APPLICATION TO THE
MINNESOTA PUBLIC UTILITIES COMMISSION
FOR A ROUTE PERMIT FOR THE
HUNTLEY-WILMARTH 345 KV TRANSMISSION LINE PROJECT

MPUC Docket No. E002, ET6675/TL-17-185

January 22, 2018

Submitted by
Northern States Power Company and ITC Midwest LLC

This Page Intentionally Left Blank

LIST OF TABLES

LIST OF FIGURES

APPENDICES

ACRONYM LIST

AADT	Annual Average Daily Traffic
ACSR	Aluminum Conductor Steel Reinforced
AFUDC	allowance for funds used during construction
ALJ	Administrative Law Judge
AMA	Aquatic Management Area
amp	ampere
amsl	above mean sea level
Applicants	Xcel Energy and ITC Midwest LLC
Application	Route Permit Application
ARMER	Allied Radio Matrix for Emergency Response
APLIC	Avian Power Line Interaction Committee
BENCO	BENCO Electric Cooperative
BGEPA	Bald and Golden Eagle Protection Act
BMPs	best-management practices
BWSR	Bureau of Soil and Water Resources
CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	carbon monoxide
Commission	Minnesota Public Utilities Commission
CR	County road
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CSAH	County State Aid Highway
CWA	Clean Water Act
CWI	County Well Index
dB	decibels
dBA	A-weighted decibels
DME	Dakota, Minnesota and Eastern
ECS	Ecological Classification System
EERA	Energy and Environmental Review and Analysis
EIS	environmental impact statement
ELF	extremely low frequencies
EMF	electric and magnetic fields
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Administration
FERC	Federal Energy Regulatory Commission

FM/AM	Frequency Modulation/Amplitude Modulation
FPPA	Farmland Protection Policy Act
FSA	Farm Service Agency
GIS	Geographic Information System
GPS	Global Positioning System
HUC	Hydrologic Unit Code
Huntley – Wilmarth Project or Project	Huntley to Wilmarth Transmission Line Project
HVTL	high voltage transmission line
Hwy.	U.S. Highway
Hz	hertz
IBA	Important Bird Area
IPaC	Information for Planning and Conservation
ITC Midwest	ITC Midwest LLC
ISD	Independent School District
kV	kilovolt
kV/m	kilovolts per meter
LGU(s)	local government unit(s)
MBTA	Migratory Bird Treaty Act
MBS	Minnesota Biological Survey
mG	milliGauss
MISO	Midcontinent Independent System Operation, Inc.
MEP	Market Efficiency Project
MGS	Minnesota Geological Survey
MDH	Minnesota Department of Health
MNDNR	Minnesota Department of Natural Resources
MNDOA	Minnesota Department of Agriculture
MNDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MPUC	Minnesota Public Utilities Commission
MVA	Mega Volt Ampere
NAAQS	National Ambient Air Quality Standards
NAC	noise area classifications
NAS	National Audubon Society
NESC	National Electric Safety Code
NHD	National Hydrography Dataset
NHIS	Natural Heritage Information System
NLEB	northern long-eared bat
NO2	nitrogen dioxide
NPC	native plant community
NPDES	National Pollution Discharge Elimination System

NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
O3	ozone
ORVW	outstanding resource value waters
OSHA	Occupational Safety and Health Administration
Pb	lead
PM	particulate matter
PPSA	Power Plant Siting Act
PWI	Public Waters Inventory
RIM	Reinvest in Minnesota
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Office
SNA	Scientific and Natural Area
SO2	sulfur dioxide
SOBS	Sites of Biodiversity Significance
SPCC Plan	Spill Prevention, Control, and Countermeasure Plan
SSA	sole source aquifer
SSURGO	U.S. Department of Agriculture Soil Survey Geographic Database
SWPPP	Stormwater Pollution Prevention Plan
TMDL	total maximum daily load
T/R/S	Township, Range, Section
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geologic Survey
UP	Union Pacific
USC	U.S. Code
WHO	World Health Organization
WHPA	Wellhead Protection Area
WMA	Wildlife Management Area
WNS	white-nose syndrome
Working Group	Minnesota Interagency Working Group
WPA	Waterfowl Production Area

EXECUTIVE SUMMARY

Project Proposal

Northern States Power Company, doing business as Xcel Energy, and ITC Midwest LLC (ITC Midwest) (collectively, the Applicants) submit this Route Permit Application (Application) to the Minnesota Public Utilities Commission (MPUC or Commission) for approval to construct a new 345 kilovolt (kV) transmission line between Xcel Energy's existing Wilmarth Substation, located on the north side of the City of Mankato, Minnesota, and ITC Midwest's Huntley Substation, located south of Winnebago, Minnesota (Huntley – Wilmarth Project or Project). A Project overview map is included below as Figure ES-1.

This Application is one of two applications submitted to the Commission for the Project. The other application is a Certificate of Need application which was submitted to the Commission on January 17, 2018, in Docket No. E002, ET6675/CN-17-184.[1] The Applicants request that the Commission order that the two proceedings be coordinated pursuant to Minnesota Statute § 216B.243, subd. 4 and Minnesota Rules 7849.1900, subp. 4. As part of the Certificate of Need process, the Commission will determine whether the Project is needed, while the Route Permit process will focus on where the transmission line should be located. A decision on the Certificate of Need application will be made before, or at the same time, as a decision on this Application for a Route Permit.

Project Need

The Huntley – Wilmarth Project was studied, reviewed, and approved by the Midcontinent Independent System Operator, Inc.'s (MISO)[2] Board of Directors as a Market Efficiency Project (MEP) in December 2016 as part of its annual Transmission Expansion Plan (MTEP16) report. An MEP is needed to reduce transmission system congestion which will improve the efficiency of MISO's energy market, resulting in lower wholesale energy costs.

Congestion on the electrical system is like a traffic jam along a highway in that when the generators and consumers of electricity want to produce and consume more energy than the transmission system has the ability to carry at that time, the result is

---

[1] A copy of the Certificate of Need application can be found on the Commission's website at https://mn.gov/puc/ by clicking on "eDockets" on the right side of the website, entering "17" and "184" in the "Docket Number" boxes, and then clicking "Search". A copy of the application will also be available on the Project's website at http://www.huntleywilmarth.com/.

[2] MISO is a regional transmission organization (RTO) that operates the transmission system and an energy market in parts of 15 states and the Canadian province of Manitoba. As an RTO, MISO is responsible for planning and operating the transmission system within its footprint in a reliable manner.

that the energy is unable to travel along the congested path. The Minnesota/Iowa border is one of the most congested areas in the region's electric transmission system. Without a solution, additional wind facilities constructed along the border will worsen congestion. The Project is needed to relieve the transmission congestion in this area and increase market access to lower-cost generation, thereby providing economic benefits through reduced wholesale energy costs. The Project will also strengthen the resiliency of the regional grid and improve the deliverability of energy by reducing curtailments of wind generators. In addition, the Project will make the Minnesota transmission system more robust because, under a variety of possible future scenarios, it will increase deliverability of energy, improve the ability of the transmission system to respond to different contingencies, and provide economic benefits.

The Huntley – Wilmarth Project is the first MEP brought forward for Commission approval in this state. As an economic Project, the need for the Project must be justified primarily on its benefit-to-cost ratio. This ratio is dependent on the total cost of the Project compared to the total adjusted production cost savings[3] that the Project will provide over time. Accordingly, cost will be an important consideration in selecting the route and design for the Project.

Given the unique nature of this Project, Applicants are proposing four route alternatives and several design options that result in nine distinct route/design combinations. These route/design options have total costs ranging from $105.8 million to $138.0 million (2016$). Applicants are providing these different design and route options to enable the Commission to select an option that provides the appropriate balance between the economic-based need for the Project while minimizing the Project's potential impacts. For instance, certain design options, such as H-frame and monopole structures that run parallel to an existing transmission line, have lower costs and thus higher net economic benefits, but have greater potential impacts to the human and natural environments. Likewise, other design options, such as double-circuit monopole structures, have higher costs and slightly lower net economic benefits, but can reduce human and natural impacts.

The Commission's final route selection will require an analysis of all routing criteria along with the tradeoffs of impacts and costs. As detailed in Chapter 2 of Applicants' Certificate of Need application, to aid the Commission in this analysis, the Applicants have undertaken a more thorough cost estimation process than is typically performed during the permitting phase and have fully evaluated the expected energy production cost savings that the Project will provide. Based on that analysis, the Applicants have

[3] Adjusted production cost savings are utilized to measure the economic benefits of proposed transmission projects. These savings are calculated as the difference in total production costs of energy for a generation fleet adjusted for import costs and export revenues with and without the proposed transmission project.

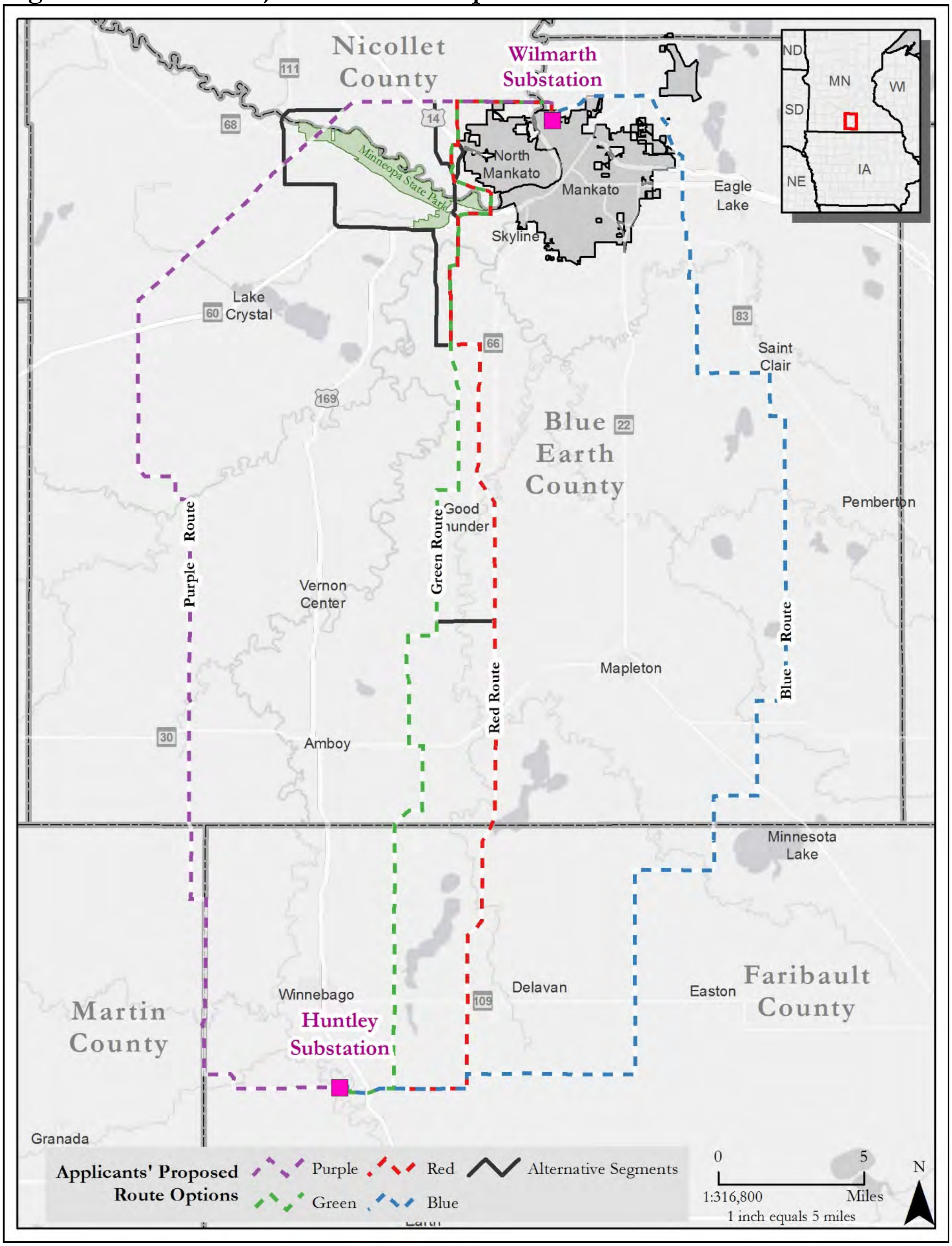
demonstrated that the Project's benefits exceed its costs if any one of the routes/designs proposed in this Application is selected by the Commission.

Project Description

The Applicants propose to construct an approximately 50-mile 345 kV transmission line connecting Xcel Energy's existing Wilmarth Substation north of Mankato, Minnesota, with ITC Midwest's Huntley Substation south of Winnebago, Minnesota. The Project also includes necessary modifications to the existing Wilmarth and Huntley substations to accommodate this new 345 kV transmission line.

The new 345 kV line would have a right-of-way width of 150 feet. Applicants propose four different routes for the new 345 kV line in this Application. These routes from west to east are: the Purple Route, the Green Route, the Red Route, and the Blue Route. In addition to the four routes, six segment alternatives are presented. An overview map of the Applicants' four route options and six segments is shown in Figure ES-1.

Figure ES-1 Project Overview Map



Route Development Process

Minnesota law requires that an applicant propose at least two routes for a new high voltage transmission line.[4] As noted above, Applicants are proposing four route alternatives in this Application given the Project's unique status as an MEP. In addition to these four routes, other routes for the Project may be proposed by the public and other stakeholders through the Route Permit process, discussed in detail below. The Commission will make the final route determination based on a comprehensive record and public comment that will be developed during the Route Permit proceeding. The route selected by the Commission may ultimately not be one of the routes proposed in this Application.

