LMNG Northern Region (USFS, 2001), and a ND Level I Species of Conservation Priority (NDGFD, 2010d; Appendix R). Black-tailed prairie dogs are known from southwest North Dakota, including the project counties of Dunn, and McKenzie (NDGFD, 2008).

Bighorn Sheep

The bighorn sheep is one of two species of wild sheep in North America with large horns, the other being the Dall sheep (*Ovis dalli*). Bighorn sheep are actually three distinct subspecies: Rocky Mountain bighorn sheep (*O. canadensis canadensis*); Sierra Nevada bighorn sheep (*O. canadensis sierrae*); and Desert bighorn sheep (*O. canadensis nelsonii*). Bighorn sheep live in the western mountainous regions of North America, ranging from southern Canada to Mexico. Most populations undergo seasonal movements, generally using larger upland areas in the summer and concentrating in sheltered valleys during the winter (National Wildlife Federation, 2012). The breeding season generally extends from August to November for desert bighorn sheep and October to January for Rocky Mountain and California bighorn sheep. Bighorn sheep have an approximately 6 month gestation period and most ewes give birth

to one lamb per year. Lambing seasons vary by location and year. Desert bighorn lambs are usually born in January to June, with the majority of births in February-April. The lambing season for bighorn sheep in colder climates is more concentrated and most births occur in April to June. Prior to giving birth, adult ewes isolate themselves in steep rocky areas. Newborn lambs can walk within hours after birth; however they are dependent upon steep terrain for protection from predators. Lambs follow their mothers for the first year of life to learn their home range and behavior (Bighorn Institute, 2012).

Bighorn sheep are found in western North Dakota. They are a big game animal in North Dakota with a regulated hunting season. North Dakota's bighorn sheep hunting season opens October 26 and continues through November 8. In 2012, NDGFD reduced the number of sheep licenses from six to four, due to a declining number of mature rams (NDGFD, 2012). The lambing season for bighorn sheep in the study area is April 1st thru July 1st of each year (NDGFD, 2010a).

Insects

USFS lists nine species of butterflies as sensitive in North Dakota: Arogos skipper (*Atryone arogos iowa*); broad-winged skipper (*Poanes viator*); Dakota skipper; Dion skipper (*Euphyes dion*); mulberry wing (*Poanes massasoit*); Ottoe skipper (*Hesperia ottoe*); Powesheik skipper (*Oarisma powesheik*); regal fritillary (*Speyeria idalia*); and tawny crescent (*Phycoides batessi*). The broad-winged skipper, Dion skipper, and the mulberry wing are associated with wetland habitats (Butterflies and Moths of North America, 2012). The Arogos skipper, Dakota skipper, Ottoe skipper, Powesheik skipper, regal fritillary are associated with prairie and grassland habitats (Shepherd, 2005; USGS, 2006b; USFWS, 2011i; Vaughan and Shepherd, 2005). The tawny crescent is found in wetland woods and prairie adjacent to woodlands (USGS, 2006b; Butterflies and Moths of North America, 2012).

The broad-winged skipper, Dion skipper, mulberry wing, and Powesheik skipper are known from eastern North Dakota. The Ottoe skipper, Arogos skipper, regal fritillary, Dakota skipper, and tawny crescent are known from western North Dakota (USGS, 2006c). The Dakota skipper is a candidate for listing under ESA and is reported to occur in Dunn and McKenzie counties in North Dakota (USFWS, 2012k). The Dakota skipper is addressed in more detail in Section 5.13.1.5.1, Endangered Species Act Species and Critical Habitat. The Powesheik skipper (also known as the Powesheik skipperling) is also a candidate for listing under ESA, but it is not reported from any of the counties crossed by the project (USFWS, 2011g). Population declines for these species are attributed primarily to habitat loss and fragmentation.

5.13.1.5.3 North Dakota Species of Conservation Priority

The State of North Dakota does not have an endangered species law but has categorized 100 fish and wildlife species into three levels of conservation priority (NDGFD 2010d). The North Dakota State Wildlife Grants (SWG) program provides federal money for wildlife conservation and restoration programs for species of conservation priority. The following categories have been developed to describe the conservation needs for North Dakota species of conservation priority:

- **Level I:** species with a high level of priority due to the declining status here or across the range or high rate of occurrence in North Dakota, constituting the core of the species breeding range but are at-risk range wide, and non-SWG funding is not readily available to them.
- **Level II:** species with a moderate level of priority or species with a high level of priority but a substantial level of non-SWG funding.
- **Level III:** species with a moderate level of priority but are believed to be peripheral or non-breeding in North Dakota.

A complete listing of the 100 species of conservation priority for North Dakota is provided in Appendix R.

5.13.2 Impacts

The proposed Project area contains a variety of diverse landscapes consisting of rolling prairies, badland areas, cultivated farmlands, and riparian areas. These landscapes contain diverse vegetative communities that serve as habitat to many species of wildlife. Riparian areas and wetlands within the proposed Project area provide habitat for plant and animal species dependent on these areas. Additionally, several special status species are known to utilize selected habitats found within the proposed Project area. This section discusses potential impacts to vegetation, wildlife, wetlands, and special status species resources resulting from construction and operation of the proposed Project.

The proposed Project will encompass a wide variety of terrain, vegetative communities, and habitat types used by a variety of wildlife. Construction and operation of the proposed Project will have impacts on vegetation, wetlands, and wildlife. Using appropriate mitigation measures, there will likely be no impacts to special status species. Potential impacts will include:

- Disturbances or changes to vegetative communities as a result of construction activities within the ROW
- Introduction and spread of noxious weeds during construction of the line

- Sedimentation within wetland areas caused by construction activities
- Removal of wetland vegetation within the ROW during construction
- Removal of wildlife habitat within the ROW
- Temporary disturbance to wildlife from human presence and disruption to habitat
- Disturbance to aquatic habitats from construction activities
- Impacts to special status species or their habitat

5.13.2.1 Vegetation

Potential impacts to vegetation will include temporary and permanent effects. Impacts will include localized disturbance to vegetative communities caused by construction equipment and vehicles during site preparation, such as damage to vegetation from vehicle tires, excavation, grading, and soil stockpiling. Woody vegetation will be cleared within the ROW where necessary depending on terrain and in areas where access roads are required. Construction through forested areas will require the removal of any trees or large shrubs that will interfere with line safety, equipment access, and operation. Vegetation will be permanently removed at each structure foundation location, and woody vegetation will be cleared within currently forested areas of the ROW. Only temporary impacts to vegetation are anticipated within the ROW in grassland, cropland, and hayland areas, as these vegetation types will be restored within the ROW upon completion of construction. Permanent impacts to vegetation will be limited to conversion of woodland to non-woodland habitat and any loss of vegetation resulting from permanent conversion of new, undeveloped areas, particularly for substation sites.

The introduction and spread of noxious weeds as a result of construction of the proposed Project will be possible through ground disturbance and transfer by equipment. North Dakota law (NDCC § 4.1-47-02) requires "that every person do all things necessary and proper to control the spread of noxious weeds". Currently, all counties included within the proposed Project area have county-level weed boards, which oversee and control efforts to eliminate the introduction and spread of noxious weeds. Precautions will be needed during construction to prevent the introduction and spread of noxious weeds, such as re-seeding of disturbed areas with certified seed that contains no viable noxious weed seeds, as well as the use of standard BMPs related to construction and re-vegetation practices within disturbed areas.

Table 5.13-3 presents the potential number of acres impacted within the Project Corridor/Route for each vegetation type for the entire route length. A discussion of impacts to vegetation resulting from the construction and operation of the Project is provided below.

Table 5.13-3: Vegetation Types within Corridor/Route

Vegetation Type	Project Corridor/Route Acres
Woodland	113.8
Grassland	1,641.5
Pasture/Hayland	158.0
Cultivated Cropland	1,392.2

*Source: National Land Cover Dataset

Temporary impacts associated with the construction of the Project will include the disturbance of vegetation along temporary access roads, as well as temporary disturbance of vegetation within the ROW boundary for access during construction. Grassland vegetation comprises the largest amount of acreage within the Corridor/Route (1,641.5 acres), although very little of this area will actually be subject to disturbance during construction. Grassland vegetation will be temporarily impacted during construction, but due to its short height, removal of only minimal grassland vegetation is anticipated within the ROW except at structure locations, and grassland vegetation will be expected to recover in full upon the completion of construction and restoration efforts. Vegetation used for pasture or hayland will be temporarily impacted as well, primarily during structure erection and pulling of conductors. In agricultural areas, cropland will be temporarily disturbed within the ROW during construction, but will be re-planted following completion of construction. Permanent vegetative impacts (not including forested areas) associated with the Project will primarily be confined to the removal of vegetation at each structure foundation location, resulting in a permanent loss of vegetation of approximately 1.03 acres over the length of the Corridor/Route.

Approximately 113.8 acres of woodland is located within the Corridor/Route. Typically, trees will be cleared to maintain access to the ROW and appropriate clearance for the safe and reliable operation of the line. For this project, much of the woodland vegetation is associated with deep draws and canyons in badland areas and around drainages. It is likely that many of these areas will be spanned in such a manner that the trees will pose no hazard to the line and clearing will be unnecessary. Thus, while approximately 113.8 acres of woodland occurs within the Corridor/Route, considerably less woodland is likely to actually require clearing. Depending on the type of vegetation adjacent to these wooded areas, cleared woodland areas will likely be converted to grassland or pasture similar to these types of areas throughout the project areas. In addition, though not categorized as woodland, numerous treed windbreaks, shelterbelts, and fencerows will be crossed by the Project. Trees within the ROW at these

locations will be cleared and the areas converted to similar vegetative cover that is adjacent to the cleared areas.

On lands managed by the USFS, a botanical survey will be performed, in coordination with USFS staff, for all USFS sensitive plant species and watch plant species. Surveys will be conducted during the survey time window established by the USFS of May 15 to September 15, 2013. During the survey, all plants identified will be recorded with particular attention paid to sensitive plant and watch plant species.

The North Dakota Natural Heritage Inventory (NHI) database has indicated that a sensitive ecological community of western little bluestem prairie is located in the vicinity of the Corridor/Route in Dunn County. The construction and operation of the Project will avoid this sensitive area.

Periodic trimming and clearing of the ROW will be anticipated to keep the transmission lines clear of any vegetation obstructions during line operation. Herbicides may be used periodically within the ROW to prevent the growth and spread of any noxious weeds, control woody vegetation and prevent stump sprouting. These activities are not anticipated to have any permanent impacts to vegetation outside of the transmission ROW along the length of the Corridor/Route. However, it may occasionally be necessary to trim or remove trees adjacent to the ROW that pose a hazard to the safe and reliable operation of the line (danger trees). Management of danger trees will be infrequent and have little if any effect on adjacent vegetative communities.

The proposed Judson and Tande substations will require the removal of all vegetation within the fenced area of the site (approximately 12 acres per substation), as both sites will be converted to utility use. These substation sites are located in grassland or cropland areas, avoiding the clearing of woodland vegetation. Impacts to vegetation within the substation boundaries will be permanent.

5.13.2.2 Wetlands

Executive Order 11990, Protection of Wetlands, requires Federal agencies to minimize the destruction, loss, or degradation of wetlands when providing Federally-undertaken, financed, or assisted construction and improvements, as well as other activities. Each agency shall avoid new construction located in wetlands unless "the agency finds (1) that there is no practicable alternative to such construction, and (2) that the Proposal includes all practicable measures to minimize harm to wetlands which may result from such use."

Impacts to NWI wetland areas within the proposed Project area are expected to be minimal. Table 5.13-4 displays potential wetland types and acreages within the Corridor/Route. Wetland data was determined

using available National Wetland Inventory (NWI) data. Prior to construction, all wetland areas within the Corridor/Route will be delineated to minimize the Project's impacts to the wetland areas. During construction, steps will be taken to avoid wetland areas while accessing the ROW, and measures will be taken to avoid disturbing areas adjacent to wetlands to prevent sedimentation and soil runoff caused by construction disturbance. No permanent impacts, such as placement of transmission structures within wetland boundaries, will occur. Basin Electric will coordinate with the USACE to determine any permitting requirements and conditions necessary for construction involving wetlands within the Corridor/Route. No impacts to wetlands are anticipated during operation of the proposed Project.

Table 5.13-4: NWI Wetland Acres within Corridor/Route

Wetland Type	Wetland Acres in Corridor/Route
PEM	13.7
PSS	0.4
Lake	11.2
Pond	1.6
Riverine	2.5
Total	**29.4**

PEM = palustrine emergent, PSS = palustrine scrub/shrub
Source: NWI Geographic Information System (GIS) data layer

No structures will be placed within any wetlands within the Corridor/Route, and no clearing of wetland vegetation is anticipated within the ROW. BMPs will be employed to minimize impacts to wetlands within the ROW during construction.

No impacts to wetlands are expected from the construction of the proposed Judson or Tande substations. No NWI wetlands are located within the boundaries of either substation site, and no wetlands will need to be crossed for access to either site for construction. BMPs will be used to minimize soil erosion and runoff during construction to prevent sedimentation into nearby wetlands.

5.13.2.3 Wildlife

The Corridor/Route will cross a variety of different habitat areas used by a diverse assemblage of wildlife species. Although construction will result in minor changes in habitat composition for lands within the ROW, project-related impacts will largely be temporary and short-term, limited to the construction period and times when workers and equipment are regularly present. Potential impacts relevant to wildlife during the construction phase of the proposed Project may include:

- Temporary disturbance to wildlife within and near the transmission ROW during construction due to human intrusion, noise, and construction activity
- Disturbance or removal of vegetation during ROW clearing that is used as food, shelter, or cover for wildlife species
- Introduction of sediment into aquatic ecosystems during construction
- Potential exposure to contaminants such as fuels and chemicals used during construction
- Permanent loss of habitat, particularly wooded areas, shelterbelts, windbreaks, and fencerows

Potential impacts, both temporary and permanent, are discussed for specific wildlife types in the following sections.