Routes presented in this Application are the result of months of careful study, along with extensive stakeholder outreach and feedback. In developing the proposed routes, the Applicants were guided by the routing criteria set forth in Minnesota law as well as input from the public and government agencies. These criteria were analyzed to select routes that minimize overall impacts. The criteria include but are not limited to:

- Sharing existing rights-of-way such as transmission lines, roads, railroads, and other existing infrastructure corridors.
- Using property lines and agricultural field boundaries to minimize impacts if existing rights-of-way were not available or not practicable.
- Maximizing distance between the transmission line and homes.
- Minimizing potential impacts to agriculture, forestry, tourism, mining, and other land-based economies.
- Minimizing potential impacts to the natural environment, including wildlife, flora and fauna, and rare and unique natural resources.

The Applicants first developed a Project Study Area (36 miles long and 29 miles wide) between the two substation endpoints. The Applicants then identified initial route options within the Project Study Area during the spring of 2017 using an analysis of constraints mapping data, identifying existing infrastructure corridors and property lines, and consulting with regulatory agencies. The route options were then presented to the public in a series of public meetings held in June 2017. After these meetings, the Applicants continued to receive and incorporate public feedback into the Applicants' route refinement process. This feedback has resulted in many route adjustments, new route segments, and additional comparative data.

[4] Minn. Stat. § 216E.03, subd. 3; Minn. R. 7850.1900, Subp. 2(C).

Based on the feedback received to date, the two most important routing factors to landowners in the Project Study Area are minimizing proximity to residences and minimizing agricultural impacts.

The presence of utility structures in farmland can present an obstacle to farm operations. For instance, depending on its location, a transmission structure can impede operation of machinery and result in less efficient field patterns. Many commenters were also concerned with the proposed lines being hindrances to aerial spraying of fields. Despite these potential obstacles, however, productivity of farm operations are unlikely to be materially impacted. Table ES-1 includes a comparison of routes/design options based on the number of structures that would be placed in farm fields.

Applicants developed initial route segments to either follow existing linear infrastructure or to follow property boundaries where there were no or few homes. The number of residences along each segment and route was used as a primary comparison criterion in the route selection process. The number of homes in proximity to the proposed transmission line centerline was kept to a minimum through the use of these methods.

Minimizing impacts to future planned developments around the City of North Mankato, Belgrade Township, and the City of Mankato was another common theme during the public outreach effort. The Red, Green, and Blue routes all cross areas designated by these municipalities for potential future development. The Applicants identified route alternatives to avoid these future development areas to give the Commission additional routing options as it evaluates its routing criteria and selects a route.

The Applicants also performed a data-based analysis to identify routes that have the least impact to people and the environment. In addition, the Applicants continued to consult with township, county, and city governments; state agencies such as the Minnesota Department of Natural Resources (MNDNR), Minnesota Department of Agriculture (MNDOA), and Minnesota Department of Transportation (MNDOT); federal agencies such as the U.S. Fish and Wildlife Service (USFWS), U.S. Army Corps of Engineers (USACE), and other interested parties. These meetings were conducted to ensure the public and agencies had the opportunity to provide input on routes before this Application was submitted. More detail about the Applicants' route selection process is included in Section 3.0 and Appendix E.

Brief Description of Applicants' Proposed Routes

The Applicants present four routes for consideration in the routing process. The routes are identified (from west to east) as Purple, Green, Red, and Blue. The major routing constraints in the Project Study Area are found on the north end and include the cities of North Mankato and Mankato, the Minnesota River, and Minneopa State Park. In addition to the four main routes, alternative segments are included to provide route options in the area west of North Mankato and to go around or cross Minneopa State Park. Connector options are also provided to cross between the Purple, Green, and Red routes.

Purple Route

The Purple Route is the westernmost route and follows Xcel Energy's existing Wilmarth – Lakefield Junction 345 kV transmission line (Lakefield Junction – Wilmarth Line) from the Wilmarth Substation approximately seven miles west where it turns diagonal to the southwest for 10 miles to a point west of Lake Crystal where it turns south for 27 miles. Just southwest of the Huntley Substation, the route turns east for five miles to the Huntley Substation. The Purple Route is 51.6 miles long.

The Purple Route follows an existing transmission line for the northern half of its length but is five miles longer than more direct routes. For the portion of the Purple Route that follows an existing transmission line, Applicants provide a design option of either building the new 345 kV line adjacent to the existing line on H-frame or monopole structures, or consolidating the new and existing 345 kV line in a double-circuit configuration. For the double-circuit design, the Applicants propose to build adjacent to the existing line (in most areas) to allow the existing line to remain in service during construction. The new 345 kV line would be offset approximately 100 feet from the existing line, measured from centerline to centerline. The existing line would then be removed when the new line is completed. Since the existing Lakefield Junction – Wilmarth Line is built cross country in the middle of fields, building adjacent to the existing line (and then removing the old line) would not increase permanent impacts to agriculture.

Green and Red Routes

The Green Route shares the same alignment as the Purple Route for its northernmost 4 miles. The Green Route is one of the two middle routes that heads south along the western fringe of the City of North Mankato and generally follows the most direct path to the south. Once south of Rapidan Township, the Green Route generally follows property divisions and roads south to the Huntley Substation. The total length of the Green Route is 45.4 miles.

The Red Route is the same as the Green Route on its northernmost 12.5 miles. South of Rapidan Township, the Red Route would be combined with an existing 161 kV line and built as a double-circuit line for 25 miles. The Red Route is approximately

46.5 miles long. A parallel (rather than double-circuit) route is not presented for the Red Route because the Green Route provides the option to build a middle route as a single-circuit design.

The Green and Red routes are the most direct routes between the two substation endpoints but must pass through an area west of the cities of North Mankato and Mankato that includes land slated for potential future residential development and existing development along a short section of U.S. Highway 169, Minneopa State Park, and the Minnesota River. The Red Route is the second shortest route and would be consolidated with an existing transmission line on its southern half while the Green Route provides the most direct route between the Huntley and Wilmarth substations.

Blue Route

The Blue Route is 57.0 miles long and follows an eastern path leaving the Wilmarth Substation and travels around the northern and eastern fringes of the City of Mankato. The majority of the Blue Route follows field divisions through farmland with only about 9.5 miles double-circuited with existing transmission lines on the north and south ends of the route. The Blue Route avoids crossing the Minnesota River and Minneopa State Park, but is the longest route and has a relatively high length through open farmland (refer to Section 6.6.1).

Major Route Constraints

In developing routes to connect the two substation endpoints, the presence of Minneopa State Park and the existing communities of the City of Mankato, the City of North Mankato, and Belgrade Township presented challenges to developing the shortest and most direct route between the substations. The existing Wilmarth Substation is located within the northern boundary of the City of Mankato. To connect this substation to the Huntley Substation to the south, Applicants developed routes that avoided the high-density areas by traversing either to the west or east of the Mankato/North Mankato area before turning south to the Huntley Substation. Routes to the west of the City of North Mankato were constrained by Minneopa State Park which occupies roughly seven miles of the Minnesota River Valley west of the cities of Mankato and North Mankato.

The following discussion focuses on these routing challenges and the Applicants' proposed routing options in these areas.

Minneopa State Park

Minneopa State Park is an important feature in the development of the Purple, Green, and Red routes as these routes are located on the west side of the cities of Mankato and North Mankato.

The Purple Route crosses Minneopa State Park on an existing transmission corridor. Applicants propose to consolidate the new 345 kV line with the existing Lakefield Junction – Wilmarth Line in a double-circuit configuration within the existing transmission line easements. The transmission easement, held by Xcel Energy, predates the park boundary in this location and authorizes the construction of another circuit.

The Green and Red routes avoid crossing Minneopa State Park by going around the east side. However, in avoiding the park, these routes cross the west and south sides of the City of North Mankato in areas that are pending annexation for future residential development. Applicants developed an alternate segment (Alternative Segment C) that avoids a portion of this impact, but this route alternative requires a new, approximately 500-foot crossing of a narrow segment of Minneopa State Park. The tradeoffs associated with these routes are impacts to future North Mankato development verses impact to agricultural land in Belgrade Township.

City of Mankato

Applicants also developed one route on the east side of the City of Mankato, the Blue Route. The Blue Route passes through land between the City of Mankato and the City of Eagle Lake. The City of Mankato designated a portion of this area east of the city for a combination of industrial, commercial (including a platted development just south of where the Blue Route crosses Highway 14), residential, and park/open space (refer to Figure 6.5.2-1); therefore, the Blue Route may impact the City of Mankato's future development plans.

Route Alternative Segments

In addition to the four route alternatives, Applicants also developed six alternative route segments that provide additional routing options in these areas.

Alternative Segments A and B are route options for a common segment of the Green and Red routes that have different impacts to the City of North Mankato and Belgrade Township. Each of these alternative segments as well as the proposed route alignment in this area generated some opposition during the Applicants' outreach. Comparing Alternative Segments A and B and the proposed route involves tradeoffs between impacts to land slated for future development verses impacts to agriculture and less dense residential areas of Belgrade Township. Applicants expect a high level of public engagement in this area and decided it was appropriate to include all three route options in this Application.

Alternative Segment C is included because it reduces land use impacts east of Minneopa State Park and eliminates the additional route length required to go around the park but would require a new crossing of Minneopa State Park.

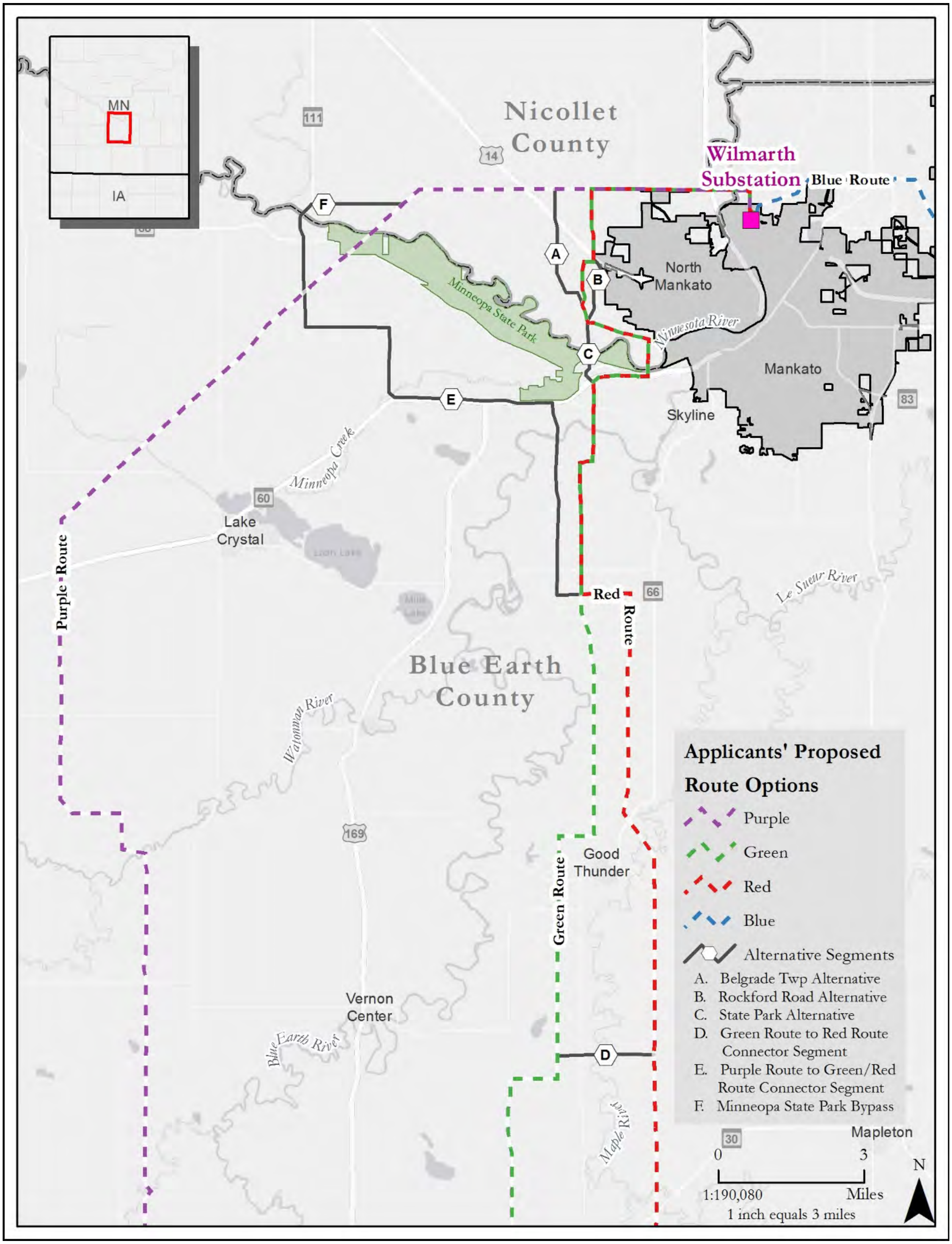
Alternative Segment D is a short segment that would connect the Red and Green routes near their midpoint. This connection would allow the use of a combination of Red and Green routes.

Alternative Segment E connects the Purple Route's Minnesota River crossing with either the Red or Green route. This segment avoids the area west of North Mankato, but still uses the most direct middle routes.

Alternative Segment F avoids crossing parkland on the Purple Route by deviating from the existing transmission corridor and going around Minneopa State Park to the west.

Figure ES-2 depicts Route Alternative Segments A to F.

Figure ES-2 Alternative Segments A to F



Design Options

Applicants are proposing several structure design options for each route design to enable the Commission to select an option that provides the appropriate balance between the economic-based need for the Project while minimizing the Project's potential impacts.

For the Purple Route, Applicants propose three different design options: (1) a single-circuit H-frame; (2) a single-circuit monopole; and (3) a double-circuit monopole. Both single-circuit designs will be constructed next to the existing transmission lines but will be constructed as double-circuit within Minneopa State Park and the federal Waterfowl Production Area (WPA).

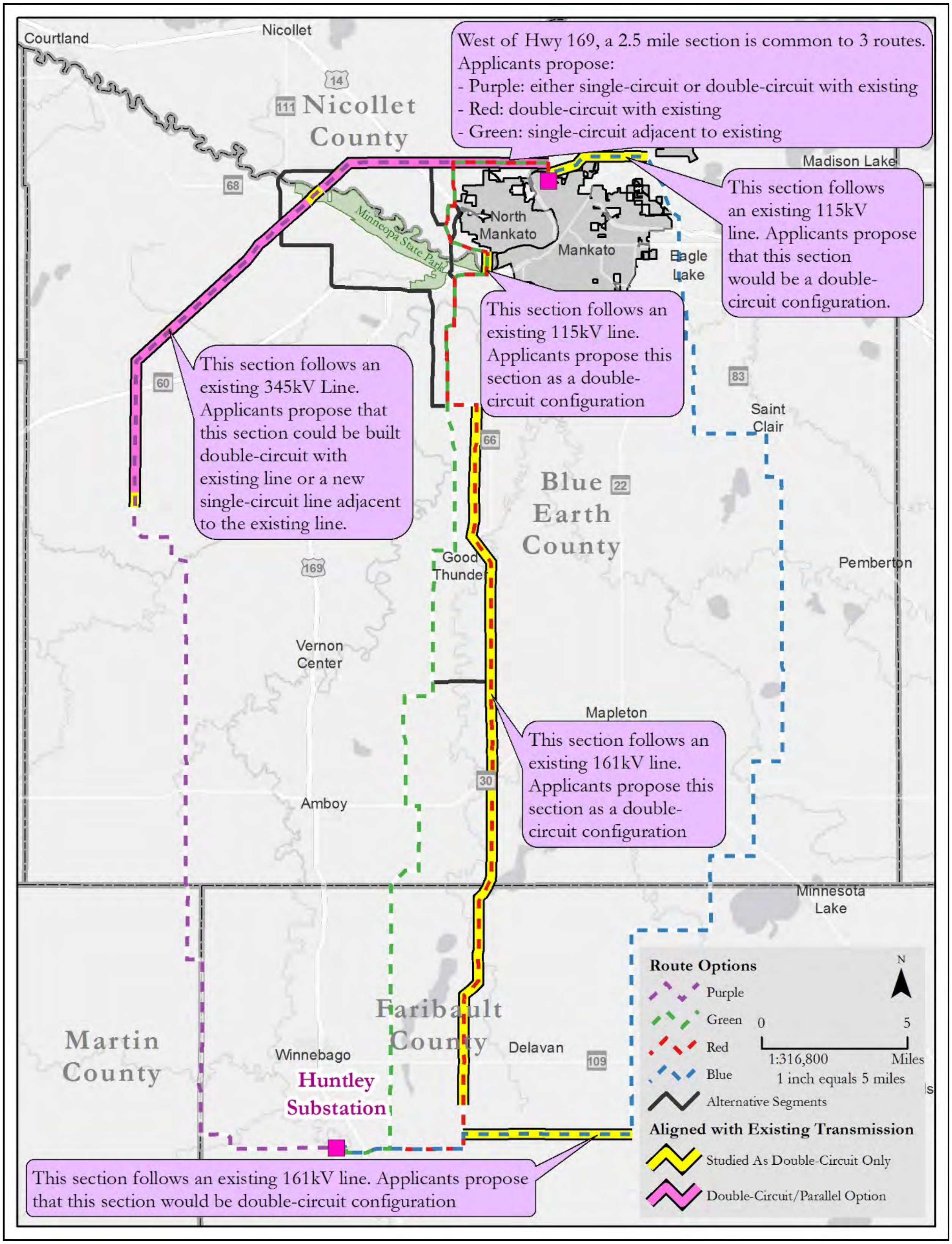
The double-circuit design will be constructed on a monopole structure with existing transmission lines in those areas where the route follows existing transmission line corridors. For the double-circuit design, in areas where the transmission line does not follow an existing transmission line corridor, the Applicants propose single-circuit monopole structures.

For the Green Route, Applicants are proposing two design options: (1) single-circuit H-frame structures; or (2) single-circuit monopole structures. The Green Route follows the existing Lakefield Junction – Wilmarth Line leaving the Wilmarth Substation but Applicants propose to construct this segment as a single-circuit design adjacent to the existing line. The only location where Applicants propose to double-circuit the Green Route with an existing line is for a one-mile segment across the Minnesota River.

For the Red Route, Applicants are proposing to double-circuit the 345 kV line in all areas where this route follows existing transmission line corridors. In the areas where the route does not follow existing transmission line corridors, the Applicants propose either: (1) single-circuit H-frame structures; or (2) single-circuit monopole structures.

For the Blue Route, Applicants propose two different design options: (1) a single-circuit H-frame; and (2) a single-circuit monopole. As discussed above, a segment near the Wilmarth Substation and a segment east of the Huntley Substation will be constructed as double-circuit monopole. Figure ES-3 depicts the design options that Applicants studied to perform an impacts analysis and prepare a cost estimate for each route.

Figure ES-3 Route Option Configurations



Summary of Key Routing Data

The following table summarizes key routing data used throughout the Applicants' route development process.

Table ES-1
Summary of Potential Environmental Impacts

Existing Feature	Route Option			
	Purple Route	Green Route	Red Route	Blue Route
Total Route Length (miles)	51.6	45.4	46.5	57.0
Agricultural Impact – range of new structures placed in agricultural fields (approximate number)	Single-Circuit: 175 to 215 Double-Circuit: 75	120(monopole)-195 (H-frame)	-5 (H-frame)to -25 (monopole)[a]	125 (monopole) to 240 (H-frame)
Length through Future Development (miles) [b]				
Industrial-Commercial	0	1.3	1.3	0.7
Open Space/ Park:	0.1	0.1	0.1	0.4
Residential	1.2	3.9	3.9	0.6
Length through Future Development (miles) [b]	Industrial/ Commercial: 0.0 Open Space/ Park: 0.1 Residential: 1.2	Industrial/ Commercial: 1.3 Open Space/ Park: 0.1 Residential: 3.9	Industrial/ Commercial: 1.3 Open Space/ Park: 0.1 Residential: 3.9	Industrial/ Commercial: 0.7[c] Open Space/ Park: 0.4 Residential: 0.6
Residences within 300 feet (number)[d]	7	26	31	5
Transmission Corridor Sharing (percent)	44.6	11.7	63.2	16.8
Parks, Native Plant Communities, and Sites of High Biodiversity Significance crossed (number)	10	5	5	3
Waterbodies Crossed (number)	26	18	22	45
Structures within Wetlands (number)	17	14	18	15

a Red Route results in a net decrease of structures in agricultural fields because the proposed 345 kV line has fewer structures per mile than the existing 161 kV line it would replace.
b Based on Mankato and North Mankato Land Use Plans (refer to Figure 6.5.2-1)
c 0.3-mile of the total is platted for development
d There are no residences within the 150-foot-wide right-of-way.

1.0 INTRODUCTION

Northern States Power Company, doing business as Xcel Energy, and ITC Midwest LLC (ITC Midwest) (collectively, the Applicants) are applying for a Route Permit from the Minnesota Public Utilities Commission (MPUC or Commission) for approval to construct the Huntley to Wilmarth Transmission Line Project (Project or Huntley – Wilmarth Project) in Blue Earth, Faribault, Martin, and Nicollet counties in Minnesota. The Project is an approximately 50-mile-long 345 kV transmission line that will extend from Xcel Energy's Wilmarth Substation located in Mankato in Blue Earth County, to ITC Midwest's Huntley Substation south of Winnebago in Faribault County, just south of the intersection of U.S. Highway 169 and 345th Avenue (refer to Figure 1.0-1).

The four routes presented in this Application are those the Applicants have identified through a comprehensive review and analysis of engineering options, environmental conditions, and socioeconomic considerations, with an objective to minimize impacts on the environment and affected landowners while meeting the Project's need.

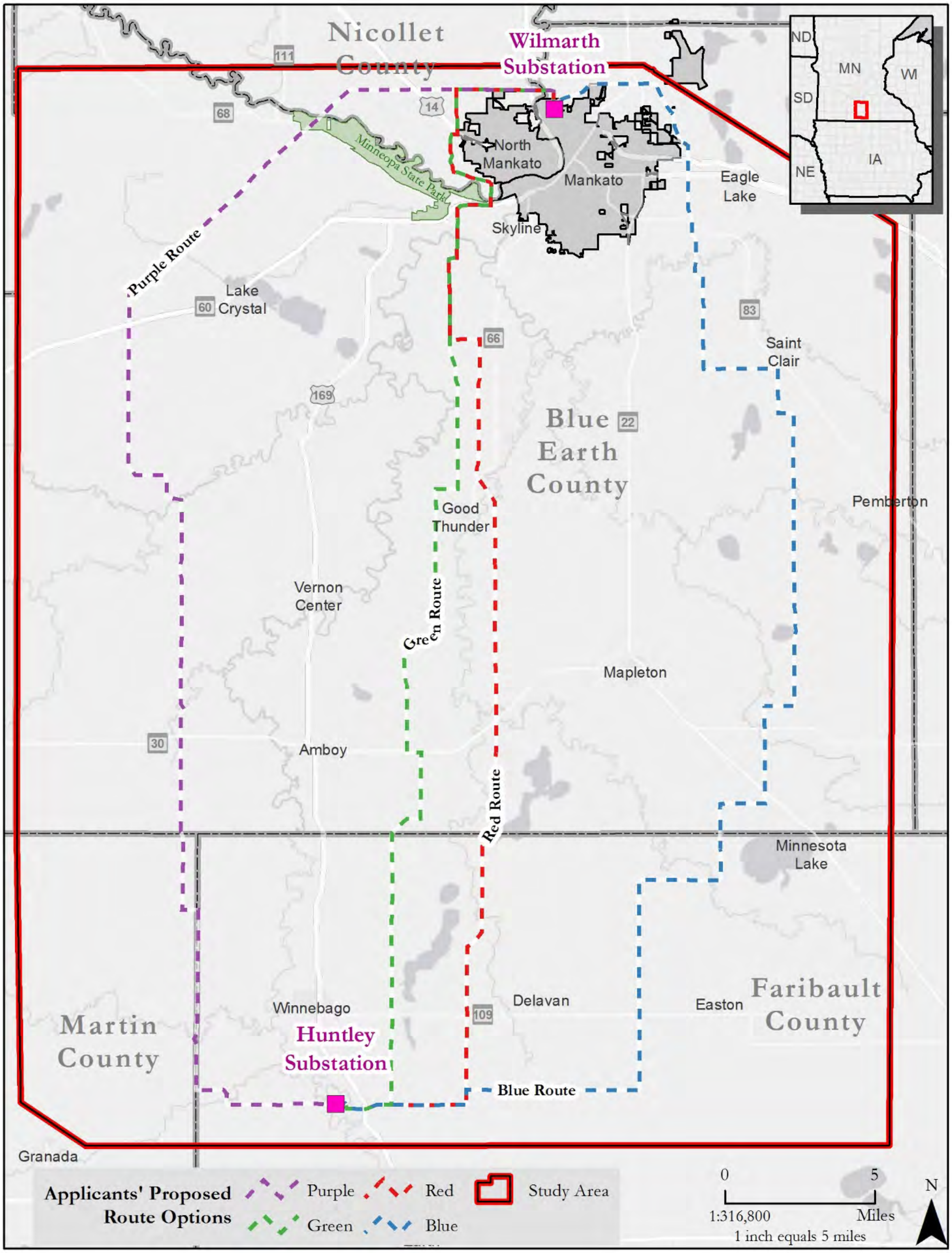
1.1 PROJECT OWNERSHIP

Xcel Energy and ITC Midwest will own all facilities proposed in this Application jointly as tenants in common, with the exception of the equipment and improvements at the substations. The equipment and improvements inside the Wilmarth Substation will be owned solely by Xcel Energy. The equipment and improvements inside the Huntley Substation will be owned solely by ITC Midwest. Xcel Energy will be responsible for the construction, maintenance, and operation of the proposed 345 kV transmission line.

Northern States Power Company, doing business as Xcel Energy, is a Minnesota corporation headquartered in Minneapolis, Minnesota, that is engaged in the business of generating, transmitting, distributing, and selling electric power and energy and related services in the states of Minnesota, North Dakota, and South Dakota. In Minnesota, Xcel Energy provides electric service to 1.3 million customers. Xcel Energy is a wholly-owned utility operating company subsidiary of Xcel Energy Inc. and operates its transmission and generation system as a single integrated system with its sister company, Northern States Power Company, a Wisconsin corporation, together known as the NSP Companies. The NSP Companies are vertically integrated transmission-owning members of MISO. The NSP Companies are among the largest transmission-owning members of MISO with over 8,000 miles of transmission lines and approximately 550 transmission and distribution substations.