Big Game

Species such as mule and white-tailed deer, elk, pronghorn antelope, and bighorn sheep will experience a potential loss of forage due to the clearing and disturbance of vegetation within the Corridor/Route. In most instances, this loss will be insignificant and available habitat and forage adjacent to the ROW will be sufficient for these species until construction was completed and vegetation within the ROW became re-established. Increased human activity and noise associated with the construction of the proposed Project will temporarily displace big game species in the area; however, during breaks in construction efforts (such as between structure placement and conductor stringing) and upon completion of construction these species will be expected to move back into the ROW and adjacent area.

Specific, sensitive areas used by certain big game species, such as lambing areas for bighorn sheep, are located within areas of the Little Missouri River badlands within the LMNG and adjacent private lands. These areas could potentially be affected if the Corridor/Route, which impacts approximately 143.8 acres of LMNG, was to be constructed through or near these areas during the lambing and calving seasons. Consultation with the North Dakota Game and Fish Department (NDGFD) determined that timing restrictions during construction will need to be adhered to within these areas in order to prevent disturbance to bighorn sheep lambing activities (April 1st thru July 1st). Based on this coordination and development and implementation of appropriate mitigation, it is anticipated that, although habitat within the ROW may be changed or modified from its current condition, big game calving and lambing activities will not be adversely impacted by construction. Following construction, the ROW will provide habitat not dissimilar to that currently present in the area and within existing utility ROW's. No changes in big game use of the area are anticipated.

Nongame Species

Potential impacts to nongame species such as small mammals, reptiles, and amphibians resulting from construction of the proposed Project will include temporary loss of habitat within the ROW in grassland and agricultural areas. Permanent impacts to existing habitat will occur in areas where forest will be cleared within the ROW. Additionally, some mortality of less-mobile or burrowing species may occur from construction vehicles or equipment within the ROW during construction. Although some nongame species will be temporarily displaced during construction of the transmission line, permanent displacement of these species is not anticipated, except potentially in cleared forest areas which may no longer provide suitable habitat for some species. Suitable forest habitat will be available in other areas near or adjacent to the Corridor/Route, and any loss of woodland will be minimal, with abundant woodland areas still available along the line for refuge during construction and as habitat during project operation. Long-term habitat fragmentation is also not anticipated due to the relatively open terrain and limited large-tract forested areas. Generally, forested areas will have a 150-foot-wide ROW cleared through them that will not create a barrier to forest-dwelling species. Additionally, in many areas woodland will be spanned, creating wooded corridors across the ROW, limiting potential fragmentation.

Birds

The MBTA (16 USC 703-712), makes it unlawful to take, kill, or possess migratory birds. The MBTA defines "take" as "to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, any migratory bird, any part, nest, or eggs of any such bird, or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof." Habitat disturbance or alteration, human disturbance, and collisions with transmission lines will result in impacts to migratory species.

Raptors, waterfowl, and other bird species may be impacted by the construction and operation of the proposed Project. Potential, temporary impacts to raptors and waterfowl species may occur during construction of the proposed Project. Foraging areas for these species will be temporarily disturbed during ROW clearing and general construction activities. Golden eagles, protected under the BGEPA, commonly use native grassland and badland areas within the proposed Project area for foraging and nesting. According to data from the North Dakota Game and Fish Department (NDGFD), three known raptor nest locations occur within 1,000 feet of the Corridor/Route, including a golden eagle nest, a Swainson's hawk nest, and a ferruginous hawk nest. Nest surveys will be conducted along and adjacent to

the proposed transmission line route prior to construction. Surveys will be done within the project ROW and a one-mile buffer on either side of the ROW using a helicopter flown at low altitude. Surveys will be done using a qualified biologist and will be completed prior to leaf out in spring to document nest locations. For nests within the ROW or for golden eagles, further nest observations may be required to determine occupancy, especially the year of construction. In coordination with the USFWS and USFS, Basin Electric will develop and implement a plan to protect any identified nests from adverse effects during construction.

ROW clearing will occur outside of nesting season or if during nesting season, nesting surveys will be completed and if nests are identified, an appropriate buffer for clearing and construction activities will be set in accordance with the protection measures identified in the Biological Assessment. Upon completion of construction, grassland species will be expected to return to the area as grassland is restored and construction disturbance ceases. Forest-dwelling species will likely move into neighboring forested areas adjacent to the ROW during construction and operation of the line. Species dependent on woodland habitat will experience a loss of habitat within the ROW. However, any loss will be minimal compared to the area of adjacent woodland and the generally minimal amount of clearing that will be required.

The Project will present the potential for avian collisions with the transmission line, particularly for larger, less maneuverable species and in areas of dense bird congregations, such as migrating waterfowl staging areas in the Missouri River crossing area. Under various conditions, including high wind, fog, or poor light conditions, avian collisions with the line, generally the overhead shield wire which is smaller and less visible than the actual conductor, may occur. Migratory waterfowl will be especially susceptible to transmission line collisions where the proposed transmission line will be located between agricultural areas (feeding) and wetland areas (roosting), and at the Little Missouri River and Missouri River crossings as these waterways will tend to concentrate waterfowl and provide natural flight corridors. Additionally, the Corridor/Route will be located entirely within the whooping crane migration corridor. Specific impacts to whooping cranes are discussed further in the Special Status Species section.

Electrocutions will pose an additional concern for bird species within the proposed Project area, particularly for raptors which commonly use transmission structures for perching while searching for prey, feeding, resting, or even nesting. However, the likelihood of electrocution from the proposed project is minimal. Transmission lines are generally not responsible for bird electrocutions as the conductors are separated far enough apart to prevent birds with outstretched wings from enabling the current to arch between lines

through the bird, resulting in an electrocution. However, Basin Electric designed the proposed project to meet the requirements for the protection of avian species from electrocution and line strikes according to the guidelines in the Avian Power Line Interaction Committee's "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006" (APLIC, 2006).

Aquatic Species

Since no transmission structures will be placed in any body of water along the course of the Corridor/Route, direct construction-related impacts to fish and other aquatic species will not occur. BMPs will be used to prevent soil erosion and runoff, sedimentation, water quality changes and contamination of water from herbicides, fuels, and other spills. In some instances, culverts may need to be installed across intermittent streams to provide access to the ROW for construction vehicles. Clearing of vegetation along stream banks may cause a local increase in water temperature due to increased levels of sunlight warming the water, potentially changing the aquatic habitat in these areas. BMPs will be employed during construction to minimize potential impacts to aquatic habitats and species.

Proposed Substations

Construction of the proposed Judson and Tande substations will require the removal of all vegetation within the fenced boundary of the sites. Impacts to wildlife during construction will be similar to those incurred during construction of the transmission line. Loss of vegetation in these fenced areas will be permanent, and any available wildlife habitat will be converted to utility use. The proposed substation sites will be 12 acres in size, and currently consist of grassland habitat. Land use in these areas is a mixture of grassland and tillable cropland. Exact impacts to available habitat will be determined upon acquisition of a site, if needed. Wildlife species using any available habitat on the proposed substation sites will be displaced to available habitat adjacent to these sites.

5.13.2.4 Special Status Species

The Project area may contain habitat for or has known occurrences of federally endangered, threatened, and candidate species; USFS sensitive and MIS species; and, North Dakota Species of Conservation Priority. These species are cumulatively referred to in this report as special status species.

According to the USFWS, the proposed Project area may contain suitable habitat for, or has known occurrences of, five Federally-listed endangered animal species, the whooping crane, interior least tern, pallid sturgeon, black-footed ferret, and gray wolf; one Federally-listed threatened species, the piping plover; and two candidate species, the Sprague's pipit and Dakota skipper. No federally listed endangered or threatened plant species are known to occur within the Corridor/Route. However, the

Corridor/Route crosses designated critical habitat for two animal species, the piping plover and pallid sturgeon at the Missouri River crossing.

The Corridor/Route contains 63.8 acres of critical habitat[15] for the piping plover. Designated areas of critical habitat include prairie alkali wetlands and surrounding shoreline; river channels and associated sandbars and islands; and reservoirs and inland lakes and their sparsely vegetated shorelines, peninsulas, and islands. Although structures will be placed within the greater boundary of critical habitat for the piping plover, no structures would be placed within the primary constituent elements of piping plover critical habitat. Impacts to the primary constituent elements are not expected. Additionally, the Corridor/Route crosses the Missouri River, known habitat for the pallid sturgeon, while paralleling U.S. Highway 85 near Williston. Habitat for the pallid sturgeon within the proposed Project area includes the upper reaches of the Missouri River itself. Impacts to sturgeon habitat are not anticipated (see Table 5.13-6 for species-specific considerations) as a result of the Project having no impacts to surface water habitats.

Although critical habitat for the whooping crane has not been designated within the Project area, the Project area is within the whooping crane migration corridor. This migration corridor provides the area within which whooping cranes are most likely to occur during spring and fall migration periods. The center of the corridor represents the core of the area followed by the cranes. The wider the corridor, the more likely cranes will occur within the corridor area considered. However, as the corridor widens out, the likelihood of crane occurrence decreases with distance from the migration corridor core. As cranes move east and west along the migration corridor in search of food, water, and roosting areas, they may venture outside the core of the migration corridor, potentially occurring in these fringe areas of the corridor. While crane occurrence at any particular location within the corridor will vary from year to year based on weather conditions and associated availability of water and wetlands and crop stages, over time, the greatest crane occurrence and use will trend toward the core of the migration corridor. Table 5.13-5 displays the length in miles that the Corridor/Route will occur within each whooping crane percent occurrence migration corridor. Although migration can be highly variable, this data provides an indication of the probability of whooping crane occurrence along the Corridor/Route.

[15] Piping plover critical habitat and pallid sturgeon habitat information was obtained from USFWS maps. Acreage of piping plover critical habitat was determined by measuring the amount of critical habitat occurring within the proposed Project ROW.

Table 5.13-5: Whooping Crane Percent Migration Corridor

	Length Through Whooping Crane Percent Migration Corridors (miles)					
	75%	**80%**	**85%**	**90%**	**95%**	**Total**
Project Corridor/Route	54.6	53.1	56.0	34.0	0	**197.8**

Source: USFWS Whooping Crane Percent Migration Corridor, as depicted in Figure 5.13-6

Whooping cranes are highly dependent on wetlands during migration for roosting, resting, and feeding and have been known to use wetland areas within the proposed Project area. Wetland acres within one mile of the Corridor/Route may also provide an indication of the likelihood of whooping cranes utilizing the area of the proposed project. The Corridor/Route will be located within one mile of 3,987.3 acres of NWI wetlands for the length of the route. Further analysis of potential whooping crane habitat is being conducted through a Resource Selection Function (RSF) analysis. This analysis will depict the probability of stopover likelihood to help identify areas of greatest risk or concern for the crane during migration.

USFS has identified 19 sensitive animal species in North Dakota that are known to occur in the Dakota Plains National Grasslands, which includes the LMNG (Appendix P). These include eight birds (Baird's sparrow, bald eagle, burrowing owl, greater prairie chicken, greater sagegrouse, loggerhead shrike, long-billed curlew, and Sprague's pipit); two mammals (black-tailed prairie dog and bighorn sheep); and nine species of butterfly (Arogos skipper, broad-winged skipper, Dakota skipper, mulberry wing, Ottoe skipper, Powesheik skipper, regal fritillary, and tawny crescent). USFS has also identified 38 sensitive/watch plants species in the LMNG. In addition, USFS has requested that the EIS for the Project address two MIS species for LMNG: the black-tailed prairie dog and the plains sharp-tailed grouse.

Table 5.13-6 presents the project considerations for all identified special status species. North Dakota Species of Conservation Priority and USFS sensitive/watch plant species are not specifically addressed here as the effects discussion for federally listed species and USFS sensitive species should encompass habitats utilized by North Dakota Species of Conservation Concern and USFS sensitive/watch plant species. Project-specific mitigation measures will be developed as part of detailed species-specific evaluation in the Biological Assessment (BA) for the Project (Appendix S), in consultation with USFWS and for lands within the LMNG in the Biological Evaluation (BE) (Appendix T), in consultation with the

USFS[16]. Project-specific mitigation measures will also be developed in consultation with USFS and will be included as conditions in the USFS-issued SUP.

Table 5.13-6: Potential Project Considerations for Federally-Listed Special Status Species

Species	Corridor/Route	Comment
Endangered		
Whooping crane	Approximately 197.8miles (entire length of Corridor/Route) of new line within migration corridor (Table 4-5)	Collisions with transmission lines pose highest potential risk, especially where line is located between wetland roosting areas and agricultural areas used for foraging. Habitat locations will be identified in the Project areas a result of surveys to be completed for suitable habitat locations. Project-specific mitigation measures will be developed as part of detailed species-specific evaluation in the Biological Assessment, in consultation with USFWS.
Interior least tern	None	Interior least terms may utilize sandbars in the vicinity of the Missouri River crossing. Project-specific mitigation measures will be developed as part of detailed species-specific evaluation in the Biological Assessment, in consultation with USFWS.
Pallid sturgeon	None	There will be no in-water work within the Missouri River and no work within its inundated floodplain; BMPs will be used to prevent impacts on water resources.
Black-footed ferret	None	No populations known to exist in North Dakota (USFWS, 2011a); surveys for prairie dog towns will be conducted prior to construction to identify habitat for black-footed ferret.
Gray wolf	None	No populations known to exist within the Project area

[16] The BA and BE are currently under development and will be included in Appendix S and Appendix T upon completion.