ITC Midwest is a transmission-only utility that owns approximately 6,600 circuit miles of transmission lines and more than 200 transmission substations in Minnesota, Iowa, Illinois, and Missouri. ITC Midwest is a "transmission company" pursuant to Minnesota Statute § 216B.02, subd. 10. ITC Midwest is a public utility under Section 203 of the Federal Power Act. As such, ITC Midwest is subject to rate and other regulatory oversight by the Federal Energy Regulatory Commission (FERC). ITC Midwest is part of ITC Holdings Corp., the largest independent transmission company in the United States with ITC Holdings Corp., the sole member of ITC Midwest, headquartered in Novi, Michigan, and ITC Midwest's headquarters in Cedar Rapids, Iowa.

Figure 1.0-1 Project Overview Map



1.2 PERMITTEE

Northern States Power Company, a Minnesota corporation, and ITC Midwest LLC are the requested permittees for the Project. Contact information is provided below.

Tom Hillstrom
Principal Agent, Siting & Land Rights
Xcel Energy
414 Nicollet Mall, 6th Floor
Minneapolis, MN 55401
thomas.g.hillstrom@xcelenergy.com
612.330.5835

Tim Tessier
Manager-Regulatory Strategy
ITC Midwest LLC
100 East Grand Avenue, Suite 230
Des Moines, IA 50309
ttessier@itctransco.com
515.283.5300 Ext. 455

1.3 CERTIFICATE OF NEED PROCESS

Minnesota Statutes section 216B.243 dictates that a Certificate of Need is required for a "large energy facility" as defined in Minnesota Statutes section 216B.2421. A large energy facility includes "any high-voltage transmission line with a capacity of 200 kilovolts or more and greater than 1,500 feet in length" and "any high-voltage transmission line with a capacity of 100 kilovolts or more with more than ten miles of its length in Minnesota or that crosses a state line."[5] The Applicants filed an application for a Certificate of Need to construct the Project on January 17, 2018. The application is available in Docket No. E002, ET6675/CN-17-184.

1.4 STATE ROUTING PROCESS

This Application is submitted under the full permitting process set forth by Minnesota law, specifically, Minnesota Statute § 216E.03 and Minnesota Rules 7850.1700 to 7850.2700 and 7850.4000 to 7850.4400. The applicable statutes and rules require, in addition to other information, that an applicant provide at least two proposed routes in its Route Permit application, and neither of the proposed routes may be designated as a preferred route and all must be designated as alternatives.[6] A "route" is defined in Minnesota statutes as "the location of a high voltage transmission line between two end points . . . [with] a variable width of up to 1.25 miles."[7]

In this Route Permit proceeding, the Commission staff, the Department of Commerce, Energy and Environmental Review and Analysis (EERA) staff, and an administrative law judge will oversee evaluation and review of the proposed routes

[5] Minn. Stat. § 216B.2421, subds. 2(2) and 2(3).
[6] Minn. Stat. § 216E.03, subd. 3; Minn. R. 7850.1900, Subp. 2(C).
[7] Minn. Stat. § 216E.01, subd. 8; *see also* Minn. R. 7850.1000, Subp. 16.

and the gathering of input from agencies, local units of government (LGUs), and the public.

After the Commission finds the Application complete, notice of an environmental impact statement (EIS) scoping meeting will be provided to stakeholders in the Project area and those on the Project Contact List. Interested parties may sign up for the Project Contact List by contacting the Commission at docketing.puc@state.mn.us or 651.201.2204 (1.800.657.3782).

At this scoping meeting, and throughout a comment period after the scoping meeting, EERA will gather information from stakeholders on potential impacts and mitigation measures that should be evaluated in the EIS. EERA will recommend to the Commission those impacts and mitigation measures, including routes and route alternatives, that it believes should be evaluated in the EIS. The Commission will issue a "Scoping Decision" that identifies the impacts and mitigation measures to be evaluated in the EIS. EERA will issue a Draft EIS and meetings will be held in the Project area to gather comments on the content of the Draft EIS. After these meetings, EERA will issue a Final EIS.

In addition to a Draft and Final EIS, public hearings on the Project will be held. The public will be invited to make comments on the Project at these hearings before an administrative law judge. After the hearings, the administrative law judge will provide a period during which stakeholders can submit written comments on the Project. Additionally, the administrative law judge will receive briefs from the Applicants and other parties to the proceeding. The administrative law judge will review this Application, the EIS, briefs, and comments received during the public hearings and, following the comment period, will prepare findings of fact, conclusions of law, and recommendations for the Commission. During an open meeting, the Commission will deliberate and make a decision as to the route for the Project, using the criteria set forth in Minnesota Statutes section 216E.03, subdivision 7(b), and Minnesota Rule 7850.4100 to guide its decision.

1.5 REQUEST FOR JOINT PROCEEDING WITH CERTIFICATE OF NEED APPLICATION

Minnesota Statutes section 216B.243, subdivision 4 and Minnesota Rule 7849.1900, subpart 4 permit the Commission to hold joint proceedings for the Certificate of Need and Route Permit in circumstances where a joint hearing is feasible, more efficient, and may further the public interest.

Applicants respectfully request that the Commission order a joint regulatory review process for the Route Permit and Certificate of Need applications. Given that the route and design selected by the Commission in the Route Permit proceeding will impact the projected economic benefits derived from the Project, a joint proceeding will further the public interest by allowing these intertwined issues to be fully examined in a singular proceeding.

2.0 PROJECT INFORMATION

2.1 PROJECT PROPOSAL

The Applicants propose to construct a new 345 kV transmission line from Xcel Energy's Wilmarth Substation located in Mankato in Blue Earth County, to ITC Midwest's Huntley Substation south of Winnebago in Faribault County, just south of the intersection of U.S. Highway 169 and 345th Avenue (refer to Figure 1.0-1). The Applicants also propose to make the modifications to the existing Wilmarth and Huntley substations to accommodate this new 345 kV transmission line.

2.2 PROPOSED ROUTES

The Applicants identified four potential routes for the new 345 kV line as described below (refer to Figure 1.0-1). These proposed routes traverse Blue Earth, Faribault, Martin, and Nicollet counties. The length of the Project will be approximately 50 miles, depending on which route is selected by the Commission. Figure 1.0-1 shows an illustrative overview of the Project and Appendix C includes detailed aerial and topographic maps of the route options and connector segments described in this Application.

2.2.1 Purple Route

The Purple Route is the westernmost route Applicants are proposing for the Project and is 51.6 miles long and is located within Blue Earth, Nicollet, Martin, and Faribault counties (refer to Figure 1.0-1).

For much of the approximately 23 miles where the Purple Route follows the Lakefield Junction – Wilmarth Line, the new 345 kV transmission line would be constructed adjacent to the existing line either on H-frame or monopole structures. The new line could also be constructed as a double-circuit design allowing for co-location with the existing Lakefield Junction – Wilmarth Line. For the double-circuit design, the Applicants would propose to build adjacent to the existing line (in most areas) to allow the existing line to remain in service during construction. The new 345 kV line would be offset approximately 100 feet from the existing line, measured from centerline to centerline. The existing line would then be removed when the new line is completed. Since the existing Lakefield Junction – Wilmarth Line is built cross-country in the middle of agricultural fields, constructing the new 345 kV line adjacent to the existing line (and then removing the old line) will not result in additional permanent agricultural impacts.

2.2.2 Green and Red Routes

The Green and Red routes are the most direct (shortest) routes at 45.4 and 46.5 miles respectively (refer to Figure 1.0-1). These routes have identical alignments for the northern 14.5 miles. South of Rapidan Township, the Red Route follows the Huntley – South Bend 161 kV line while the Green Route generally follows property lines. Where the Red Route follows the Huntley – South Bend 161 kV line, Applicants studied only a double-circuit configuration that would generally follow the centerline of the existing line.

2.2.3 Blue Route

The Blue Route is 57.0 miles long and is the easternmost route, crossing Blue Earth and Faribault counties (refer to Figure 1.0-1). The Blue Route follows existing transmission at the northern and southern ends of the Project Study Area, but the vast majority of the route follows agricultural field lines and roads where practicable. While the Blue Route could be built parallel to the existing transmission lines at the north and south ends, Applicants studied the Blue Route as a double-circuit configuration in these locations. At the north end of the Blue Route, constructing these sections of the Blue Route with double-circuit structures is necessary due to the lack of space to accommodate additional parallel transmission structures. In addition, a double-circuit configuration will reduce permanent agricultural impacts because the existing and proposed transmission lines will be consolidated on a single structure.

Refer to Section 4.0 for more detailed route description information.

2.3 STATE PARK CROSSING

One of Applicants' proposed routes and one of Applicants' alternative segments cross lands within the statutory boundaries of the Minneopa State Park. The Purple Route crosses Minneopa State Park along the existing 345 kV Xcel Energy transmission line easement for the Lakefield Junction – Wilmarth Line. The transmission line easement pre-dates the park's acquisition and allows for reconstruction of the line to add a second 345 kV circuit. Alternative Segment C also crosses a 500-foot stretch of state-owned land within Minneopa State Park, where there is no existing infrastructure or utility easement.

Minnesota siting rules prohibit locating new transmission lines in a state park except in limited circumstances. Minnesota Rule 7850.4300, subpart 2 provides that such crossings are permissible when "the transmission line would not materially damage or impair the purpose for which the area was designated and no feasible and prudent alternative exists. Economic considerations alone do not justify use of these areas for a high voltage transmission line."

Applicants believe that the Purple Route's crossing of the park within the existing transmission line easement would avoid material impacts to Minneopa State Park. At this location, the Purple Route would cross approximately 3,300 feet of Minneopa State Park along Xcel Energy's existing 150-foot wide utility easements where the new 345 kV line and the existing 345 kV line would be double-circuited on a single structure, resulting in no additional impacts to the park. The existing 345 kV transmission line is operated under unrestricted easements acquired in 1971 through condemnation proceedings and contains broad rights that would allow for this line to be rebuilt with double-circuit structures within the existing 150-foot wide right-of-way. Consequently, this rebuild would not require a License to Cross Public Lands from the MNDNR. There would be short-term construction impacts associated with this route, but the same right-of-way width would be maintained, resulting in no material long-term impact to Minneopa State Park.

If the Commission selects Alternative Segment C as the approved route for the Project, Applicants will apply to the MNDNR for a License to Cross Public Lands. Applicants will work with the MNDNR to define appropriate vegetation management rights and identify methods to minimize impacts to the park. While Applicants believe that the requirements of Minnesota Rule 7850.4300, subpart 2 will be met if the Commission decides to select one of these route options, to the extent that a variance from this rule is necessary, Applicants request that the Commission grant such a variance.

2.4 ROUTE WIDTH

The Power Plant Siting Act (PPSA), Minnesota Statutes chapter 216E, directs the siting of transmission lines in a way that "minimize[s] adverse human and environmental impact while ensuring continuing electric power system reliability and integrity and ensuring that electric energy needs are met and fulfilled in an orderly and timely fashion." The PPSA further authorizes the Commission to meet its routing responsibility by designating a "route" for a new transmission line when it issues a Route Permit. A "route" may have "a variable width of up to 1.25 miles," within which the right-of-way for the transmission facilities can be located.

A route should be wide enough to provide flexibility for the permittee to work with landowners to address concerns and to address engineering issues that may arise after a Route Permit is issued. Once a route is established by the Commission, the permittee then does more detailed engineering and survey work in addition to contacting landowners to gather additional detailed information about their property.

Only after considering all these inputs does the permittee establish an exact centerline and pole placement.

Once the utility establishes a final alignment and structure placement, proposed construction drawings are provided to the Commission, in the form of a "Plan and Profile" compliance filing, so the Commission can confirm that the permittee's plans are consistent with the Route Permit.

Given the Commission's practice to identify an "anticipated alignment" in its Route Permit decisions, the Applicants have developed what they currently believe to be the likely alignments for all route alternatives that minimize the overall potential impacts based on the routing factors identified in Minnesota Statutes section 216E.03, subdivision 7(b), and Minnesota Rule 7850.4100. These alignments are referred to as the "Application alignments." These Application alignments may require modifications after a Route Permit is issued due to limitations inherent in identifying an alignment absent detailed survey and engineering work, site review, and design. The Application alignments that were developed for purposes of evaluating the potential impacts of each route, are available on the detailed maps in Appendix C. The Applicants completed a preliminary design for each route based on the information known at the time of the filing of this Application.

After the Commission issues a Route Permit decision with an "anticipated alignment," a final alignment will be developed by discussing that "anticipated alignment" with individual landowners and agencies with permitting responsibilities and performing detailed survey and engineering work, site review, and design. The final alignment will be provided to the Commission through the Plan and Profile submission and review process discussed above. As part of that submission, the Applicants will inform the Commission as to where deviations in the final alignment from the "anticipated alignment" occur.

Existing transmission lines, roads, property boundaries, field lines, fence lines, and other routing opportunities are typically found in quarter-mile intervals in the land use settings in the Project Study Area. Human settlement in rural areas also tends to have a similar quarter-mile development pattern. Therefore, the Applicants request a route width of 1,000 feet for all routes and route alternative segments. The Applicants also request an additional route width of 1,000 feet surrounding both the Wilmarth and Huntley substations to accommodate the potential relocation of existing lines entering the substations.

2.5 TRANSMISSION STRUCTURE AND CONDUCTOR DESIGN

The new 345 kV transmission line would be constructed of steel pole structures in either single (monopole) or two-pole H-frame configurations except in certain locations, such as angles, along highways, or environmentally-sensitive areas, where multiple pole or other specialty structures may be required. These multiple pole structures include three-pole structures that may be used on all routes to accommodate large angles where the transmission line route changes direction. The proposed structures will range in height from approximately 75 feet to 170 feet tall. The typical spans between structures will be about 1,000 feet. A single pole structure is typically installed on a concrete foundation while an H-frame structure can either be installed on two concrete foundations or direct embedded in the ground. Table 2.5-1 summarizes the three typical structure designs for the line.