Species	Corridor/Route	Comment
Threatened		
Piping plover	Approximately 63.8 acres of designated critical habitat within Corridor/Route, however structures will not be placed in the primary constituent elements of piping plover habitat.	A habitat survey will be on both sides of the centerline of the Corridor/Route and findings included in the Biological Assessment. Project-specific mitigation measures will be developed as part of detailed species-specific evaluation in the Biological Assessment, in consultation with USFWS.
Candidate		
Sprague's pipit (also a USFS sensitive species)	Approximately 1,641.5 acres of potential grassland habitat within Corridor/Route	Potential temporary disturbance to grassland habitat within ROW; grassland habitat re-established upon completion of construction Project-specific mitigation measures will be developed as part of detailed species-specific evaluation in the Biological Assessment, in consultation with USFWS.
Dakota skipper (also a USFS sensitive species)	Approximately 1,166.1 acres of potential grassland habitat within Corridor/Route in Dunn and McKenzie Counties	Potential temporary disturbance to native grassland habitat within ROW; grassland habitat to be re-established upon completion of construction. Project-specific mitigation measures will be developed as part of detailed species-specific evaluation in the Biological Assessment, in consultation with USFWS.
USFS Sensitive Species		
Baird's sparrow	Approximately 1,641.5 acres of grassland habitat potentially containing areas of suitable native grassland within Corridor/Route	Potential temporary disturbance to native grassland habitat within ROW; grassland habitat to be re-established upon completion of construction. Project-specific mitigation measures will be developed in consultation with USFS and will be included as conditions in the SUP.

Species	Corridor/Route	Comment
Bald eagle/Golden eagle	No known nests within 1 mile of centerline of Corridor/Route	Nest surveys for raptors will be conducted in an area 1 mile on both sides of the centerline of the Corridor/Route during spring 2013. As part of project implementation, USFWS, USFS and NDGFD will be consulted to develop and implement a plan to protect any identified nests from adverse effects during construction. Basin Electric will develop an Avian Protection Plan for operation of the line and associated facilities.
Burrowing owl	Approximately 1,641.5 acres of grassland within Corridor/Route	Potential temporary disturbance to native and nonnative grassland habitat within ROW; grassland habitat to be re-established upon completion of construction. Project-specific mitigation measures will be developed in consultation with USFS and will be included as conditions in the SUP
Greater prairie chicken	None	No populations known to exist within the Project area
Greater sage-grouse	Approximately 0.6 acre of sage brush habitat within the Corridor/Route	Sage grouse not reported from the Project area, but are reported from adjacent counties. Potential disturbance to sage brush habitat within ROW; sage brush habitat to be reestablished upon completion of construction; Project-specific mitigation measures will be developed in consultation with USFS and will be included as conditions in the SUP.
Loggerhead shrike	Approximately 1,641.5 acres of grassland within Corridor/Route Approximately 0.6 acre of sage brush habitat within the Corridor/Route	Potential disturbance to sage brush and grassland habitat within ROW; sage brush and grassland habitat to be reestablished upon completion of construction. Project-specific mitigation measures will be developed in consultation with USFS and will be included as conditions in the SUP.
Long-billed curlew	Approximately 1,641.5 acres of grassland within Corridor/Route Approximately 1,392.2 acres of cropland within Corridor/Route	Potential temporary disturbance to grassland habitat and cropland within ROW; grassland habitat to be re-established upon completion of construction. Project-specific mitigation measures will be developed in consultation with USFS and will be included as conditions in the SUP.

Species	Corridor/Route	Comment
Black-tailed prairie dog (also a MIS for the LMNG)	No prairie dog towns are known to occur within the Corridor/Route	Potential temporary disturbance to native and nonnative grassland habitat within ROW; grassland habitat to be re-established upon completion of construction. Project-specific mitigation measures will be developed in consultation with USFS and will be included as conditions in the SUP.
Bighorn sheep	Approximately 1,641.5 acres of grassland within Corridor/Route Approximately 113.8 acres of woodland habitat within Corridor/Route	Potential impacts to foraging, wintering, and lambing habitat; Basin Electric will coordinate with NDFGD and USFS to avoid construction in lambing areas during the lambing season; Project-specific mitigation measures will be developed in consultation with USFS and will be included as conditions in the SUP.
Arogos skipper	Approximately 1,641.5 acres of grassland habitat potentially containing areas of suitable native grassland within Corridor/Route	Potential temporary disturbance to native grassland habitat within ROW; grassland habitat to be re-established upon completion of construction. Project-specific mitigation measures will be developed in consultation with USFS and will be included as conditions in the SUP.
Broad-winged skipper	None	No populations known to exist in the Project area. Species only reported from eastern North Dakota.
Dion skipper	None	No populations known to exist in the Project area. Species only reported from eastern North Dakota.
Mulberry wing	None	No populations known to exist in the Project area. Species only reported from eastern North Dakota.
Ottoe skipper	Approximately 1,641.5 acres of grassland habitat potentially containing areas of suitable native grassland within Corridor/Route	Populations known to exist in western North Dakota. Potential temporary disturbance to native grassland habitat within ROW; grassland habitat to be re-established upon completion of construction (USFWS, 2011d). Project-specific mitigation measures will be developed in consultation with USFS and will be included as conditions in the SUP.
Powesheik skipper	None	No populations known to exist in the Project area. Species only reported from eastern North Dakota.

Species	Corridor/Route	Comment
Regal fritillary	Approximately 1,641.5 acres of grassland habitat potentially containing areas of suitable native grassland within Corridor/Route	Populations known to exist in western North Dakota. Potential temporary disturbance to native grassland habitat within ROW; grassland habitat to be re-established upon completion of construction. Project-specific mitigation measures will be developed in consultation with USFS and will be included as conditions in the SUP.
Tawny crescent	Approximately 1,641.5 acres of grassland habitat potentially containing areas of suitable native grassland within Corridor/Route Forested wetlands not known to occur within Corridor/Route	Populations known to exist in western North Dakota. Potential temporary disturbance to native grassland habitat within ROW; grassland habitat to be re-established upon completion of construction. Project-specific mitigation measures will be developed in consultation with USFS and will be included as conditions in the SUP.
USFS Management Indicator Species		
Plains sharp-tailed grouse	Approximately 1,641.5 acres of grassland habitat potentially containing areas of suitable native grassland within Corridor/Route	Potential temporary disturbance to native grassland habitat within ROW; grassland habitat to be re-established upon completion of construction. Project-specific mitigation measures will be developed in consultation with USFS/NDGF and will be included as conditions in the SUP.

Surveys for Species under U.S. Fish and Wildlife Service Jurisdiction

Coordination has occurred with USFWS to determine the level of investigations required to provide information for the Biological Assessment being prepared for this project. As a result of that coordination and in preparation of the Biological Assessment, desktop reviews and field surveys will occur in the fall 2012 and spring 2013 for the following species:

Whooping Crane – The initial determination of whooping crane habitat within the Project area will occur using the Resource Selection Function methodology that USFWS approved. Based on discussions with USFWS, the badlands area will not be included in the review area for the Whooping Crane. The Resource Selection Function methodology may be supplemented by verification on the ground during spring 2013.

Sprague's Pipit – Beginning fall 2012, an ongoing analysis of Sprague's pipit habitat is being conducted by reviewing aerial photography to determine native prairie grasslands locations within a 2,000-foot survey corridor (1,000 feet on each side of the centerline). A request of potential Sprague's pipit habitat shapefile has been made to the USFWS for use in the analysis. A presence survey for Sprague's pipit will be conducted prior to initiating construction activities in areas identified as habitat for the species if clearing is done during the nesting season.

Piping Plover – Beginning fall 2012, an analysis of piping plover habitat is being conducted by reviewing aerial photography and soils data to determine alkali wetland locations within a 2,000-foot survey corridor (1,000 feet on each side of the centerline). A presence survey for piping plover will be conducted prior to initiating construction activities in areas identified as habitat for the species.

Raptor Nest Surveys – A survey for raptor nests in within a 2-mile-wide survey corridor (1 mile on either side of the centerline) will occur in spring 2013. A second survey of the area for raptor nests may be conducted in spring 2013 to determine occupancy of the nests.

No surveys will be required for other species under the jurisdiction of USFWS.

U.S. Forest Service Sensitive and Management Indicator Species Surveys

Coordination with the USFS Dakota Prairie Grasslands office (USFS, 2012b) resulted in USFS providing a list of sensitive wildlife species. This list has been prepared by the USFS's Region 1 Forester and has identified several taxa as being of special conservation concern in the grasslands areas across Montana, Idaho, North Dakota and South Dakota. The list is included in Appendix P. In order to issue a SUP to cross USFS lands, USFS has requested that a Biological Evaluation be prepared and that field surveys be conducted for sensitive plant species that they have identified on USFS lands (Appendix Q). These surveys will take place between May 15 and September 15, 2013. All surveys will be conducted in compliance with USFS protocols for the LMNG. USFS also asked that the EIS address two sensitive species for the Dakota Prairie National Grasslands, the sharp-tailed grouse and the black-tailed prairie dog (USFS, 2012a).

Proposed Substations

No special status species or habitat for these species is known to occur within the site boundaries for either substation. Impacts on special status species resulting from construction and operation of these sites will not occur.

5.13.3 Mitigation

- Restore any new temporary access roads created during construction of the transmission line to the natural condition of the surrounding area after construction is completed.
- Revegetate disturbed areas outside of the substation/switchyard and within the ROW using native vegetation and certified weed-free seed and mulch to protect native vegetation and wildlife habitat.
- Inspect equipment for seeds and other vegetative material and power-wash prior to transport to new areas to prevent the spread of undesirable plants from one area to another.
- Coordinate with the North Dakota Public Service Commission to determine appropriate mitigation for the vegetation removed. Typically for these types of projects, the tree and shrub vegetation is replaced at a ratio of 2:1, reducing the overall loss of these vegetation types over time.
- Avoid the Natural Heritage Inventory-listed significant ecological community (western little bluestem prairie) in Dunn County. If the significant ecological community cannot be avoided, Basin Electric will coordinate with North Dakota Game and Fish Department (NDGFD) to minimize impacts and implement mitigation measures.
- Coordinate with USACE and the state of North Dakota to obtain the necessary permits if impacts on wetlands, streams, or other waterbodies are unavoidable.
- Avoid wetland areas while accessing the ROW during construction. Design and install temporary low-water crossings or culverts, if needed, so as not to inhibit fish passage, or create upstream or downstream habitat changes.
- Coordinate with NDGFD and USFS to avoid construction during bighorn sheep lambing season (April 1st thru July 1st; and other important times for game species) in the Little Missouri Badlands area and LMNG.
- Conduct raptor and migratory bird surveys along and adjacent to the proposed transmission line route prior to construction. Coordinate with USFWS, USFS, and NDGFD to develop and implement a plan to protect any identified nests from adverse effects during construction. Coordinate with USFWS to develop an Avian Protection Plan for operation of the transmission line.
- Design the proposed project to meet the requirements for the protection of avian species from electrocution and line strikes according to the guidelines in the Avian Power Line Interaction Committee's "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006" (APLIC, 2006).

- Coordinate with USFS and NDGFD regarding sharp-tailed grouse habitat. Structures will not be placed within 0.25 mile of active lek sites. In addition, consult with USFWS, USFS, and NDGFD prior to construction within a 2-mile radius of an active lek during the period of March 1st through June 15th.
- Coordinate with USFWS to avoid construction in designated critical habitat during the piping plover nesting season (mid-April to mid-August) and in interior least tern nesting habitat during the nesting season.
- Comply with all conditions issued by USFS in conjunction with the SUP.
- Include the results of the ESA Section 7 consultation in the Final EIS and implement any measures required.

5.14 SUMMARY OF CORRIDOR/ROUTE IMPACTS

The construction and operation of Basin Electric's proposed Project could have a potential impact on environmental and human resources located in northwestern North Dakota. A summary of potential impacts and mitigation by resource is located in Table 5.14-1.

Table 5.14-1: Summary of Project Impacts and Mitigation

Resource	Corridor/Route		Substations		Mitigation
	Permanent Impacts	**Temporary Impacts**	**Permanent Impacts**	**Temporary Impacts**	
Socioeconomics	Economic benefit to businesses and surrounding communities from increased electrical capacity and reliability. Potential changes in property values. Property tax revenues of $59,340 annually to Project counties.	Economic benefit to local communities during construction as a result of construction crews generating local revenue.	Economic benefit to businesses and surrounding communities from increased electrical capacity and reliability. Potential changes in property values	Minor economic benefit to local communities during construction as a result of construction crews generating local revenue.	• The construction contractor, after assessing utilization of existing housing availability, should plan to establish its own housing in the form of man-camps and/or recreational vehicles (RVs) brought in from outside of the region to a number of locations secured by the contractor. • Work with agricultural producers to minimize disruptions during the harvest season and to limit the impact on the farmers' ability to maneuver equipment in the vicinity of the immediately affected area. • Work with individual landowners to try to coordinate the timing of construction to minimize short-term impacts on agriculture. • Initiate discussions with local fire and police districts prior to construction and work with the districts and other appropriate emergency response providers to develop fire and emergency response plans.
Land Use	3,589.8 acres of ROW will be required and will be restricted from some types of future development. Approximately 1 acre of soil (0.0009-acre per structure) will be permanently removed. 24 acres of land will be required for construction of new substations and require permanent conversion from agricultural uses to a utility use. Corridor/Route will include state and federal properties. Corridor/Route will include approximately 143.8 acres of LMNG, 57.7 acres of USACE property, and approximately 123.5 acres of school trust lands.	Loss of use for landowners within ROW on private lands during construction. Access restrictions and/or loss of use within ROW during construction on state or federal properties. Disturbance from heavy equipment may result in some crop loss during construction	12 acres will be permanently converted from agriculture use to utility use for each substation.	Construction-related impacts such as increased noise and dust on surrounding agricultural lands.	• Provide a schedule of construction activities to all landowners who could be affected by construction. • Coordinate with landowners for potential measures to minimize project impacts on uses on specific properties. • Coordinate with appropriate federal and state land management agencies to obtain appropriate permits and easements for portions of the Corridor/Route traversing public lands. • Obtain the appropriate permits as necessary to comply with county and township zoning ordinances. • Plan and conduct construction activities to minimize temporary disturbance, displacement of crops, and interference with agricultural activities. • Restore compacted cropland soils as close as possible to pre-construction conditions using tillage. • Compensate landowners for any new land rights required for ROW or access road easements. • Compensate landowners at market value for any new land rights required for ROW easements or acquired for new temporary or permanent access roads on private lands. This should include compensation for agricultural production and market values lost during the construction period.
Infrastructure-Transportation	No long-term effects on utility infrastructure are anticipated.	Existing utility infrastructure will be traversed during construction activities and may	No effect	Short-term interruption of existing transmission lines during construction activities	• Time conductor stringing across U.S. Highway 85, U.S. Highway 2, ND State Highway 8, ND State Highway 22, and ND State Highway 23 to avoid peak traffic, in consultation

	No long-term effects on transportation are anticipated. Potential impacts on airports within 10 nautical miles will be avoided through coordination with FAA. Basin Electric will coordinate with BNSF to minimize or avoid potential impacts on railroads in areas where the route will traverse railroads at a vertical elevation.	be temporarily taken out of service. Some temporary road closures are likely during construction activities and may result in short-term adverse impacts. Basin Electric will also coordinate with BNSF in order to string the transmission line over existing railroad tracks.		may result minor temporary impacts. The introduction of material haul trucks and road closures during construction activities may result in short-term adverse impacts.	with North Dakota Department of Transportation. • Mark a detour route, if required by North Dakota Department of Transportation, and provide traffic information to motorists in advance of the detour, consistent with the Manual on Uniform Traffic Control Devices (Federal Highway Administration, 2012). • Coordinate with townships, counties, and North Dakota Department of Transportation to redress any road damage related to construction of the project. • Coordinate with FAA to avoid or minimize impacts on local aircraft facilities. • Identify existing utilities and coordinate with the owners to implement appropriate measures to protect both facilities and construction workers during crossings. Railroads (BNSF, 2011): • Locate poles 50 feet out from the centerline of railroad main, branch and running tracks, CTC sidings, and heavy tonnage spurs. • Provide at least 10-foot clearance from the centerline of track for poles located adjacent to industry tracks. If located adjacent to curved track, then said clearance must be increased at a rate of 1.5 inches per degree of curved track. • Locate unguyed poles (regardless of the voltage) at a minimum distance from the centerline of any track, equal to the height of the pole above the ground-line plus 10 feet. If guying is required, place the guys in such a manner as to keep the pole from leaning/falling in the direction of the tracks. • Locate poles (including steel poles) at a minimum distance from the railroad signal and communication line equal to the height of the pole above the ground-line or else be guyed at right angles to the lines. High voltage towers (345 kV and higher) must be located off railroad ROW. • Perform (if requested by BNSF) an inductive coordination study for electrical lines paralleling the tracks. • Construct utilities that cross railroad property, to the extent feasible and practical, perpendicular to the railroad alignment and preferably at not less than 45 degrees to the centerline of the track. • Do not place utilities within culverts or under railroad bridges, buildings, or other important structures. • Do not install crossings under or within 500 feet of the end of any railroad bridge, or 300 feet from the centerline of any culvert or switch area. • Span property completely with supportive structures and appurtenances located outside railroad property. For electric supply lines, normally the crossing span shall not exceed 150 feet with adjacent span not exceeding 1.5 times the crossing span length. • Encourage joint-use construction at locations where more than one utility or type of facility is involved. However, electricity and petroleum, natural gas, or flammable materials shall not be combined. Review and approve pipe truss design and layout with BNSF Engineering. • Construct electric lines with a minimum clearance of 26.5 feet or greater above top of rail when required by the National Electric Safety Code or state and local regulations.

					Electric lines must have a florescent ball marker on low wire over centerline of track. • Label the posts closest to the crossing with the owner's name and telephone number for emergency contact.
Public Health and Safety	Long-term adverse effects expected to be negligible to minor. EMFs will be well below identified thresholds to protect the public. The operation of farm equipment near proposed structures could result in unnecessary contact and/or damage to machinery and/or operators. Standard operating and safety procedures will be employed to ensure the safe delivery of services.	Hazardous and/or potentially hazardous materials may be encountered during construction, or exposure to energized transmission lines. These impacts are likely to be minor with the implementation of construction plans that ensure worker safety, proper handling of hazardous materials, and spill cleanup.	Long-term adverse effects are expected to be negligible to minor.	Hazardous and/or potentially hazardous materials may be encountered during construction. Impacts on public health and safety are likely to be minor with the implementation of construction plans that ensure worker and public safety, proper handling of hazardous materials, and spill cleanup.	• Prepare a construction plan in accordance with the National Electrical Safety Code and the Occupational Safety and Health Administration's regulations, as required by federal law, to ensure the safety of construction workers. This will also identify procedures should a spill occur or hazardous materials be discovered. • Construct the proposed project with materials designed to contain electric currents and meet the highest safety standards. • Employ standardized agency procedures should the transmission line need maintenance or repairs. The use of such can help ensure the safety of both workers and those in the surrounding area. • Additional measures such as those identified in Appendix I are designed to ensure that Basin Electric's operational procedures are adhered to the highest standard to ensure the safety of workers and others close to the construction and operation of the proposed project.
Air Quality	Potential increase in GHG levels as a result of the operation of the transmission line	Increases in fugitive dust caused by construction activity, vehicles, and equipment. Increased emissions from construction vehicles and equipment	Potential increase in GHG levels as a result of the operation of the substations.	Increases in fugitive dust caused by construction activity, vehicles, and equipment. Increased emissions from construction vehicles and equipment	• Use water on roads and disturbed areas to minimize dust. • Re-seed vegetation in disturbed areas outside of the substation/switchyard to prevent wind-blown dust from areas void of vegetation. • Implement vehicle idling and equipment emissions measures, such as establishing operating policies that limit idling time and mechanical modifications to the vehicles that restrict the amount of idle time. • Encourage carpooling and the use of shuttle vans among construction workers to minimize construction-related traffic and associated emissions. • Locate staging areas as close to construction sites as practicable to minimize driving distances. • Locate, where possible, staging areas in previously disturbed or graveled areas to minimize soil and vegetation disturbance where practicable. • Encourage the use of the proper size of equipment for the job to maximize energy efficiency. • Use alternative fuels, if possible, for generators at construction sites, such as propane or solar, or use electrical power where practicable. • Recycle or salvage non-hazardous construction and demolition debris where practicable. • Dispose of wood debris (burning) in the local area where practicable. • Use local rock sources for road construction where practicable.
Noise	No effect	Increases in noise levels along the Corridor/Route from construction vehicles and equipment	No effect	Increases in noise levels for nearby residences during construction of the substations.	• Use equipment with sound-control devices no less effective than those provided on the original equipment. • Do not use equipment with an unmuffled exhaust. • Do not conduct noise-generating construction activity within 1,000 feet of a residential

					structure between the hours of 10:00 p.m. and 7:00 a.m. • Notify landowners directly impacted along the Corridor/Route prior to construction activities. • During operation, if the proposed transmission line is found to be the source of radio or television interference in areas with reasonably good previous reception, measures will be taken to restore the reception to a quality as good as or better than before the interference.
Visual	Change in the visual characteristics and viewshed within project area and for residents located near the transmission line (2 residences within 500 feet)	Visibility of construction vehicles and equipment along Corridor/Route	Additional visual element added to the landscape.	No effect	• Use weathering single pole steel structures where steel towers are utilized, to reduce visual impacts. • Work with the agencies to choose a structure type (weathering steel or galvanized) that will reduce visual impacts in highly visible or scenic areas, such as the Missouri and Little Missouri River crossings, the National Grasslands, and badland areas. • Leave (where possible) plants smaller than 8 feet in height within the 150-foot-wide ROW to help reduce the effect of the Corridor/Route on visual and aesthetic resources. • Keep the ROW free of construction debris and other litter during construction to further minimize visual intrusion to the surrounding landscape.
Cultural	No adverse effects on NRHP-eligible cultural resources. Based on the Class I cultural resources investigation conducted for the Project, known sites have been avoided; a portion of the Corridor/Route has been surveyed at the Class III level. The rest of the Corridor/Route will be surveyed and any cultural resource sites will be avoided.	No adverse effects on NRHP-eligible cultural resources.	No adverse effects on NRHP-eligible cultural resources.	No adverse effects on NRHP-eligible cultural resources.	• If necessary, develop a Memorandum of Agreement that will establish procedures to guide the identification and evaluation of historic properties, the assessment of adverse effects on them, and the development of appropriate mitigation of any adverse effects for cultural resources within the Corridor/Route. • Conduct a Class III cultural survey within the Corridor/Route and the site boundaries of all proposed substations and switchyards prior to construction and develop mitigation measures where required. • Span and protect known archaeological sites within the Corridor/Route from disturbance during construction. • Prevent construction workers from collecting or disturbing discovered cultural resources. • Develop a Project's Unanticipated Discovery Plan to provide guidance on how to proceed if a previously unknown archaeological or historic resource is encountered during construction or operation of the proposed transmission line, including contact of the SHPO and RUS-designated Federal Preservation Officer for further evaluation.
Recreation	Approximately 325 acres of state or federal land potentially open to dispersed recreational activities such as hunting will be located within the Corridor/Route.	Increased noise, dust, and traffic congestion in recreational areas. Temporary access restrictions during construction on public use areas	Conversion of land for substations will remove it from further land use, including recreational use. Each substation will occupy 12 acres.	Increased noise, ground disturbance, access restrictions, and human activity may impede hunting activities around the substation sites.	• Impacts on recreation will largely be associated with changes in viewsheds and general recreational experiences from the presence of the proposed transmission line. Mitigation measures for viewsheds are described under Aesthetics and Visual Resources. • Recreation will also be impacted in the short term by noise and dust from construction activities, equipment, and vehicles; construction-related traffic; and the presence of construction crews. Mitigation measures for these impacts are described under Geology and Soils; Infrastructure and Transportation; and Noise.
Soils and Farmland	Approximately 1 acre of soil (0.0009-acre per structure) will be permanently removed. Farmland for crop production permanently impacted only at	337 acres (0.29-acre per structure) of temporary soil disturbance during construction within Corridor/Route, with temporary loss of crop	Any farmland within the 12-acre substation sites will be permanently converted to utility use	No effect	Soils: • Confine construction activities to the ROW and around structure locations for placement of the transmission structures. • Stockpile any topsoil removed during any required leveling of structure sites nearby and

	structure locations	production			replace it following construction. • Re-grade disturbed ground to as close to pre-construction condition as appropriate for stabilization and revegetated or approved for tillage depending on pre- construction land use. • Locate the construction laydown areas required for the proposed Project at previously-disturbed or developed locations, such as vacant lots or agricultural lands, where feasible. • Place construction materials on pallets or cribbing within the designated laydown areas. • Return laydown areas to pre-construction condition upon completion of the project. Farmland: • Compensate landowners for any crop damage that may occur as a result of construction and operation of the proposed project. • Redress any compaction or other construction-related issues that could affect soil productivity and agricultural operations.
Geology and Landforms	Displacement of 1.74 million cubic feet of soil and rock during structure foundation borings and construction	Potential for erosion on steeper slopes during construction	No effect	No effect	• Conduct geotechnical assessments at structure locations to develop a process or approach to minimize the potential development of landslides in susceptible areas during construction. • Span identified landslide areas with no structures being placed within susceptible landslide areas. • Prepare a stormwater pollution prevention plan for construction activities prior to construction.
Water	No effects anticipated. 12 perennial waterways and 13.5 acres of FEMA floodplain crossed, but all will be spanned. Natural floodplain will be crossed with structure placement.	Potential sedimentation and runoff caused by construction	No effect	No effect	• Clean up any spills or equipment leaks promptly to prevent materials entering surface water. • Contain and store appropriately any materials such as fuel, lubricants, and solvents. • Schedule construction in the area of the Missouri River crossing in low water periods or during winter to minimize impacts to the geographical floodplain. Coordinate construction timing with USACE. • Span floodplains to the extent possible to avoid potential impacts. • Plant or seed non-agricultural areas that were disturbed during construction. Use native seed mixes from the indigenous plants and plant indigenous species located in the immediate disturbed soil area; ensure seeding and/or plantings are done in a time congruent with seeding and growth of the area, not during a time that will preclude germination or rooting. • Remove excavated material and other debris from flood prone areas to maintain storage volumes and prevent introduction of debris that may lead to clogged culverts or bridges, resulting in changes to water flow and flood patterns. • Locate structures and disturbed areas away from rivers and lakes, where practicable. • Install sediment control measures prior to construction in accordance with plans and permits including: mulch produced through the chipping of removed trees; soil berms; and partially burying logs along the ROW. • Use wastewater and stormwater control measures to meet the effluent limits prior to