Table 2.5-1
Typical Structure Design Summary

Line Type	Structure Type	Structure Material	Typical Right-of-way Width (feet)	Structure Height (feet)	Structure Base Diameter (inches)	Foundation Diameter (feet)	Average Span Between Structures (feet)
345 kV Single-Circuit	H-Frame	Weathering Steel	150	75-150	30	4 (culvert diameter for direct embed) 7-10 (concrete foundations)	1,000
345 kV Single-Circuit	Monopole w/ Davit Arms	Weathering Steel	150	90-150	48-62	7-12	1,000
345 kV Double-Circuit[8]	Monopole w/ Davit Arms	Weathering Steel	150	110-170	54-67	7-12	1,000

The conductors for the 345 kV transmission line will consist of double-bundled, twisted pair Dove (2-556.5 kcmil) Aluminum Conductor Steel Reinforced (ACSR) cables, or cables with comparable capacity. The 345 kV twisted pair conductors will have a capacity equal or greater to 3,000 amperes (amps). In locations where the new 345 kV line are proposed to be built as a double-circuit line with an existing transmission line, the conductor for the existing line will be sized appropriately for new construction at that voltage. Twisted pair conductors may be used instead of the

[8] One circuit would be 345 kV while the other circuit would be 345 kV, 161 kV, or 115 kV, depending on the specific design criteria and existing transmission lines along the selected route.

existing round wire to minimize the potential conductor movement caused by "galloping."[9]

The proposed transmission line will be designed to meet or surpass relevant local and state codes including the National Electric Safety Code (NESC) and Xcel Energy standards. Applicable standards will be met for construction and installation, and applicable safety procedures will be followed during design, construction, and after installation.

Figure 2.5-1 provides photos of typical single-circuit and double-circuit structures that the Applicants propose to use for this Project. Technical diagrams of these three proposed structure types are included in Appendix D.

[9] Galloping is the motion of conductors that can occur due to wind acting on conductors that are coated with a layer of ice or wet snow. Under certain wind conditions, the asymmetrical profile caused by ice can act like an airfoil causing the conductors to move significantly, usually vertically. If the galloping action is significant, it can cause phase-to-phase and phase-to-ground faults. Galloping can also produce mechanical loads sufficient to damage hardware and structure components.

Figure 2.5-1 Photos of Typical 345 kV Structures

345 kV Steel Single-Circuit Monopole Structure	345 kV Steel Single-Circuit H-Frame Structure	345 kV/345 kV Steel Double-Circuit Monopole Structure[10]

[10] If the new 345 kV transmission line is constructed on double-circuit monopole structures with a 161 kV or 115 kV transmission line, the structure will look similar to this structure.

2.6 TRANSMISSION LINE RIGHT-OF-WAY

The Applicants anticipate constructing the new 345 kV transmission line facilities, either double-circuit or single-circuit, using structures that require a 150-foot wide right-of-way. When paralleling existing road rights-of-way, the Applicants propose to place poles on adjacent private property, approximately 10 feet offset from the existing road right-of-way. In areas where a 10-foot offset is not feasible, poles may be placed inside road rights-of-way subject to the road authority's utility accommodation policy (e.g., the Red and Green routes along the south side of U.S. Highway 169). These pole placements allow the transmission line right-of-way to share existing road rights-of-way to the greatest extent feasible and may reduce the overall size of the easement required from the private landowner. Pole placement and offset distances may vary in areas such as highway interchanges due to county or state design requirements and in areas of planned future road expansion.

When a route follows existing transmission line corridors through Minneopa State Park and WPAs, the Applicants will utilize existing easements and place the new structures on the same centerline as the existing structures so that no additional easement width will be needed.

2.7 ASSOCIATED FACILITIES

2.7.1 Wilmarth Substation Modifications

The existing Wilmarth Substation, owned by Xcel Energy, is the northern endpoint of the proposed 345 kV transmission line. This substation is located on the northern edge of the City of Mankato, adjacent to Xcel Energy's refuse derived fuel plant, just east of the Minnesota River.

New substation equipment necessary to accommodate the new 345 kV transmission line will be installed at the Wilmarth Substation. These modifications will be made within the existing fenceline. However, potential relocation of existing lines entering the substation may be required to accommodate the Project. This area is accounted for within the route width requested in this Application.

2.7.2 Huntley Substation Modifications

The Huntley Substation is the southern endpoint of the Project and was recently constructed by ITC Midwest as part of its Minnesota – Iowa 345 kV Transmission Project.[11] This substation is located approximately three miles south of the City of

[11] ITC Midwest's Minnesota –Iowa 345 kV Transmission Line Project, also known as "MVP3," received a Certificate of Need and Route Permit from the Commission in 2014. *See In the Matter of the Application of ITC Midwest LLC for a*

Winnebago, approximately one mile north of Interstate 90, and just west of U.S. Highway 169.

New substation equipment necessary to accommodate the new 345 kV transmission line will be installed at the Huntley Substation. The Huntley Substation was constructed in 2017 to accommodate future 345 kV bays within the substation fenced area and, as a result, this Project will not require expansion of the fenced area.

Modifications to existing transmission lines in the vicinity of either substation may be warranted to accommodate the new 345 kV transmission line. Applicants do not anticipate that any construction or relocation will be necessary on any existing transmission lines crossed by the new 345 kV transmission line. At the time of final design of the Project, however, Applicants may determine that short segments of existing transmission lines crossed by the new 345 kV transmission line or at either substation may need to be relocated or reconstructed to ensure NESC and Applicant design criteria and clearances are maintained.

2.8 PROJECT SCHEDULE

An anticipated permitting and construction schedule for the Project is provided in Table 2.8-1. This schedule is based on information known as of the date of filing and may be subject to change as further information develops or if there are delays in obtaining the necessary federal, state, or local approvals that are required prior to construction.

Table 2.8-1
Anticipated Project Schedule

Activity	Estimated Activity Dates
Minnesota Certificate of Need and Route Permit Issued	Second Quarter, 2019
Land Acquisition Begins	Third Quarter, 2019
Survey and Transmission Line Design Begins	Second Quarter, 2019
Other Federal, State, and Local Permits Issued	First Quarter, 2020
Start Right-of-Way Clearing	Second Quarter, 2020
Start Project Construction	Second Quarter, 2020
Project In-Service	December 2021

Certificate of Need for the Minn.-Iowa 345kV Transmission Line Project in Jackson, Martin, and Faribault Counties, Docket No. ET6675/CN-12-1053, ORDER GRANTING CERTIFICATE OF NEED WITH CONDITIONS (Nov. 25, 2014); *In the Matter of the Application of ITC Midwest LLC for a Route Permit for the Minn.-Iowa 345 kV Transmission Line Project in Jackson, Martin, and Faribault Counties*, Docket No. ET6675/TL-12-1337, ORDER ISSUING ROUTE PERMIT (Nov. 25, 2014).

2.9 PROJECT COSTS

For purposes of this Application, Applicants developed route and structure design-specific cost estimates for the Project. These alternatives have varying costs and varying impacts to the human and natural environments. These cost estimates were developed to allow the Commission to evaluate each of the route and design options for the Project in terms of how the costs for each of these choices impact the projected benefit-to-cost ratio of the Project.

Due to the importance of costs in determining the need for this Project, Applicants deployed a more thorough cost estimation process for this Project than what is typically employed prior to submitting a Route Permit application to the Commission. As Applicants have extensive recent experience constructing high voltage transmission infrastructure in the Midwest region, they were able to draw upon that experience, lessons learned, and cost information from these prior projects to develop the cost estimates for this Project.

Tables 2.9-1 and 2.9-2 provide total Project costs for each of Applicants' nine proposed routes and design alternatives. These costs include all transmission line costs (including materials, associated construction, permitting and design costs, and risk assessment contingencies), substation modification costs (including materials, construction, permitting, and design costs, and risk contingencies), allowance for funds used during construction (AFUDC), and right-of-way costs.

The costs in Table 2.9-1 are 2016 dollar costs. The costs in Table 2.9-2 have been escalated to the year a particular cost is anticipated to be incurred. Refer to Chapter 2 of the Certificate of Need application (Docket No. E002, ET6675/CN-17-184) for more detailed information on the Applicants' cost analysis.

Table 2.9-1
Total Project Costs (2016$)

Design Option	Route Option			
	Purple Route (West Route) ($Millions)	Green Route (Middle Route) ($Millions)	Red Route (Middle Route) ($Millions)	Blue Route (East Route) ($Millions)
Single-Circuit H-Frame		$109.0		
Single-Circuit Monopole		$121.3		
Single-Circuit Parallel H-frame	$105.8			
Single-Circuit Parallel Monopole	$121.7			
Double-Circuit Monopole and Single-Circuit H-Frame			$135.2	$123.7
Double-Circuit Monopole and Single-Circuit Monopole	$137.9		$138.0	$135.8

Table 2.9-2
Total Project Costs ($ escalated to anticipated year spend)

Design Option	Route Option			
	Purple Route (West Route) ($Millions)	Green Route (Middle Route) ($Millions)	Red Route (Middle Route) ($Millions)	Blue Route (East Route) ($Millions)
Single-Circuit H-Frame		$121.2		
Single-Circuit Monopole		$134.9		
Single-Circuit Parallel H-frame	$117.9			
Single-Circuit Parallel Monopole	$135.4			
Double-Circuit Monopole and Single-Circuit H-Frame			$150.5	$137.5
Double-Circuit Monopole and Single-Circuit Monopole	$153.3		$153.5	$151.0

Applicants also prepared preliminary cost estimates for the alternative route segments identified during the route selection process (refer to Table 2.9-3). These costs are presented as the difference in costs of a particular route if the alternative segment is selected. For example, use of Alternative Segment A would increase the cost of the Red Route or Green Route by $2.1 million (2016$).

Table 2.9-3
Alternative Segment Costs

Segment Alternative	Cost (2016$) ($Millions)	Cost (escalated to anticipated year spend$)	Comments
Alternative Segment A	$2.1	$2.3	Alternative Segments A and B have common endpoints. Each can be used to modify either the Red or Green route.
Alternative Segment B	($0.57)	($0.61)	
Alternative Segment C	($3.0)	($3.2)	Alternative Segment C can be used to modify either the Red or Green route.
Alternative Segment F	$0.07	$0.08	Alternative Segment F is single-circuit 345 kV and can be used to modify the Purple Route.

Cost estimates for the connector segments identified by the Applicants are shown in Table 2.9-4. These costs are the total costs for these connector segments. Applicants have not estimated the total route cost for a route using these connector segments. For example, Alternative Segment D is estimated to cost $4.7 million (2016$).

Table 2.9-4
Connector Segment Costs

Segment Alternative	Cost (2016$) ($Millions)	Cost (escalated to anticipated year spend$)	Comments
Alternative Segment D	$4.7	$5.0	Alternative Segment D is a two-mile connector segment between Red and Green routes.
Alternative Segment E	$30.2	$31.6	Alternative Segment F is an 11.7 mile connector segment between the Red and Green routes to the Purple route.

2.10 DESIGN OPTIONS TO ACCOMMODATE FUTURE EXPANSION

As discussed in the Certificate of Need application, the proposed 345 kV transmission line was designed to meet current and projected need to relieve congestion along the Minnesota/Iowa border. In addition, both the Wilmarth and Huntley substations have the ability to accommodate additional transmission line connections.

3.0 ROUTE SELECTION PROCESS

The Applicants conducted a thorough and systematic route selection process beginning in late 2016 and extending throughout 2017. This process included consideration of statutory and rule requirements, information gathering, public outreach and input, and comparison of route segments and alignments. Considerable public and agency outreach and information gathering was conducted in Blue Earth, Faribault, Martin, and Nicollet counties. The Applicants also met with federal, state, and local agencies, including county departments, as part of the outreach program for the Project. The Applicants developed a Geographic Information System (GIS) database that contained information gathered from publicly available data resources and from on-site field review efforts. Figure 3.0-1 illustrates the iterative process the Applicants used to develop their proposed routes.

This process resulted in the identification of four routes, four route alternative segments, and two connector segments between the routes presented in this Application. A more detailed description of each step in the route selection process is provided below and in Appendix E.

Figure 3.0-1
Route Selection
Process
Identify Study Area & Gather Data
Identify Opportunities & Constraints
LGU/Agency Outreach
Routing Input From:
• USFWS
• MNDNR
• Mankato
• North Mankato
Idenfity Potential Route Segments & Routes
Landowner/ Agency/ LGU Outreach
• 25,000 Project information/Invitations
• Newspaper ads
• Feedback included 200 public comments
Refine Routes
Additional Notice to Stakeholders
• Additional segments near St. Clair
• Additional segments west of North Mankato
Comparitive Analysis/ Refine Routes
Follow-up meetings with DNR, LGU, and landowners

3.1 SUMMARY OF ROUTE SELECTION PROCESS AND GUIDING FACTORS

MISO is a regional transmission organization (RTO) that operates the transmission system and an energy market in parts of 15 states and the Canadian province of Manitoba. As an RTO, MISO is responsible for planning and operating the transmission system within its footprint in a reliable and efficient manner.

In fulfilling its responsibility to operate an energy market in an efficient manner, MISO operates day-ahead and real-time energy markets. Limits on transmission facilities can prevent MISO from dispatching the most efficient generation resources during all hours of the year, increasing wholesale energy costs. Currently, there is low-cost energy being produced in Iowa and southern Minnesota that is unable to serve load centers, like the Twin Cities, due to transmission constraints along the Minnesota/Iowa border that create congestion. More specifically, some energy cannot be delivered to load centers because the loading limits on certain system components preclude this additional energy from being transmitted along those facilities. As a result, not all available wind energy can be delivered and it must be replaced by more costly substitute energy from other areas (without transmission constraints). These transmission constraints create inefficiencies in the wholesale energy market and increase costs.