					discharging from construction sites to surface waters. • Avoid the use of fertilizers, pesticides, or herbicides in or near surface waterbodies. • Fuel construction vehicles away from surface waterbodies and use appropriate spill prevention and containment procedures.
Biological Resources	Vegetation: Approximately 113.8 acres of woodland potentially removed within Corridor/Route, depending on slope. One acre of vegetation permanently removed within Corridor/Route at structure locations. Potential introduction of noxious weeds within Corridor/Route to be avoided by weed mitigation measures. Wildlife: Loss of forested habitat due to removal of 113.8 acres of woodland within the Corridor/Route. Some mortality of small, less-mobile species. Potential avian species collisions with power lines. Aquatic Resources: Change in local aquatic habitats in areas where vegetation is cleared along shoreline. Special Status Species: No adverse effect on listed species pending outcome of consultation with USFWS and USFS. Wetlands: No effect. All 29.4 acres of wetland (NWI) within Corridor/Route will be spanned. No structures placed in wetlands and no wetland vegetation will be cleared.	Vegetation: Disturbance of vegetation within the Corridor/Route and along access roads during construction. Natural Heritage Inventory sensitive ecological community potentially impacted. Wildlife: Disturbance within and near the Corridor/Route during construction due to human intrusion, noise, and construction activity. Temporary loss of habitat due to vegetation clearing within ROW during construction. Aquatic Resources: Potential for sedimentation, runoff, and spills during construction; to be avoided by use of BMPs. Special Status Species: Potential impacts to grassland habitat within Corridor/Route during construction. Wetlands: Potential sedimentation and runoff caused by construction near wetlands.	Vegetation: All vegetation removed from 12 acre sites and converted to utility use. Wildlife: Loss of habitat within the 12 acre sites as these are converted to utility use. Aquatic Resources: No effect. Special Status Species: No effect. Wetlands: No effect.	Vegetation: No effect. Wildlife: Disturbance to nearby species due to construction activities Aquatic Resources: No effect. Special Status Species: No effect. Wetlands: Potential sedimentation and runoff caused by construction near wetlands located near substation sites.	• Restore any new temporary access roads created during construction of the transmission line to the natural condition of the surrounding area after construction is completed. • Revegetate disturbed areas outside of the substation/switchyard and within the ROW using native vegetation and certified weed-free seed and mulch to protect native vegetation and wildlife habitat. • Inspect equipment for seeds and other vegetative material and power-wash prior to transport to new areas to prevent the spread of undesirable plants from one area to another. • Coordinate with the North Dakota Public Service Commission to determine appropriate mitigation for the vegetation removed. Typically for these types of projects, the tree and shrub vegetation is replaced at a ratio of 2:1, reducing the overall loss of these vegetation types over time. • Avoid the Natural Heritage Inventory-listed significant ecological community (western little bluestem prairie) in Dunn County. If the significant ecological community cannot be avoided, Basin Electric will coordinate with North Dakota Game and Fish Department (NDGFD) to minimize impacts and implement mitigation measures. • Coordinate with USACE and the state of North Dakota to obtain the necessary permits if impacts on wetlands, streams, or other waterbodies are unavoidable. • Avoid wetland areas while accessing the ROW during construction. Design and install temporary low-water crossings or culverts, if needed, so as not to inhibit fish passage, or create upstream or downstream habitat changes. • Coordinate with NDGFD and USFS to avoid construction during bighorn sheep lambing season (April 1st thru July 1st; and other important times for game species) in the Little Missouri Badlands area and LMNG. • Conduct raptor and migratory bird surveys along and adjacent to the proposed transmission line route prior to construction. Coordinate with USFWS, USFS, and NDGFD to develop and implement a plan to protect any identified nests from adverse effects during construction. Coordinate with USFWS to develop an Avian Protection Plan for operation of the transmission line. • Design the proposed project to meet the requirements for the protection of avian species from electrocution and line strikes according to the guidelines in the Avian Power Line Interaction Committee's "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2012" (APLIC, 2012). • Coordinate with UFWS, USFS, and NDGFD regarding greater prairie chicken, greater sage-grouse, and Plain's sharp-tailed grouse habitat. Structures will not be placed within 0.25 mile of active lek sites. In addition, consult with USFWS, USFS, and NDGFD prior to construction within a 2-mile radius of an active lek during the period of March 1st through June 15th. • Coordinate with USFWS to avoid construction in designated critical habitat during the

					piping plover nesting season (mid-April to mid-August) and in interior least tern nesting habitat during the nesting season. • Comply with all conditions issued by USFS in conjunction with the SUP. • Include the results of the ESA Section 7 consultation in the Final EIS and implement any measures required.

* * * * *

6.0 PUBLIC AND AGENCY COORDINATION

Several public participation activities were conducted to:

- Inform agencies and the public about the proposed project;
- Public announcements about the proposed project were made in the Federal Register, in the local newspapers, on local radio stations and through mailings to project stakeholders;
- Information scoping meetings were held for agencies and the general public;
- Comments were received from the several agencies and the public.

The purpose of the public participation process was to gain input about any potential concerns that anyone had and identify issues that need to be addressed in the EIS. During this public participation scoping process, contact was made with federal agencies, tribal representatives, state agencies, local officials and the general public. More detail about public participation can be found in the Antelope Valley Station (AVS) to Neset 345-kV Transmission Project Scoping Report on the RUS website at http://www.rurdev.usda.gov/USP-AVS-Neset.html

Initial Project Coordination. During the early stages of defining the proposed project Basin Electric made informal contact with various local, state and federal officials. As the project materialized into a specific type of solution to satisfy the needs of the area, letters were sent to various local, state and federal agencies that described the proposed project and requested that any concerns be identified. The Notice of Intent (NOI) informing the public that RUS was intending to prepare an EIS for the proposed project was published in the *Federal Register* on November 2, 2011.

Agency Scoping. A second set of letters went out from RUS to federal, state, and local agencies, tribal representatives, as well as organizations and persons that had requested to be on the mailing list for Western or Basin Electric. The agency scoping meeting was conducted on November 14, 2011 in Bismarck, North Dakota, with 12 agencies having representatives in attendance. The agencies represented included:

- Little Missouri Scenic River Commission
- National Park Service (NPS)
- North Dakota State Department of Health
- North Dakota State Historic Preservation Office
- North Dakota Department of Trust Lands

- North Dakota Transmission Authority
- U.S. Army Corps of Engineers (USACE)
- U.S. Department of Agriculture Rural Utilities Service (USDA-RUS)
- U.S. Department of Agriculture Natural Resources Conservation Service (USDA-NRCS)
- U.S. Forest Service (USFS)
- U.S. Fish and Wildlife Service (USFWS)
- Western Area Power Administration

Public Scoping. Letters, radio public service announcements, and newspaper advertisements announcing the proposed project and the scoping meeting location and times were distributed prior to the public scoping meetings. One meeting was conducted in Williston, North Dakota on November 15, 2011 and a second meeting was conducted in Killdeer, North Dakota on November 16, 2011.

Comments. A total of 38 comment sheets and letters were received during the scoping comment period. Several of the comment sheets and letters identified multiple topics that resulted in the 62 comments in the categories identified below.

Topic (# of comments)

- Air Quality (2)
- Aesthetics (4)
- Conservation (21)
- Environmental Justice (1)
- Project Information/Communication (5)
- Need for the Project (2)
- Noise (1)
- Property Values (2)
- Route Alternatives (10)
- Vegetation (2)
- Water (3)
- Wildlife (9)

The key issues identified during the comment process were primarily related to the visual impacts and general disturbance to the natural areas along the alternative corridor that followed U.S. Highway 85 between the TRNP and USFS properties. The comments sheets and issues are included in Appendix B.

Additional Public Participation. Opportunities for public and agency input will occur during the duration of the project as additional coordination occurs. Public hearings were held during the Draft EIS comment period in Killdeer on January 15, 2013, and in Williston on January 16, 2013.

* * * * *

7.0 IDENTIFICATION OF REQUIRED PERMITS/APPROVALS

7.1 PERMITS/APPROVALS

Federal, state and local laws, regulations, and associated permits, approvals and coordination that are applicable to the Project are:

Table 7.1-1: Permits, Authorizations, and Consultation Required

Federal Agency	Permit, Regulation or Consultation
USDA Rural Utilities Service (RUS)	• National Environmental Policy Act (NEPA) compliance (42 USC. 4321) • RUS Environmental Policies and Procedures (7 CFR. 1794)
Western Area Power Administration (Western)	• NEPA compliance • National Historic Preservation Act (NHPA) (36 CFR. 800) - Section 106 consultation • Section 7 of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531-1544; 50 CFR 22 consultation) • Tribal consultation
U.S. Army Corps of Engineers (USACE)	• Clean Water Act (CWA) of 1977 Section 404 and 401 permits • Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) permit (Missouri River and Little Missouri River) • Easement to cross lands owned and managed by USACE
U.S. Fish and Wildlife Service (USFWS)	• Section 7 of the Endangered Species Act (ESA) consultation • Migratory Bird Treaty Act (MBTA) (16 U.S.C. 701-712) • Bald and Golden Eagle Protection Act (BGEPA) (16 USC 668; 50 CFR 22) • Use authorization if ROW required on National Wildlife Refuge or Wetland Management District lands (Standard Form 299)

U.S. Department of Agriculture-Natural Resources Conservation Service (NRCS)	• Farmland Protection Policy Act • Farmland Conversion Impact Rating (Form AD-1006)
U.S. Department of Agriculture-Farm Services Agency, North Dakota State Office	• Consultation regarding crossing of lands enrolled in the Conservation Reserve Program (CRP)
Federal Aviation Administration (FAA)	• Form 7460-1: Objects Affecting Navigable Airspace
National Park Service (NPS)	• Consultation for National River Inventory (NRI) rivers (Missouri and Little Missouri rivers) • Possible consultation for viewshed impacts within TRNP • National Trails System Act in 1978 [16 U.S.C. 1244 (a)(6)] consultation regarding Lewis & Clark National Historic Trail
U.S. Environmental Protection Agency (EPA)	• CWA Section 404 permit • CWA Section 402 compliance • Section 303(d) of CWA compliance if applicable
U.S. Forest Service (USFS)	• USFS Special Uses Program authorization
Federal Highway Administration (FHWA)	• Permit to cross federal highways and interstate highways
State Agency or Other Permits	**Permit, Regulation or Consultation**
North Dakota Department of Transportation (NDDOT)	• Road crossing permits, highway access permits, utility permits
North Dakota Parks and Recreation Department (NDPRD)	• Consultation regarding visual impacts to Killdeer Mountain Four Bears Scenic Byway
North Dakota State Land Department	• ND School Trust Lands permit for easements on Trust Lands
North Dakota Public Service Commission	• Certificate of Corridor Compatibility and Route Permit
State of North Dakota Historic Preservation Office (SHPO)	• National Historic Preservation Act (NHPA) – Section 106 compliance

North Dakota Game and Fish Department (NDGFP)	• Special use permit for crossing of any Wildlife Management Areas (WMA) • Consultation to identify any State-listed species of concern • Noxious weeds
North Dakota Department of Health	• Storm Water Pollution Prevention Plan (SWPPP) • Section 401 Water Quality Certification
North Dakota State Water Commission	• Construction permits for crossing navigable waterways
Burlington Northern/Santa Fe Railroad	• Authorization to construct and operate a transmission line across railroad ROW
Dunn, McKenzie, Mercer, Mountrail, Williams counties	• Conditional Use permit • County road encroachments • County Floodplain encroachments

* * * * *

8.0 FACTORS CONSIDERED

NDCC Section 49-22-09 of the North Dakota Energy Conversion and Transmission Facility Siting Act lists 11 factors to guide the Commission in evaluation of sites, corridors, and routes. The following sections address these factors where applicable to the Project Corridor/Route.

8.1 AVAILABLE RESEARCH AND INVESTIGATIONS RELATING TO THE EFFECTS OF THE LOCATION, CONSTRUCTION, AND OPERATION OF THE PROPOSED FACILITY ON PUBLIC HEALTH AND WELFARE, NATURAL RESOURCES, AND THE ENVIRONMENT

Section 5.0 of this Application discusses the research and investigations relating to the effects of the proposed Project on public health and welfare, natural resources, and the environment. Section 5.0 includes a detailed discussion of the resources present within the Project area and a discussion of the potential effects and proposed mitigation in relation to the Corridor/Route. Basin Electric took into consideration impacts to important natural and human resources when selecting the Corridor/Route.

8.2 THE EFFECTS OF NEW ENERGY CONVERSION AND TRANSMISSION TECHNOLOGIES AND SYSTEMS DESIGNED TO MINIMIZE ADVERSE ENVIRONMENTAL EFFECTS

Basin Electric will utilize the most recent transmission technologies and systems that minimize impacts to the environment. Section 4.0 discusses the engineering and operational design of the project and includes a discussion of the proposed structure types and construction techniques. These technologies and techniques are the most appropriate technologies to minimize adverse environmental effects.

8.3 THE POTENTIAL FOR BENEFICIAL USES OF WASTE ENERGY FROM A PROPOSED ENERGY CONVERSION FACILITY

This factor is not applicable to this Project.