The Huntley – Wilmarth Project was studied, reviewed, and approved by the MISO Board of Directors as an MEP in December 2016. An MEP is designed to address congestion to basically level the playing field for all generators to deliver their energy based on supply and demand, which in turn ensures that the energy market operates in the most efficient and cost-effective manner. The Project will also improve the deliverability of wind generation as it will reduce curtailments, allowing the maximum amount of this low-cost renewable generation to meet customer demands. Reducing curtailments improves energy delivery, reduces system generation costs, and provides environmental benefits in the form of lower carbon emissions. Finally, the Project will improve the robustness of the regional backbone transmission system by improving the efficient delivery of energy and enabling the system to better withstand contingencies under multiple Future scenarios. A robust transmission system is better positioned to deal with unplanned system outages. A robust regional transmission system is also key to enabling access to a diverse mix of generation resources, which in turn allows customers to access the least expensive power available at any given time. A more detailed discussion of MISO's analysis and approval of the Project is presented in the Certificate of Need application (Docket No. E002, ET6675/CN-17-184).

MISO designated the substation endpoints for the Project as Xcel Energy's existing Wilmarth Substation in Mankato in Blue Earth County and the recently constructed ITC Midwest Huntley Substation, located south of the existing Winnebago Junction Substation in Faribault County.

Following the identification of the Project's endpoints, the Applicants developed a Project Study Area boundary between these two endpoints that covers portions of Blue Earth, Faribault, Martin, and Nicollet counties. The Project Study Area covers an area of approximately 1,000 square miles and is approximately 36 miles long and 29 miles wide. The Project Study Area is depicted in Figure 3.1-1.

The criteria for route development are set forth in Minnesota Statutes section 216E.03, subdivision 7, and Minnesota Rule 7850.4100 directed the Applicants' route development process. These criteria guide the Commission's decision when selecting a route for a high voltage transmission line.

Minnesota Statutes section 216E.03, subdivision 7(a) provides that the Commission's route permit determinations "must be guided by the state's goals to conserve resources, minimize environmental impacts, minimize human settlement and other land use conflicts, and ensure the state's electric energy security through efficient, cost-effective power supply and electric transmission infrastructure." Subdivision 7(e) of the same section requires the Commission to "make specific filings that it has considered locating a route for a high-voltage transmission line on an existing high-voltage transmission route and the use of parallel existing highway right-of-way and, to the extent those are not used for the route, the Commission must state the reasons."

In addition to the statutory criteria noted above, Minnesota Statutes section 216E.03, subdivision 7(b) and Minnesota Rule 7850.4100 provide factors the Commission will consider in determining whether to issue a route permit for a high voltage transmission line. These factors are:

A. Effects on human settlement, including, but not limited to: displacement, noise, aesthetics, cultural values, recreation, and public services;

B. Effects on public health and safety;

C. Effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining;

D. Effects on archaeological and historic resources;

E. Effects on the natural environment, including effects on air and water quality resources and flora and fauna;

F. Effects on rare and unique natural resources;

G. Application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity;

H. Use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries;

I Use of existing large electric power generating plant sites;

J. Use of existing transportation, pipeline, and electrical transmission systems or rights-of-way;

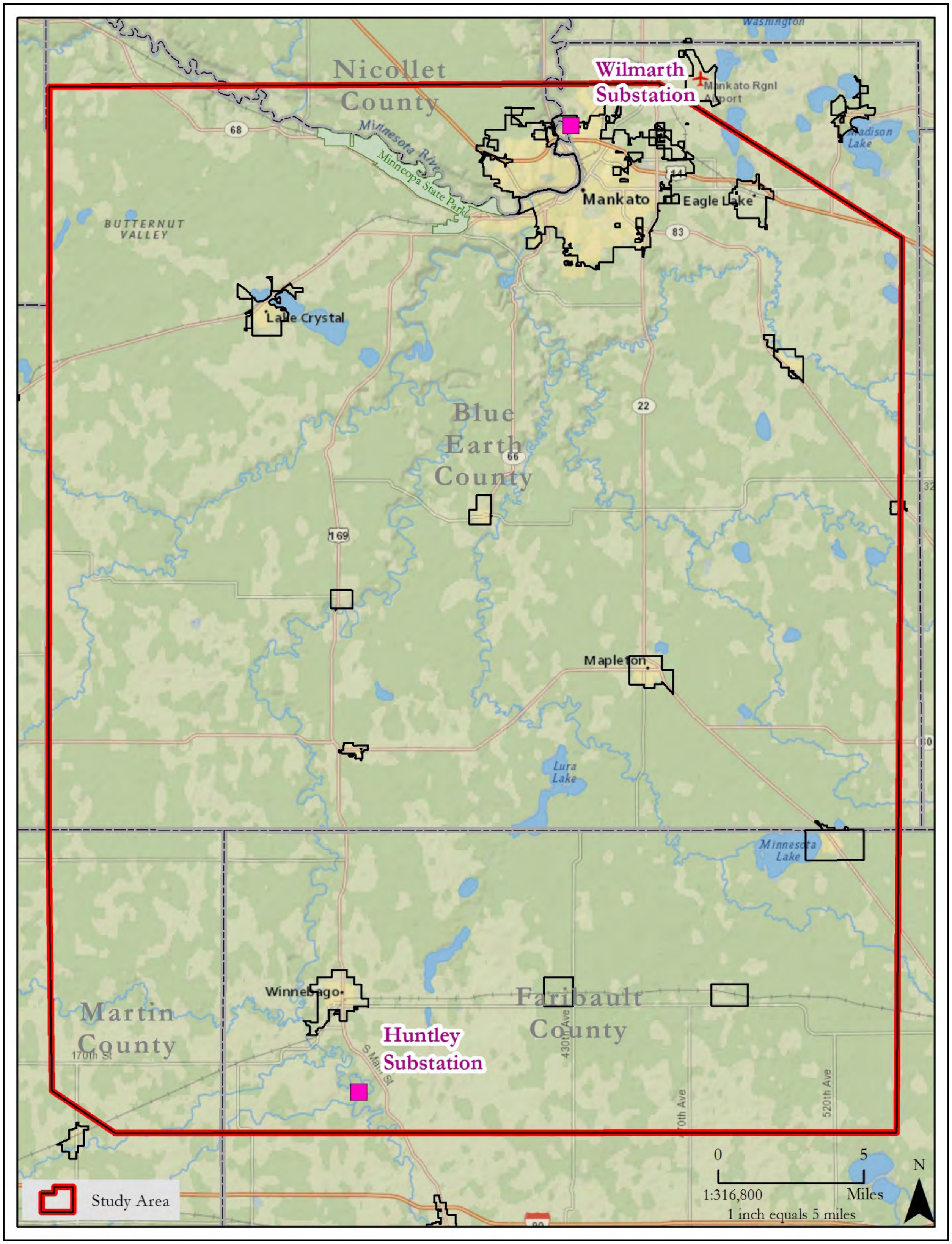
K. Electrical system reliability;

L. Costs of constructing, operating, and maintaining the facility which are dependent on design and route;

M. Adverse human and natural environmental effects which cannot be avoided; and

N. Irreversible and irretrievable commitments of resources.

Figure 3.1-1 Project Study Area



3.2 ROUTE DEVELOPMENT PROCESS

The Applicants utilized a year-long systematic process of identifying, refining, and comparing route options to arrive at the four proposed route options, alternative segments, and connector routes. The following steps were taken as part of this process:

- Establish boundaries for Project Study Area
- Identify Opportunities and Constraints
- Local Government and Agency Outreach
- Conduct Initial Outreach in the Project Study Area
- Review Route Network on Site
- Hold Public Open House Meetings
- Refine and Finalize Routes

The following sections summarize the route development process (refer to Appendix E for more detailed information).

3.2.1 Project Study Area

The Project Study Area was designed to include an area large enough that a reasonable number of route options to connect the Huntley and Wilmarth substations could be identified without it being so large as to encumber the analysis with excessive data and routing options that did not present reasonable alternatives. The purpose of identifying a Project Study Area for the Project was to establish boundaries and limits for the information-gathering process (e.g., identifying environmental and land use resources, routing constraints, and routing opportunities) and the subsequent development of route options for the Project.

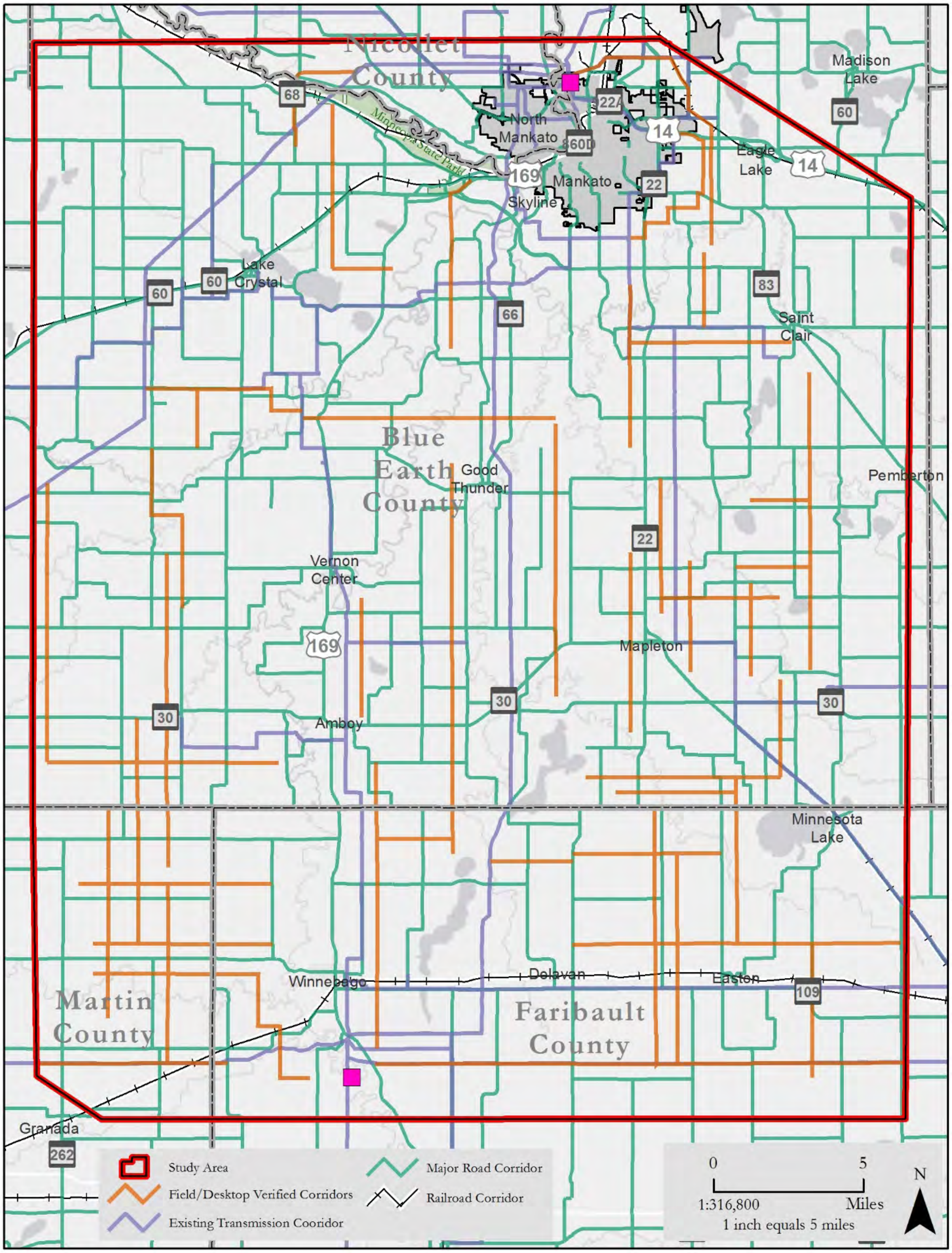
3.2.2 Identify Routing Opportunities and Constraints

After establishing a Project Study Area, the next step was to identify potential routes and route segments. To identify route segments that minimized impacts to humans and the environment, Applicants identified routing opportunities and constraints within the Project Study Area. To minimize impacts on the environment and affected landowners, the Applicants looked for routing opportunities that would share existing rights-of-way with existing transmission lines as well as along road and railroad rights-of-way and field and section lines (refer to Figure 3.2.2-1).

Applicants also examined the Project Study Area to identify routing constraints that should be avoided, if practicable (e.g., airports, Wildlife Management Areas (WMAs), WPAs, residential subdivisions, lakes, etc.).

Based on an examination of routing opportunities and constraints, Applicants developed an Initial Route Network. The Initial Route Network included numerous route segments that, when combined, created various route combinations (although some routes differed from each other by only one or two segments).

Figure 3.2.2-1 Huntley to Wilmarth Identification of Existing Corridors



3.2.3 Initial Local Government and Agency Outreach

Following development of the Project Study Area and Initial Route Network, several meetings were held with federal, state, county, and local agencies (e.g., MNDNR, USFWS, and various county and local administrators). The purpose of these meetings was to gather feedback on the Initial Route Network and identify potential concerns. More details of the discussions with agency and county staff may be found in Section 7 of this Application.

3.2.4 Site Review of Route Network

After the desktop identification of the Initial Route Network, the Applicants performed a field site reconnaissance of the Project Study Area. Using data and information gathered from the formal agency responses, county meetings, and the GIS constraints database developed for the Project, the Applicants investigated numerous route segments and noted features not evident on aerial photos and observed the context of each route.

3.2.5 Public Open House Meetings

Following the development of the Initial Route Network, and after incorporating route changes based on agency meetings and the site review, the Applicants conducted four public open houses, two in Mapleton, Minnesota, on June 20, 2017, and two in Mankato, Minnesota, on June 21, 2017. Notices for these open houses were provided via newspaper and direct mail to residents, landowners, public officials, and other potential stakeholders (Appendix H). The open house invitation provided information such as a general Project description, a map of the Project Study Area and Initial Route Network, the Project's website address, and Applicants' contact information to submit questions and comments.

The open house format had several stations to display and communicate information about the Project to the attendees. Large-scale poster-sized maps were on display depicting the Project Study Area and Initial Route Network. Meeting attendees were encouraged to leave comments either at the meeting or following the meeting. Landowner feedback from these open houses included comments and concerns regarding the following: proximity to residences; minimizing impacts to farm operations; preference to follow existing infrastructure; visual impacts; avoiding water, historic, and other natural resources; keeping costs low; and other route development considerations. More information on the feedback received is available in Section 7.2.

Applicants received approximately 200 comments, tallied each comment received, and identified the number of times each category was referenced as a concern. Table 3.2.6-3 summarizes the criteria ranking from the comments received.

Table 3.2.6-3
Summary of Criteria Ranking –All Comments Received

Issues	Number of Comments Expressing Concern for Issue
Avoid Proximity to Residences	71
Avoid Impacts to Farm Operations	62
Follow Existing Transmission Lines	46
Visual Impacts	43
Avoid Natural Resource Impacts	27
Avoid Water Resource Impacts	16
Keep Costs Low	15
Avoid Historic Resources	12

3.3 ROUTE REFINEMENT AND ANALYSIS

3.3.1 Development of Comparison Metrics

After the data was compiled and initial public and agency outreach was completed, the Applicants developed a comprehensive set of route comparison and evaluation criteria to compare the characteristics and potential impacts of different route segment combinations. The criteria were based on routing factors set forth in Minnesota Statutes section 216E.03, subdivision 7(b), and Minnesota Rule 7850.4100 and were categorized, generally, as human settlement, environmental, or engineering.

Route segments were assembled to develop end-to-end routes between Wilmarth Substation and the Huntley Substation. Route criteria data for each segment were tabulated to provide an evaluation of the total human and natural resources along each of the individual route combinations.

3.3.2 Comparison of Segments and Routes

Data for the route combinations were quantified for the route evaluation criteria for each of these segment combinations. Additionally, the routing criteria included evaluation categories such as length, co-location with existing linear features, and numbers of occurrences of selected resources or features.

The route screening analysis was used to identify a smaller set of routes upon which to focus the selection process. Additionally, opportunities were identified to connect between these routes to create flexibility in configuring combinations of routes if desired (refer to Section 4.5).

The following primary route options were identified for a comparative analysis (refer to Appendix E):

- A western route following the existing 345 kV Lakefield Junction – Wilmarth Line across the Minnesota River, then south along a new right-of-way, including a west and east option at about the mid-point between the Wilmarth and Huntley substations.
- A route generally following U.S. Highway 169, including two route options at the north end of the Project Study Area around and through a narrow stretch of Minneopa State Park.
- A set of two route options in the center of the Project Study Area, one following a new right-of-way and one following the existing 161 kV Huntley – South Bend Line south to Huntley Substation. These routes also have two options at the north end of the Project around and through a narrow stretch of Minneopa State Park, as well as an option around the edge of the City of Mankato. In total, these make up six endpoint-to-endpoint route options.
- An eastern route around the north and east side of the City of Mankato then south following a new right-of-way.

The Applicants identified various segment combinations for each potential route and reviewed each route in detail (refer to Appendix E). This review considered potential human settlement and natural resource impacts as well as compliance with Minnesota routing criteria, regulatory requirements of other agencies for project permitting (e.g., MNDNR regulations for lake crossings), and engineering and construction considerations (e.g., access, constructability, etc.). Upon a thorough and detailed investigation, evaluation, and consideration, certain routes were dropped from further consideration for this Project. The routes and reasons for elimination are discussed in Appendix E.

Based on this analysis, four routes, along with alternatives and connector segments, were selected.

Subsequently, the Applicants added or adjusted route segments in response to agency, local government, and landowner comments. Additional consultation feedback was received from agencies regarding the routes and that feedback was incorporated into the final four routes proposed by the Applicants for the Project. Information on the consultation feedback is available in Section 7. Potentially-affected landowners were notified of new segments by mail on August 30, November 8, and December 1, 2017. These mailings included maps of the new segments and information on how to provide feedback. The area in which the new segments were introduced are Belgrade Township, the City of St. Clair, and the City of Eagle Lake.

The remaining four end-to-end routes were analyzed according to Minnesota routing criteria and are depicted in Figure 3.3.2-1. The Applicants also identified alternatives and connector segments. The four routes are discussed in Sections 4.1 to 4.4, and the alternatives and connector segments are discussed in Section 4.5.

A summary of the impacts and factors considered in evaluating the four routes is detailed in Table 3.3.2-1.

Figure 3.3.2-1 Applicants' Final Proposed Route Options

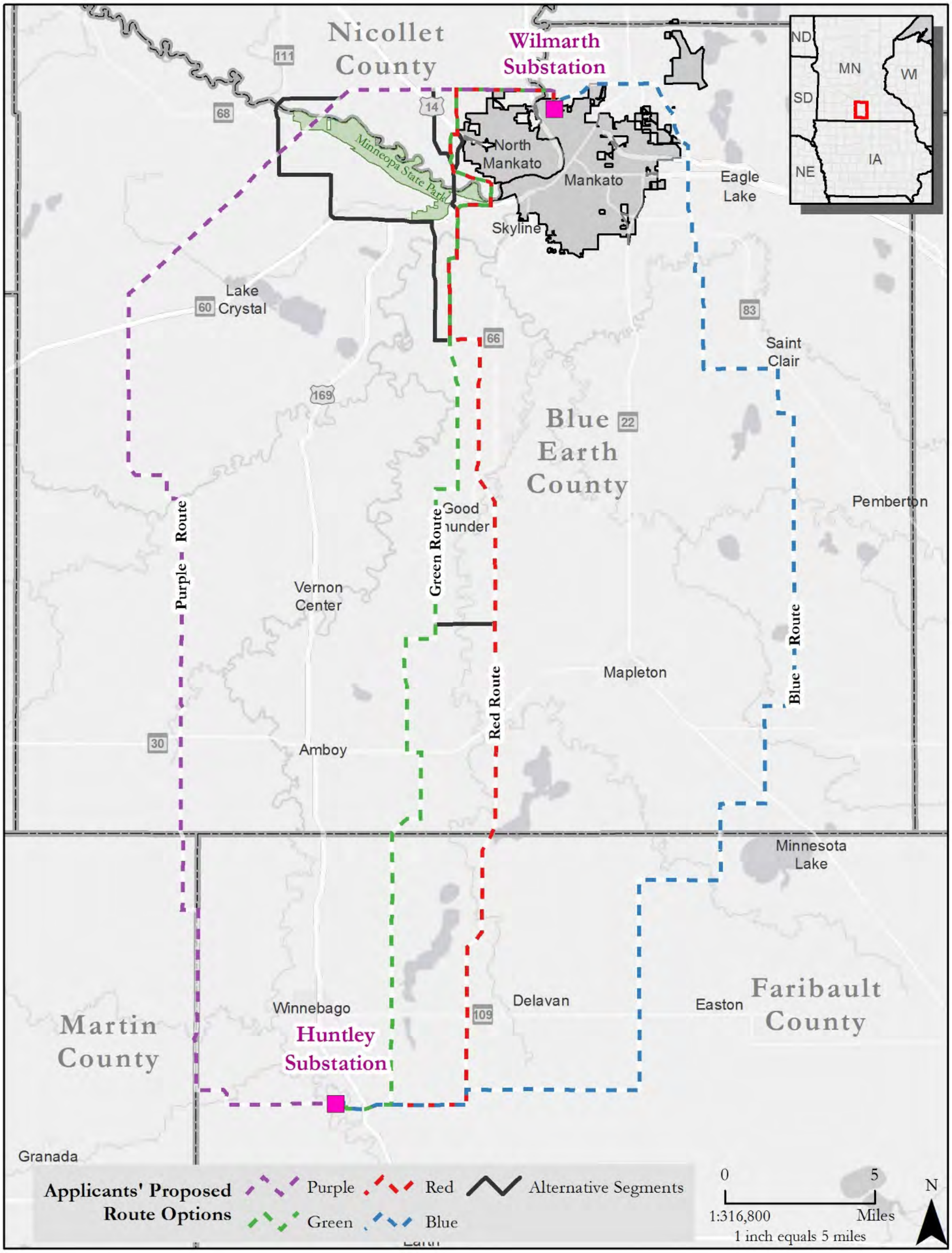


Table 3.3.2-1
Summary of Comparative Impacts and Routing Factors Considered

<table>
<tr><th>Factor</th><th>Purple Route</th><th>Green Route</th><th>Red Route</th><th>Blue Route</th><th>Summary</th></tr>
<tr><td colspan="6">Effects on Human Settlement</td></tr>
<tr><td colspan="6">Proximity to Residences (feet)</td></tr>
<tr><td>0-75</td><td>0</td><td>0</td><td>0</td><td>0</td><td rowspan="4"></td></tr>
<tr><td>76-150</td><td>0</td><td>11</td><td>11</td><td>1</td></tr>
<tr><td>151-300</td><td>7</td><td>15</td><td>20</td><td>4</td></tr>
<tr><td>301-500</td><td>9</td><td>44</td><td>38</td><td>10</td></tr>
<tr><td>Land Use – Length through Future Development</td><td>• 1.2 miles residential
• 0.1 mile open space</td><td>• 3.9 miles residential
• 0.1 mile open space
• 1.3 miles industrial</td><td>• 3.9 miles of residential
• 0.1 mile of open space
• 1.3 miles of industrial</td><td>• 0.6 mile residential
• 0.4 mile open space
• 0.7 mile of future industrial (0.3 mile of which is platted)</td><td>The Blue Route crosses less future development lands than the other routes.</td></tr>
<tr><td>Displacement</td><td colspan="5">No displacement (removal of businesses or residences) is anticipated for the Project.</td></tr>
<tr><td>Noise</td><td colspan="5">Temporary localized increases in noise during construction are anticipated. Transmission line and substation noise levels will not exceed noise limits set by the MPCA.</td></tr>
<tr><td>Aesthetics</td><td colspan="5">All the routes would introduce a new visual feature. New line would be consistent with existing viewscape in the Project Study Area given the presence of electric infrastructure, including transmission lines and wind generating facilities. Proximity to residences, presented above, may be used to quantify aesthetic impact to residences.</td></tr>
<tr><td>Cultural Values</td><td colspan="5">No impacts to cultural values are anticipated.</td></tr>
</table>

Table 3.3.2-1
Summary of Comparative Impacts and Routing Factors Considered

Factor	Purple Route	Green Route	Red Route	Blue Route	Summary
Recreation	• Minneopa State Park • one WPA within an existing transmission line easement • two State Water Trails • four snowmobile trails • does not cross WMAs or AMAs	• one WMA • two State Water Trails • three biking trails • two snowmobile trails • does not cross AMAs or WPAs	• one WPA (within an existing transmission line easement) • one WMA • two State Water Trails • three biking trails • two snowmobile trails • does not cross AMAs	• one State Water Trail • one State Trail • five snowmobile trails • does not cross Minneopa State Park, WMAs, WPAs, or AMAs	All routes would result in potential temporary noise, disruption, and use restrictions of recreational areas during construction. No long-term impacts are anticipated.
Public Services	No impacts to public services are anticipated.				
Effects on Public Health and Safety					
Public Health and Safety	Effects on public health and safety for all route options would include only minor temporary increase in demand for services during construction from the presence of construction crews. The Applicants will comply with all applicable safety requirements during construction and operation of the proposed project.				
Effects on Land-Based Economies					
Agriculture – Range of new structures placed in agricultural fields (approximate number) – Refer to Section 6.6.1	Double-circuit design: • 75 Single-circuit designs: • H-frame design: 215 • Monopole design: 175	• H-frame design: 195 • Monopole design: 120	• H-frame design: -5 • Monopole design: -25 The Red Route results in a net reduction to structures in agricultural fields because the existing 161 kV line has more structures per mile than the 345 kV design	• H-frame design: 240 • Monopole design: 125	A more detailed farmland impact analysis is presented in Section 6.6.1.
Forestry	No impacts to economically important forestry will occur.				

Table 3.3.2-1
Summary of Comparative Impacts and Routing Factors Considered

Factor	Purple Route	Green Route	Red Route	Blue Route	Summary
Tourism	No impacts to tourism are anticipated.				
Mining	No impacts to active mining operations are anticipated.				
Effects on Archaeological and Historic Resources					
Archaeological Resources	• two previously documented archaeological sites	• one previously documented archaeological site	• three previously documented archaeological sites	• three previously documented archaeological sites	The number of previously documented archaeological resources are comparable for all routes. None of the sites have been evaluated NRHP eligibility.
Historic Resources	• no previously documented architectural resources were identified	• one previously documented historic architectural resource • resource is listed in the NRHP.	• no previously documented architectural resources were identified.	• one previously documented historic architectural resource • resource has not been evaluated for NRHP eligibility	One NRHP-eligible historic architectural resource is present within the Green Route and one unevaluated historic architectural resource is within the Blue Route. No previously documented historic architectural resources are within the Purple or Red Routes.
Effects on the Natural Environment					
Air Quality	During construction, vehicle emissions and fugitive dust along right-of-way and local gravel roads are expected to occur. Construction-related emissions would be similar but much less than those resulting from normal agricultural activities. Any emissions of ozone from the transmission line are expected to be well below federal and state standards.				
Water Quality and Wetlands	• 24 waterways, including 14 PWI streams • 6.2 acres of forested wetland • approximately 17 structures would be placed in wetlands	• 18 streams or rivers, including 8 PWI streams • 6.9 acres of forested wetland • approximately 14 structures would be placed in wetlands	• 22 streams or rivers, including 14 PWI streams • 12.9 acres of forested wetland • approximately 18 structures would be placed in wetlands	• 45 streams or rivers, including 17 PWI streams • 13.9 acres of forested wetland • approximately 15 structures would be placed in wetlands	The Green Route has fewer overall wetland impacts and crosses fewer streams.