8.4 ADVERSE DIRECT AND INDIRECT ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSED SITE OR ROUTE BE DESIGNATED

Unavoidable impacts are those that will occur after implementation of mitigation measures. In summary, construction and operation of the proposed Project will convert approximately 25 acres of land from

agricultural uses to utility uses. This permanently converted acreage will represent a negligible portion (much less than 1 percent) of the cropland in the Project area. The introduction of new transmission lines will permanently change the visual landscape of the Project area. Oil and gas development in the area has already introduced visual contrast to the natural landscape, and the introduction of a transmission line will likely be less noticeable because of the existing visual intrusions. Other unavoidable impacts will occur due to increased traffic from construction personnel. As indicated in the air emission and transportation analyses, these temporary impacts will be minor and will not significantly affect the environmental quality of the area. Other environmental impacts of the proposed project, such as construction traffic to access tower facilities, will produce impacts that are temporary in nature, and restoration of the natural landscape will occur following these temporary impacts. These relatively minor impacts to environmental resources will be offset to some degree by the societal benefit of better electrical service to western North Dakota. It is not possible to quantify this benefit, as individuals will weigh the tradeoffs differently, and assign widely variable values to each resource.

8.5 ALTERNATIVES TO THE PROPOSED SITE, CORRIDOR, OR ROUTE WHICH ARE DEVELOPED DURING THE HEARING PROCESS AND WHICH MINIMIZE ADVERSE EFFECTS

As discussed in Section 1.0, alternatives to the proposed Corridor/Route were identified by Basin Electric and reviewed during various stages of the NEPA process carried out by RUS and/or Western. The AES and MCS prepared as part of the process were used to evaluate system alternatives for the proposed Project and to develop suitable macro-corridors for routing a transmission line within the Project area. The EIS included a detailed evaluation and comparison of two alternative routes and a no action alternative. Through these processes, the Corridor/Route presented in this Application has been selected as the best location for the transmission line route.

8.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF NATURAL RESOURCES SHOULD THE PROPOSED SITE, CORRIDOR, OR ROUTE BE DESIGNATED

Irreversible resource commitments involve damage to a resource that is not recoverable for use by future generations. The small size of the permanent footprint, approximately 25 acres, means that there will be minimal irreversible damage to regional natural resources. This will primarily involve the soil and agricultural property taken for the towers and substations, and restoration after the life of the transmission line will reduce these potential irreversible impacts. Irretrievable resource commitments are permanent losses of nonrenewable resources such as fossil fuels. Natural gas, energy, and non-recyclable materials

used in construction and operation will represent irretrievable commitments of non-renewable resources that will not be available for use in other projects.

8.7 THE DIRECT AND INDIRECT ECONOMIC IMPACTS OF THE PROPOSED FACILITY

Section 5.1.2 includes a discussion of the direct and indirect economic impacts of the proposed Project. The Project will provide direct economic benefits of approximately $23.4 million in wages for construction workers and indirect economic benefits of approximately $13.4 million in expenditures in the local communities by construction workers. Furthermore, the Project will provide induced economic benefits to businesses and the surrounding communities from increased electrical capacity and reliability.

8.8 EXISTING PLANS OF THE STATE, LOCAL GOVERNMENT, AND PRIVATE ENTITIES FOR OTHER DEVELOPMENTS AT OR IN THE VICINITY OF THE PROPOSED SITE, CORRIDOR, OR ROUTE

As discussed in Section 5.2.2, the Project will be consistent with future land use development plans. All applicable zoning and land use approvals will be obtained for the proposed Project prior to construction. Basin Electric is coordinating with USFS for Project impacts to the LMNG. Basin Electric will also coordinate with USFWS, USACE, the North Dakota Department of Trust Lands, and other applicable agencies, regarding impacts to state and federal properties, as necessary.

8.9 THE EFFECT OF THE PROPOSED SITE OR ROUTE ON EXISTING SCENIC AREAS, HISTORIC SITES AND STRUCTURES, AND PALEONTOLOGICAL OR ARCHAEOLOGICAL SITES

Section 5.8.2 discusses the potential effects of the Project on cultural resources. One hundred percent coverage Class III surveys will occur on the Corridor/Route. A Class III survey of the proposed Judson and Tande substation sites did not identify any cultural resources present. Additional coordination with SHPO will be conducted regarding adverse effects to NRHP-eligible cultural resources within the Corridor/Route and the need for additional cultural resources surveys for the Project prior to construction.

8.10 THE EFFECT OF THE PROPOSED SITE OR ROUTE ON AREAS WHICH ARE UNIQUE BECAUSE OF BIOLOGICAL WEALTH OR BECAUSE THEY ARE HABITATS FOR RARE AND ENDANGERED SPECIES

Section 5.13.2 discusses the effects of the Project on biological resources, including wetlands, vegetation, wildlife, and special status species. Approximately 113.8 acres of woodland will potentially be removed within the Corridor/Route, resulting in a loss of forested habitat for some wildlife. Approximately one acre of vegetation will be permanently removed as a result of structure placement with the Corridor/Route. The Project will have no effect on wetlands, as all 29.4 acres of wetlands within the Corridor/Route will be spanned, and no structures will be placed in wetlands. Coordination with USFWS and NDGFD will continue regarding adverse effects of the Project on special status species. Section 7 Consultation on Endangered Species will be conducted as part of the EIS process, and any Reasonable and Prudent measures will be implemented.

8.11 PROBLEMS RAISED BY FEDERAL AGENCIES, OTHER STATE AGENCIES, AND LOCAL ENTITIES

State and federal agencies reviewed the Project area for concerns and provided comment as part of the EIS/NEPA process for the Project. Appendix B includes a copy of agency correspondence and coordination conducted for the Project. Specific scoping agency comments and concerns, as well as coordination efforts, are discussed in detail under the applicable resource categories in Section 5.0. Comments on the DEIS were received from the public and agencies in late January, 2013. Issues and responses are being developed to support the Final EIS that is scheduled to be issued later in 2013.

* * * * *

9.0 QUALIFICATIONS OF CONTRIBUTORS

Name/Project Role	Education and Professional Experience
Duey Marthaller Project Manager Basin Electric	B.S. Civil Engineering
Cris Miller Sr. Environmental Project Manager Basin Electric	B.S. Civil Engineering
Gary Christianson Project Engineer Basin Electric	B.S. Civil Engineering
Greg Knauer Project Manager Burns & McDonnell	B.A. Zoology M.S. Zoology/Aquatic Ecology
Steve Thornhill Project Manager Burns & McDonnell	M.S. Biology B.S. Biology
John Dunham Environmental Scientist Burns & McDonnell	B.S. Fisheries & Wildlife Biology
Jennifer Bell Environmental Scientist Burns & McDonnell	B.S. Environmental Science Master of Urban and Regional Planning (MURP)
Kimball Banks Regional Manager Metcalf Archaeological Consultants, Inc.	PhD. Anthropology with an emphasis on Archaeology M.A. Anthropology with an emphasis on Archaeology

* * * * *

10.0 REFERENCES

American Railway Engineering and Maintenance-of-Way Association. 2012. 2012 Manual for Railway Engineering. Available at: http://www.arema.org/publications/mre/index.aspx (accessed June 20, 2012).

Avian Power Line Interaction Committee (APLIC). 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, DC, and Sacramento, CA.

Bailey, R.G. 1995. Description of the Ecoregions of the United States. 2nd ed. Misc. Publ. No. 1391 (rev) Washington D.C. USDA Forest Service. 108 p.

Banks, K. 2012. Basin Electric Power Cooperative's Antelope to Neset 345kV Substation: A Class III Cultural Resource Inventory in Mountrail County, North Dakota. Prepared for Basin Electric Power Cooperative by Metcalf Archaeological Consultants, Inc. Bismarck, North Dakota.

Basin Electric Power Cooperative (Basin Electric). January 2012. Williston Tie Project: Application to the North Dakota Public Service Commission for a Waiver of Procedures and Timelines, and Consolidated Certificate of Corridor Compatibility and Route Permit (PU-11-692)..

Bighorn Institute. 2012. Facts About Bighorn Sheep. Available at: http://www.bighorninstitute.org/faq.htm (accessed October 2012).

Billing, L. (2013, January 9). City police set new records for arrests. McKenzie County Farmer. Available at: http://www.watfordcitynd.com/?id=10&nid=1985 (accessed March 2013).

BNSF Railway Company (BNSF). 2011. Utility Accommodation Plan. Available at: http://www.bnsf.com/communities/faqs/pdf/utility.pdf (accessed on October 29, 2012).

Board of Mercer County Commissioners. 2009. Mercer County Zoning Ordinance. Available at: http://www.mercercountynd.com/?id=38 (accessed August 2011).

Board of Mountrail County Commissioners. 2010. Mountrail County Zoning Ordinance, amended March 16, 2010.

Brady, N.C. 1996. The Nature and Properties of Soils. Nyle C. Brady. Raymond R. Weil – 11th edition.

Bryce, Sandra. James M. Omernik, David E. Pater, Michael Ulmer, Jerome Schaar, Jerry Freeouf, Rex Johnson, Pat Kuck, and Sandra H. Azevedo. 1998. Ecoregions of North Dakota and South Dakota. Jamestown, ND: Northern Prairie Wildlife Research Center Online. Available at: http://www.npwrc.usgs.gov/resource/habitat/ndsdeco/index.htm (accessed July 2011).

Bureau of Labor Statistics. 2012. Local Area Unemployment Statistics. Available at: http://www.bls.gov/lau (accessed December 2012).

Butterflies and Moths of North America. 2012. Attributes of *Poanes viator*, *Euphyes dion*, *Poanes Massasoit*, and *Phyciodes batesii*. Available at: http://www.butterfliesandmoths.org/species/Poanes-viator http://www.butterfliesandmoths.org/species/Euphyes-dion http://www.butterfliesandmoths.org/species/Poanes-massasoit http://www.butterfliesandmoths.org/species/Phyciodes-batesii (accessed October 2012).

Caldwell, D. (2010, September 5). Requesting more help. Minot Daily News. Available at: http://www.minotdailynews.com/page/content.detail/id/542611.html (accessed December 2011).

City of Williston. 2011. Williston Capital Improvements Plan, January 2011. Available at: http://www.cityofwilliston.com/usrfiles/CM/Docs/WillistonCIPBrochure.pdf (accessed January 2012).

Cowardin, L.M., V. Carter, F.C. Golet, E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

Domaskin, A. (2011, December 9). Crime overwhelming law enforcement in oil patch. Great Plains Examiner. Available at: http://www.greatplainsexaminer.com/2011/12/09/crime-overwhelming-law-enforcement-in-oil-patch/ (accessed December 2011).

Dunn County Planning Commission. 2011a. Dunn County Land Development Code, adopted December 30, 2011.

Dunn County Planning Commission. 2011b. Dunn County Comprehensive Plan, adopted October 12, 2011.

Edison Electric Institute. 1984. Electric Power Plant Environmental Noise Guide, Volume 1, 2nd Edition.

Egan, M.D. 1988. Architectural Acoustics. McGraw-Hill, New York.

Ellis, B. (2011, October 26). Crime turns oil boomtown into wild west. CNN Money. Available at http://money.cnn.com/2011/10/26/pf/America_boomtown_crime/index.htm (accessed December 2011).

Energy Information Administration (EIA). 2012. North American Electric Reliability Corporation (NERC) Regions. Available at: http://205.254.135.7/cneaf/electricity/chg_str_fuel/html/fig02.html (accessed July 16, 2012).

Engineering Services. 2011. Burlington Northern Santa Fe Utility Accommodation Policy. Available at: http://www.bnsf.com/communities/faqs/pdf/utility.pdf (accessed June 20, 2012).

Environmental Laboratory. 1987. Wetlands Research Program Technical Report Y-87-1 (online edition). Corps of Engineers Wetlands Delineation Manual. Available at: http://el.erdc.usace.army.mil/wetlands/pdfs/wlman87.pdf (accessed October 2012).

EPA. 2011. North Dakota Water Quality Assessment Report. Available at: http://iaspub.epa.gov/waters10/attains_state.control?p_state=ND (accessed July 2011).

EPA. 2009. Greenhouse Gas Equivalencies Calculator. http://www.epa.gov/cleanrgy/energy-resources/calculator.html (accessed June 2011).

EPA. 2006. Global Anthropogenic Emissions of Non-CO2 Greenhouse Gases, 1990-2020. Report 430-R-06-003. http://www.epa.gov/climatechange/economics/international.html (accessed June 2011).

Federal Aviation Administration (FAA). 2011. National Flight Data Center. Available at: www.faa.gov/airport_safety/airportdata_5010/menu/index.cfm (accessed July 2011).

Federal Highway Administration. 2012. 2009 MUTCD with Revisions 1 and 2, May 2012. Available at: http://mutcd.fhwa.dot.gov/kno_2009r1r2.htm (accessed August 14, 2012).

Federal Energy Regulatory Commission (FERC). 2006. Rules Concerning Certification of the Electric Reliability Organization; Procedures for the Establishment, Approval and Enforcement of

Electric Reliability Standards, Order No. 672, FERC Stats. & Regs. ¶31,204 (2006). Available at: http://www.ferc.gov/whats-new/comm-meet/072006/E-5.pdf (accessed November 9, 2012).

Fong, C. 2011. 50th Biennial Report for the Biennial Period of July 1, 2009 through June 30, 2011. Office of the State Tax Commissioner. Bismarck, ND.

Fong, C. 2010. State and Local Taxes: An Overview and Comparative Guide. Office of the State Tax Commissioner. Bismarck, ND.

France, E.L. 2012. The Antelope Valley Station to Neset 345kV Transmission Line: Final Report of a Class I Cultural Resources Inventory: In Portions of Dunn, Mercer, McKenzie, Mountrail, and Williams Counties, North Dakota. Prepared for Basin Electric Power Cooperative by Metcalf Archaeological Consultants, Inc., Bismarck, North Dakota.

Gangl, L. 2011. Personal communication with Larry Gangl (District 5 Engineer, ND Department of Transportation) regarding ongoing and planned road construction projects in District 5. May 16, 2011.

Hagel, T. 2011. Personal communication with Todd Hagel, Assistant State Conservationist, Water Resources, North Dakota NRCS. December 13, 2011.

Hoberg, T. and C. Gause. 2006. Reptiles and Amphibians of North Dakota. Available at: http://www.npwrc.usgs.gov/resource/herps/amrepnd/index.htm (accessed July 2011).

Institute of Electrical and Electronics Engineers Standards Association. 2012. National Electrical Safety Code. Available at: http://standards.ieee.org/about/nesc/index.html (accessed June 20, 2012).

International Commission on Non-Ionizing Radiation Protection (ICNIRP). 2010. ICNIRP Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (1 Hertz to 100 kilohertz). Available at: http://www.icnirp.de/documents/LFgdl.pdf (accessed June 20, 2012).

Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: Synthesis Report, Summary for Policymakers. http://www.ipcc.ch.

Integrated System (IS). 2011. Eastern Montana/Western North Dakota Load Serving Study Facility Additions Justification – August 2011.

Jones, S.L. 2010. Sprague's Pipit (*Anthus spragueii*) Conservation Plan. U.S. Department of Interior, Fish and Wildlife Service, Washington, DC. 56 pp.

Klungle, M.M. and M.W. Baxter. 2005. Lower Missouri and Yellowstone rivers pallid sturgeon study. Report submitted to Western Area Power Administration. Montana Department of Fish, Wildlife and Parks, Fort Peck, MT. 23 pp.

LeBeau II, S.C. 2009. Reconstructing Lakota Ritual in the Landscape: The Identification and Typing System for Traditional Cultural Property Sites. PhD dissertation, University of Minnesota.

Lepper, B.T. and R. Bonnichsen. 2004. New Perspectives on the First Americans. Texas A&M University. College Station, TX.

Licht, D. S. and S. H. Fritts. 1998. Gray wolf (*Canis lupus*) occurrences in the Dakotas. U.S. Fish and Wildlife Service. Jamestown, ND: Northern Prairie Wildlife Research Center. Available at: http://www.npwrc.usgs.gov/resource/mammals/wolves/index.htm. (Version 17JUN98) (accessed November 9, 2012).

Lott, C.A. 2006. Distribution and Abundance of the Interior Population of the Least Tern (*Sternula antillarum*), 2005. U.S. Army Corps of Engineers, Engineer Research and Development Center. Vicksburg, MS. 88 pp.

McKenzie County Commission. 2013a. McKenzie County, North Dakota, Zoning Ordinance(currently working draft final March, 2013).

McKenzie County Commission. 2013b. McKenzie County Comprehensive Plan(currently working draft final March 2013)

Midwest Reliability Organization (MRO). 2010. Available at: http://www.midwestreliability.org/01_about_mro/overview/mro_manual/MRO_Reliability_Plan.pdf (accessed November 9, 2012).

Missouri River Recovery Program. 2010. Integrated Science Program General Science Questions and Key Findings – October 2010. 37pp.

Montana Natural Heritage Program and Montana Fish, Wildlife and Parks. n.d. Montana Gray Wolf - *Canis lupus*. Montana Field Guide. 2012. Available at: http://FieldGuide.mt.gov/detail_AMAJA01030.aspx (accessed November 9, 2012).

National Audubon Society, Inc. 2012. Long-billed Curlew (*Numenius americanus*). Available at: http://birds.audubon.org/species/loncur (accessed October 2012).

National Park Service (NPS). 2011. Theodore Roosevelt National Park. Available at: http://www.nps.gov/thro/index.htm (accessed May 2012).

National Wildlife Federation. 2012. Wildlife Library. Mammals. Bighorn Sheep. Available at: http://www.nwf.org/Wildlife/Wildlife-Library/Mammals/Bighorn-Sheep.aspx (accessed October 2012).

North Dakota Department of Agriculture (NDDOA). 2011. County and City Noxious Weeds List. Available at: http://www.agdepartment.com/Programs/Plant/NoxiousWeeds.html (accessed July 2011).

NDDOA. 2003. Noxious Weeds Team. Available at: http://www.agdepartment.com/Programs/Plant/NoxiousWeeds.html (accessed July 2011).

North Dakota Department of Health (NDDOH). 2005. Emergency Medical Services and Trauma. Ambulance Service Areas. http://www.ndhealth.gov/EMS/ProviderMap/ (accessed December 2011).

North Dakota Department of Mineral Resources (NDDMR). 2011. Presentation to Basin Electric Board of Directors, May 11, 2011.

North Dakota Department of Transportation (NDDOT). 2010. Statewide Transportation Improvement Program, 2011-2014, Final Document. Available at: http://www.dot.nd.gov/manuals/planning/STIP/final-STIP.pdf (accessed May 16, 2011).

North Dakota Game and Fish Department (NDGFD). 2012. Bighorn Sheep Numbers Increase. Available at: http://gf.nd.gov/news/bighorn-sheep-numbers-increase (accessed October 2012).

NDGFD. 2011. 2011 PLOTS Guide. Available at: http://gf.nd.gov/maps/plots.html (accessed July 2011).

NDGFD. 2010a. Hunting and Trapping in North Dakota. Species Information. Available at: http://gf.nd.gov/hunting/ (accessed July 2011).

NDGFD. 2010b. Birds of North Dakota Field Checklist. Available at: http://gf.nd.gov/multimedia/ndoutdoors/issues/articles-brochures/nd-birds-check-list/ (accessed July 2011).

NDGFD. 2010c. Fish Species. Available at: http://gf.nd.gov/fishing/species.html (accessed August 2011).

NDGFD. 2010d. Wildlife Action Plan. 100 Species of Conservation Priority. Available at: http://gf.nd.gov/conservation/levels-list.html#levelI (accessed August 2011).

NDGFD. 2008. Black-tailed Prairie Dog Distribution. Southwest North Dakota. Available at: http://gf.nd.gov/gnf/maps/hunting/p-dog-towns-map.pdf (accessed October 2012).

North Dakota Geographic Information System (ND GIS). 2011. Data files for North Dakota resources. Available at: www.nd.gov/gis/mapsdata/data/ (accessed May 2011).

North Dakota Geologic Survey (NDGS). 2011. Available at: https://www.dmr.nd.gov/ndgs/ (accessed June 2011).

North Dakota Petroleum Council. 2011. North Dakota Oil and Gas Industry: Facts and Figures, 2011 Edition. Available at: http://www.ndoil.org/image/cache/Facts_and_Figures_2011_-_online.pdf (accessed December 2011).

North Dakota Pipeline Authority (NDPA). 2010. An Update on North Dakota's Natural Gas Infrastructure. Industrial Commission of North Dakota. www.pipeline.nd.gov (accessed September 2011).

State Historical Society of North Dakota (ND SHPO). 2008. North Dakota Comprehensive Plan for Historic Preservation: Archaeological Component. Available at: http://history.nd.gov/hp/stateplan_arch.html (accessed November 9, 2012).

N.D. State Land Department. 2011. Surface Management Division. Available at: http://www.land.nd.gov/surface/surface.htm (accessed August 2011).

North Dakota State Water Commission (NDSWC). 2011. Maps and Data Sources. Major Drainage Sub-Basins of North Dakota. Available at: http://www.swc.state.nd.us/4dlink9/4dcgi/GetSubCategoryRecord/Map%20and%20Data%20Resources/Published%20Maps (accessed December 2011).

NDSWC. 2010. 2011-2013 North Dakota Water Development Report: An Update to the 2009 State Water Management Plan. Available at: http://www.swc.state.nd.us/4dlink9/4dcgi/redirect/index.html (accessed September 2011).

NDSWC. 2005. A Reference Guide – Water in North Dakota North Dakota

Title 57. n.d. Taxation. Chapter 57-06, Assessment and Taxation of Public Utilities. Available at: http://www.legis.nd.gov/cencode/t57c06.pdf (accessed April 30, 2012).

Ondracek, Witwer, & Bertsch. 2010. North Dakota Communities Acutely Impacted by Oil and Gas Development: Housing Demand Analyses. Available at: http://www.ndhfa.org/Default.asp?nMenu=02356 (accessed December 2011).

Ramsey, C. and H. Sleeper. 1994. Architectural Graphic Standards, 9th Edition. John Wiley and Sons, New York.

Royce, C.C. 1899. Indian Land Cessions in the United States. Eighteenth Annual Report of the Bureau of American Ethnology to the Secretary of the Smithsonian Institution, 1896-97. Pt. 2. Government Printing Office. Washington, DC.

Ruggles, K. (2011, October 19). Work begins to extend City's water and sewer service. McKenzie County Farmer. Available at http://www.watfordcitynd.com/?id=10&nid=1372 (accessed January 2012).

Schneider, M.J. 2002. Cultural Affiliations of Native American Groups within North and South Dakota: An Ethnohistorical Overview. Anthropology Research. University of North Dakota. Contribution No. 375. Grand Forks. Submitted to the Dakotas Area Office, Bureau of Reclamation. Bismarck, ND.

Shepherd, M.D. 2005. Species Profile: *Atrytone arogos* and *Hesperia ottoe*. In Shepherd, M.D., D.M. Vaughan, and S.H. Black (Eds). Red List of Pollinator Insects of North America. CD-ROM Version 1 (May 2005). Portland, OR: The Xerces Society for Invertebrate Conservation. Available at: http://www.xerces.org/wpcontent/uploads/2008/09/atrytone_arogos.pdf and http://www.xerces.org/wpcontent/uploads/2008/09/hesperia_ottoe.pdf (accessed October 2012).

Smith, N. (2011, March 17). Officials question census. Williston Herald. Available at http://www.willistonherald.com/articles/2011/03/17/news/doc4d822e28a475a487119020.txt (accessed January 2012).

T. Dan Bracken. Inc. 2001. Schultz-Hanford Area Transmission Line Project. Available at: http://www.eh.doe.gov/NEPA/eis/eis0325/appxI/sch-ha-emf-080601final-rev.pdf (accessed 2007).

Towner, J. 2011, November 23. Letter to M. Plank from U.S. Fish and Wildlife Service.

UCompareHealthCare.com. 2011. Hospitals. Available at: http://www.ucomparehealthcare.com/hospital/tioga_medical_center/ (accessed December 2011).

U.S. Army Corps of Engineers (USACE). 2011. U.S. Army Corps of Engineers, Omaha District. Lake Sakakawea. Available at: http://www.nwo.usace.army.mil/html/Lake_Proj/garrison/lake.html (accessed December 2011).

USACE. (2007, December 14). Garrison Dam/Lake Sakakawea Master Plan with Integrated Programmatic Environmental Assessment. Missouri River, North Dakota. Update of Design Memorandum MGR-107D. Available at: http://www.nwo.usace.army.mil/html/Lake_Proj/MasterPlan/GarrisonMP.pdf (accessed August 2011).

U.S. Census Bureau. 2011a. 2011 American Community Survey 1-Year Estimates. American FactFinder. Available at: http://factfinder2.census.gov (accessed December 2012).

U.S. Census Bureau. 2011b. 2009-2011 American Community Survey 3-Year Estimates. American FactFinder. Available at: http://factfinder2.census.gov (accessed December 2012).

U.S. Census Bureau. 2011c. 2007-2011 American Community Survey 5-Year Estimates. American FactFinder. Available at: http://factfinder2.census.gov (accessed December 2012).

U.S. Census Bureau. 2000. 2000 Census. American FactFinder. Available at: http://factfinder2.census.gov (accessed August 2011).

U.S. Census Bureau. 1990. 1990 Census. American FactFinder. Available at: http://factfinder.census.gov (accessed December 2011).

U.S. Department of Agriculture (USDA). 2011. National Invasive Species Information Center. Laws and Regulations. Available at: http://www.invasivespeciesinfo.gov/laws/execorder.shtml (accessed August 2011).

USDA. 2009a. RUS Bulletin 1724E-200 Design Manual for High Voltage Transmission Lines. Revised May, 2009.

USDA. 2009b. 2007 Census of Agriculture: North Dakota State and County Data. Available at: http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/North_Dakota/index.asp (accessed August 2011).

USDA, Natural Resources Conservation Service (USDA-NRCS). 2011a. Plants Database. Wetland Indicator Status. Available at: http://plants.usda.gov/wetland.html (accessed August 2011).

USDA-NRCS. 2011b. North Dakota Wetlands Reserve Program . Available at: http://www.nd.nrcs.usda.gov/programs/WRP/wrp.html (accessed July 2011).

USDA-NRCS. 2011c. Wetlands Reserve Program. Available at: www.nrcs.usda.gov/wps/ (accessed December 2011).

USDA-NRCS. 2011d. Land Resource Regions and Major Land Resource Areas of the United States, Caribbean, and the Pacific Basin. Major Land Resource Regions Custom Report. Available at: http://soils.usda.gov/MLRAExplorer (accessed October 2011).

USDA-NRCS. 2011e. Soil Data Mart. Available at: http://soildatamart.nrcs.usda.gov/ (accessed December 2011).

USDA-NRCS. 2006. Major Land Resource Regions Custom Report. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. Available at: http://soils.usda.gov/MLRAExplorer (accessed November 2011).

U.S. Fish and Wildlife Service (USFWS). 2012a. Migratory Bird Program: Migratory Bird Flyways. Available at: http://www.fws.gov/migratorybirds/Flyways.html (accessed July 2012).

USFWS. 2012b. Endangered Species: North Dakota Field Office Species Profile, Piping Plover. U.S. Department of the Interior, USFWS. Available at: http://www.fws.gov/northdakotafieldoffice/endspecies/endangered_species.htm (accessed November 9, 2012).

USFWS. 2012c. Endangered Species: North Dakota Field Office Species Profile, Gray Wolf. U.S. Department of the Interior, USFWS. Available at: http://www.fws.gov/northdakotafieldoffice/endspecies/endangered_species.htm (accessed November 9, 2012).

USFWS. 2012d. Dakota skipper (*Hesperia dacotae*). North Dakota Field Office Species Profile. Last updated July 10, 2012. Available at: http://www.fws.gov/northdakotafieldoffice/endspecies/species/dakota_skipper.htm (accessed November 9, 2012).

USFWS. 2012e. Whooping Crane (*Grus americana*). 5-Year Review: Summary and Evaluation. Available at: http://ecos.fws.gov/docs/five_year_review/doc3977.pdf (accessed November 9, 2012).

USFWS. 2012f. The Baird's Sparrow. Audubon National Wildlife Refuge Complex, Mountain-Prairie Region. Available at: http://www.fws.gov/audubon/audnwr2.htm (accessed October 2012).

USFWS. 2012g. Species of Habitat Fragmentation Concern. Greater Prairie Chicken. Available at: http://www.fws.gov/northdakotafieldoffice/Greater%20Prairie%20Chicken.pdf (accessed October 2012).

USFWS. 2012h. U.S. Counties within North Dakota in which the Greater sage-grouse, entire is known to or believed to occur. Available at: http://ecos.fws.gov/speciesProfile/profile/countiesByState.action?entityId=8741&state=North%20Dakota (accessed October 2012).

USFWS. 2012i. Endangered Species Act Success Story: Bald Eagle (*Haliaeetus leucocephalus*). Available at: http://www.fws.gov/northdakotafieldoffice/endspecies/endangered_species_act_success_bald_eagle.htm (accessed October 2012).

USFWS. 2012j. Sage-Grouse Conservation Objectives Draft Report. Available at: http://www.fws.gov/mountainprairie/species/birds/sagegrouse/20120803conservationobjectivesteamdraftreport.pdf (accessed October 2012).

USFWS. 2012k. North Dakota Field Office. County Occurrence of Endangered, Threatened, and Candidate Species and Designated Critical Habitat in North Dakota. Available at: http://www.fws.gov/northdakotafieldoffice/county_list.htm (accessed October 2012).

USFWS. 2011a. Endangered Species Program. Species County Lists. Available at: http://www.fws.gov/endangered/ (accessed July 2011).

USFWS. 2011b. Pallid Sturgeon (*Scaphirhynchus albus*). North Dakota Field Office Species Profile. Last updated October 1, 2011. Available at: http://www.fws.gov/northdakotafieldoffice/endspecies/species/pallid_sturgeon.htm (accessed November 9, 2012).

USFWS. 2011c. Black-footed Ferret (*Mustela nigripes*). North Dakota Field Office Species Profile. Last updated October 1, 2011. Available at: http://www.fws.gov/northdakotafieldoffice/endspecies/species/black-footed_ferret.htm (accessed November 9, 2012).

USFWS. 2011d. Gray Wolf (*Canis lupus*). Biologue. U.S. Department of the Interior, USFWS. Available at: http://www.fws.gov/midwest/wolf/aboutwolves/biologue.htm (accessed November 9, 2012).

USFWS. 2011e. Least tern (*Sterna antillarum*). North Dakota Field Office Species Profile. Last updated October 1, 2011. Available at: http://www.fws.gov/northdakotafieldoffice/endspecies/species/least_tern.htm (accessed November 9, 2012).

USFWS. 2011f. U.S. Fish and Wildlife Service, Species Assessment and Listing Priority Assignment Form. Available at: http://www.fws.gov/midwest/endangered/insects/pdf/DAKSKCandidateAssessForm2011.pdf (accessed November 9, 2012).

USFWS. 2011g. Endangered Species Program. Species County Lists. Available at: http://www.fws.gov/northdakotafieldoffice/county_list.htm (accessed October 2012).

USFWS. 2011h. Endangered Species. Mountain-Prairie Region. Black-Tailed Prairie Dog. Available at: http://www.fws.gov/mountain-prairie/species/mammals/btprairiedog/ (accessed October 2012).

USFWS. 2011i. Endangered Species. Midwest Region. Poweshiek Skipperling (*Oarisma poweshiek*). Candidate Species. Available at: http://www.fws.gov/midwest/endangered/insects/posk/ (accessed October 2012)

USFWS. 2010. 12-Month Finding on a Petition to List Sprague's Pipit as Endangered or Threatened Throughout Its Range. U.S. Department of the Interior, USFWS. Federal Register. Vol. 75, No. 178: 56028-56050.

USFWS. 2009a. Status Assessment and Conservation Action Plan for the Long-Billed Curlew (*Mumenius americanus*). Biological Technical Publication. Available at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/FocalSpecies/Plans/LBCU_Plan_2009.pdf (accessed October 2012).

USFWS. 2009b. The Black-Tailed Prairie Dog Conservation Assessment and Strategy. Available at: http://www.fws.gov/mountainprairie/species/mammals/btprairiedog/BTPDConservationAgreement1999.pdf (accessed October 2012).

USFWS. 2008. 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation-North Dakota. Available at: http://www.census.gov/prod/www/abs/fishing.html (accessed October 2011).

USFWS. 2007a. Dakota Skipper Conservation Guidelines, *Hesperia dacotae* (Skinner) (*Lepidoptera*: *Hesperiidae*). September 2007. Available at: http://www.fws.gov/northdakotafieldoffice/SkipGuidelines07.pdf (accessed November 9, 2012).

USFWS. 2007b. International Recovery Plan, Whooping Crane (*Grus americana*). Third Revision. March 2007. Available at: http://ecos.fws.gov/docs/recovery_plan/070604_v4.pdf (accessed November 9, 2012).

USFWS. 2007c. National Bald Eagle Management Guidelines. May 2007. Available at: http://www.fws.gov/northeast/EcologicalServices/pdf/NationalBaldEagleManagementGuidelines.pdf (accessed October 2012).

USFWS. 2003. Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States. Biological Technical Publication. Available at: http://www.fws.gov/mountainprairie/species/birds/wbo/Western%20Burrowing%20Owlrev73003a.pdf (accessed October 2012).

USFWS. 2002. Status Assessment and Conservation Guidelines, Dakota Skipper. April 2002. Available at: http://www.fws.gov/midwest/endangered/insects/pdf/dask-status.pdf (accessed November 9, 2012).

USFWS. 1993. Pallid Sturgeon Recovery Plan. U.S. Department of the Interior, USFWS, Bismarck, ND. 55 pp.

USFWS. 1990. Recovery Plan for the Interior Population of the Least Tern *Sterna Antillarum*. U.S. Department of the Interior, USFWS. Twin Cities, MN. 90 pp.

USFWS. 1989. Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act. Denver, CO and Albuquerque, NM.

USFWS. 1987. Northern Rocky Mountain Wolf Recovery Plan. U.S. Department of the Interior, USFWS, Denver, CO. 119 pp.

USFWS. n.d. Whooping Crane (*Grus americana*). Available at: http://ecos.fws.gov/docs/life_histories/B003.html (accessed November 9, 2012).

U.S. Forest Service (USFS). 2012a. Personal communication with David Valenzuela on October 18, 2012.

USFS. 2012b. Personal communication with Dan Svingen, Grasslands Biologist, Dakota Prairie Grasslands Office, Bismarck, N.D. Sent on August 16, 2012.

USFS. 2010. Dakota Prairie Grasslands. Available at: http://www.fs.fed.us/r1/dakotaprairie/index.shtml (accessed July 2011).

USFS. 2005a. Greater Prairie-Chicken (*Tympanuchus cupido*): A Technical Conservation Assessment. Prepared for the USDA Forest Service, Rocky Mountain Region, Species Conservation Project. Available at: http://www.fs.fed.us/r2/projects/scp/assessments/greaterprairiechicken.pdf (accessed October 2012).

USFS. 2005b. Loggerhead Shrike (*Lanius ludovicianus*): A Technical Conservation Assessment. Prepared for the USDA Forest Service, Rocky Mountain Region, Species Conservation Project. Available at http://www.fs.fed.us/r2/projects/scp/assessments/loggerheadshrike.pdf (accessed October 2012).

USFS. 2002. Nest Site Selection and Productivity of Burrowing Owls Breeding on the Little Missouri National Grassland. 2001 Annual Report. Available at: http://www.fs.fed.us/r1/dakotaprairie/projects/survey_projects/burowls.pdf (accessed October 2012).

USFS. 2001. Northern Great Plains Management Plans Revision. (accessed via compact disk available at Northern Great Plains Planning, USDA Forest Service, Chadron, NE).

USFS. 1992. Carbon Storage and Accumulation is the United States Forest Ecosystems. General Technical Report WO-59. August 1992.

U.S. Geological Survey (USGS). 2009. North Dakota Water Science Center. North Dakota Basin Maps. Available at: http://nd.water.usgs.gov/data/basinmap.html (accessed July 2011).

USGS . 2008. National Assessment of Oil and Gas Fact Sheet: Assessment of Undiscovered Oil Resources in the Devonian-Mississippian Bakken Shale Formation, Williston Basin Province, Montana and North Dakota, 2008. Available at: http://pubs.usgs.gov/fs/2008/3021/pdf/FS08-3021_508.pdf (accessed December 2011).

USGS. 2006a. Breeding Birds of North America. Long-billed curlew (*Numenius americanus* [Bechstein]). Northern Prairie Wildlife Research Center. Available at: http://www.npwrc.usgs.gov/resource/birds/bbofnd/species/2640.htm (accessed October 2012).

USGS. 2006b. Northern Prairie Wildlife Research Center. North Dakota's Federally Listed Endangered, Threatened, and Candidate Species - 1995. Dakota Skipper Butterfly (*Hesperia dacotae*), Regal Fritillary Butterfly (*Speyeria idalia*), and Tawny Crescent Butterfly (*Phyciodes batesii*). Available at: http://www.npwrc.usgs.gov/resource/wildlife/nddanger/species/hespdaco.htm. http://www.npwrc.usgs.gov/resource/wildlife/nddanger/species/speyidal.htm. http://www.npwrc.usgs.gov/resource/wildlife/nddanger/species/phycbate.htm. (accessed October 2012).

USGS. 2006c. Northern Prairie Wildlife Research Center. North Dakota's Federally Listed Endangered, Threatened, and Candidate Species - 1995. Atlas of North Dakota Butterflies. Available at: http://www.npwrc.usgs.gov/resource/insects/bflynd/index.htm#contents (accessed October 2012).

USGS. 1995. North Dakota's Federally Listed Endangered, Threatened, and Candidate Species - 1995. Northern Prairie Wildlife Research Center. Available at:

http://www.npwrc.usgs.gov/resource/wildlife/nddanger/species/laniludo.htm (accessed October 2012).

USGS. 1983. Guide to North Dakota's Ground-Water Resources, Water Supply Paper, 2236.

USGS, Northern Prairie Wildlife Research Center (USGS-NPWRC). 2006. Checklist of North Dakota Mammals. Available at: http://www.npwrc.usgs.gov/resource/mammals/mammals/cheklist.htm (accessed August 2011).

U.S. National Park Service (NPS). 2011. Theodore Roosevelt National Park. Available at: http://www.nps.gov/thro/index.htm (accessed July 2011)

Vaughan, D.M., and M.D. Shepherd. 2005. Species Profile: *Speyeria idalia*. In Shepherd, M.D., D.M. Vaughan, and S.H. Black (EDS). Red List of Pollinator Insects of North America. CD-ROM Version 1 (May 2005). Portland, OR: The Xerces Society for Invertebrate Conservation. Available at: http://www.xerces.org/wpcontent/uploads/2008/09/speyeria_idalia.pdf (accessed October 2012).

Western Area Power Administration (Western). 2010. Williston to Tioga Transmission Line Project Environmental Assessment, March 2010. Available at: https://www.wapa.gov/ugp/Environment/EnvWillTiogaEA.htm (accessed June 2011).

Whitehead, R.L. 1996. Groundwater Atlas of the United States: Montana, North Dakota, South Dakota, Wyoming. HA 730-I. U.S. Geological Survey. Available at: http://pubs.usgs.gov/ha/ha730/ch_i/index.html (accessed August 2011).

Williston Herald. 2012. Possible airport plans discussed at meeting. Available at: http://www.willistonherald.com/news/possible-airport-plans-discussed-atmeeting/article_df232604-dcc2-11e1-a1d4-001a4bcf887a.html (accessed September 19, 2012).

Williston Planning Department and Williams County Planning Commission. 1987. Zoning Ordinance and Subdivision Regulations of Williams County, North Dakota. Williston, North Dakota. Available at: http://www.williamsnd.com/usrfiles/1987-Zoning%20Ord%20%20amended%202007.pdf (accessed August 2011).

* * * * *

Burns & McDonnell World Headquarters
9400 Ward Parkway
Kansas City, MO 64114
Phone: 816-333-9400
Fax: 816-333-3690
www.burnsmcd.com

Burns & McDonnell: Making our clients successful for more than 100 years