Table 3.3.2-1
Summary of Comparative Impacts and Routing Factors Considered

Factor	Purple Route	Green Route	Red Route	Blue Route	Summary
Flora	• Nelson WPA • no WMAs • 27 acres of forested clearing would occur	• May cross a portion of the Rice Lake WMA • no WPAs • 57 acres of forested habitat clearing would occur	• Smith WMA • Roberts WPA • 49 acres of forested habitat clearing would occur	• no WMAs or WPAs • 14 acres of forested habitat clearing would occur	The Blue Route would have the least impact on habitats with native or restored flora since it avoids sensitive areas such as WPAs and WMAs.
Fauna	Woodland habitat would be cleared and converted to non-woody habitat. Construction activity and noise would temporarily displace wildlife from agricultural or grassland habitats. The Blue Route would have the least impact on forested habitats. Following completion of construction and restoration, wildlife would generally move back into the area.				
Effects on Rare and Unique Natural Resources					
Rare and Unique Natural Resources	• 13 reported federally- or state-listed threatened or endangered species within one-mile • 8 SOBS • 6 NPCs	• 18 reported federally- or state-listed threatened or endangered species within one-mile • 5 SOBS • 4 NPCs	• 18 reported federally- or state-listed threatened or endangered species within one-mile • 3 SOBS • 4 NPCs	• 11 reported federally- or state-listed threatened or endangered species within one-mile • 3 SOBS • 3 NPCs	The Blue Route has fewer recorded state-listed threatened and endangered species within one mile.
Design Options that Maximize Energy Efficiencies, Mitigate Adverse Environmental Effects, and Could Accommodate Expansion of Transmission or Generating Capacity					
General	The design of the facilities along all the route options will maximize energy efficiencies and mitigate adverse environmental effects.				

Table 3.3.2-1
Summary of Comparative Impacts and Routing Factors Considered

Factor	Purple Route	Green Route	Red Route	Blue Route	Summary
Route Specific	Could be double-circuited with an existing 345 kV line for 44.8 percent of its length.	Studied as double-circuit with 115 kV line across Minnesota River and U.S. Highway 169 for 1.8 percent of its length.	Studied as double-circuited for 55.7 percent of its length. • 161 kV line for 53.9 percent • 115 kV line for 1.8 percent across Minnesota River and U.S. Highway 169	Studied as double-circuited for 16.8 percent of its length: • 161 kV line for 10.3 percent • 115 kV line for 6.5 percent	The Purple and Red routes have comparable design options where co-location opportunities with existing transmission is available.
Use or Paralleling of Existing Division Lines					
Survey Lines, Natural Division Lines, Agricultural Field Boundaries	26 percent	48 percent	17 percent	52 percent	The use of survey lines, natural division lines, and agricultural field boundaries is greatest for the Blue Route.
Use of Existing Transportation, Pipeline, and Electrical Transmission Systems or Rights-of-Way					
Existing road Rights-of-way	13.2 miles	11.7 miles	7.9 miles	9.5 miles	The Purple and Green routes follow slightly more miles of existing road rights-of-way as compared to the Red and Blue routes.
Existing Electrical Transmission Systems or Rights-of-Way	23.1 miles (45 percent); some alternatives would be adjacent to existing line, others double-circuit with existing line.	5.3 miles (12 percent)	26.0 miles (56 percent)	9.6 miles (17 percent)	The Red Route follows existing transmission rights-of-way for more miles and a higher percentage of its length as compared to the other routes. Of all the routes, the Green Route follows existing transmission rights of way for the fewest miles and the lowest percentage of its length as compared to other routes.
Existing Pipeline Systems or Rights-of-Way	None of the routes follow existing pipeline systems or rights-of-way, although there are crossings of pipeline systems and their rights-of-way.				

Table 3.3.2-1
Summary of Comparative Impacts and Routing Factors Considered

Factor	Purple Route	Green Route	Red Route	Blue Route	Summary
Electrical System Reliability					
Electrical System Reliability	All routes support and enhance the reliability of the regional electrical system.				
Cost of Constructing, Operating, and Maintaining the Facility					
Construction Costs (2016$)	• Approximately 52 miles long • $105.8 – 137.9 million	• Approximately 45 miles long • $109.0 – 121.3 million	• Approximately 47 miles long • $135.2 – 138.0 million.	• Approximately 57 miles long • $123.7- 135.8 million	Costs for the routes range from $105.8 – 138.0 million. This includes the cost associated with removing existing lines when applicable.
Operation and Maintenance Costs	The minimal difference in overall project length would not result in any material differences in the operation and maintenance costs of any of the route options.				
Adverse Human and Natural Environmental Effects Which Cannot Be Avoided					
General	Overall, unavoidable adverse impacts include aesthetic impacts, physical impacts to land use and change in landcover where the route requires vegetation maintenance. The Applicants will implement appropriate mitigation measures during construction to minimize impacts and will compensate landowners for damage to agricultural lands.				
Irreversible and Irretrievable Commitments of Resources					
General	A commitment of people and resources would be required to successfully construct any of the route options. Some resources could be scrapped and recycled at the end of the life of the project, such as concrete and rock for foundations and aggregate backfill, steel poles, conductor and shield wires. Other resources would be irreversibly committed to the Project and would be irretrievable. These would include trees cleared along the right-of-way, and fuels and lubricants used by equipment during construction. Resources committed would be similar for any route due to the same general area being crossed by each route.				
Route Specific	• Approximately 52 miles long • approximately 293 structures	• Approximately 45 miles long • approximately 259 structures	• Approximately 47 miles long • approximately 270 structures	• Approximately 57 miles long • approximately 324 structures	Resource commitments for the routes are anticipated to be comparable.

Table 3.3.2-1
Summary of Comparative Impacts and Routing Factors Considered

Factor	Purple Route	Green Route	Red Route	Blue Route	Summary
Notes: MPCA: Minnesota Pollution Control Agency WPA: Waterfowl Production Area WMA: Wildlife Management Area AMA: Aquatic Management Area kV: kilovolt NRHP: National Register of Historic Places PWI: Public Waters Inventory SOBS: Site of Biodiversity Significance NPC: Native Plant Community					

This Page Intentionally Left Blank

4.0 DESCRIPTION OF PROPOSED ROUTES

The sections below provide a brief description of the proposed routes and Figure 4.0-1 depicts the four proposed routes. Refer to Appendix C for detailed route maps.

4.1 PURPLE ROUTE

Starting from the Wilmarth Substation, the Purple Route follows the existing Lakefield Junction – Wilmarth Line to the west and south for approximately 23 miles. In this segment of the Purple Route, the new 345 kV circuit could be built either parallel to the existing line on monopole or H-frame structures or could be constructed on double-circuit structures, allowing co-location of the two 345 kV transmission lines. For the double-circuit design, the Applicants would propose to build adjacent to the existing line (in most areas) to allow the existing line to remain in service during construction.

The Purple Route crosses the Minnesota River twice; once just northwest of the Wilmarth Substation and once approximately eight miles west of Mankato near Judson, Minnesota. The river crossing near Judson would cross Minneopa State Park on an existing easement that pre-dates establishment of the state park and allows installation of additional circuits. The Purple Route departs from the existing 345 kV line in Lincoln Township and proceeds south for 23.5 miles, generally following property divisions and roads. The Purple Route turns to the east just southwest of Winnebago and follows property divisions and 160th Street the remaining five miles to the Huntley Substation.

4.2 GREEN ROUTE

The Green Route is 45.4 miles long and follows a relatively direct path to the Huntley Substation, generally following property lines through farmland and an existing transmission line. The Green Route crosses Blue Earth, Nicollet, and Faribault counties (refer to Figure 4.0-1). Starting from the Wilmarth Substation, the Green Route follows the Lakefield Junction – Wilmarth Line for 4.5 miles north and west. The Green Route departs from the existing 345 kV transmission line in Belgrade Township and heads south along property lines through agricultural and low density residential areas crossing three wooded ravines on upper and middle terraces of the Minnesota River Valley. The Green Route bypasses Minneopa State Park by heading east between the Minnesota River and North Mankato to the existing South Bend – Wilmarth Line crossing of the Minnesota River bottom land and river channel. In this segment of the Green Route, the new 345 kV line is proposed to be double-circuited with the existing 115 kV transmission line along an existing Bureau of Soil and Water Resources (BWSR) conservation easement at the Minnesota River crossing.

Once across the Minnesota River, the Green Route heads west along U.S. Highway 169 for one mile where it turns south. After departing from U.S. Highway 169, the Green Route takes a relatively direct route south for 30 miles to the Huntley Substation, generally along field divisions and roads with a few deviations from these features to avoid homes.

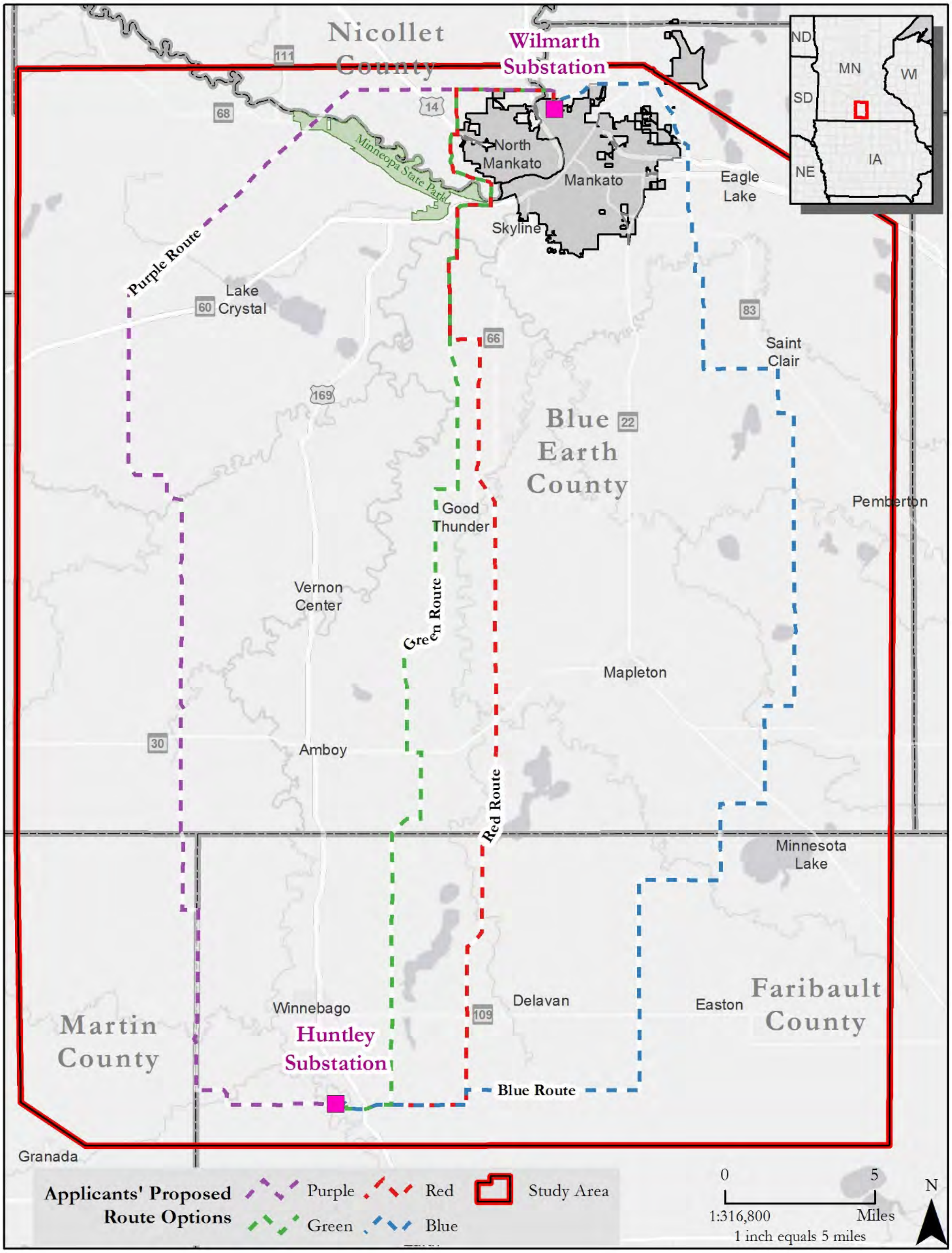
4.3 RED ROUTE

The Red Route is 46.5 miles long, crossing Blue Earth, Nicollet, and Faribault counties, and shares the same route as the Green Route for its northern 16 miles (refer to Figure 4.0-1). The Red Route deviates from the Green Route near Rapidan Township where it follows the existing Huntley – South Bend Line for approximately 24 miles. The Red Route would be constructed on the same alignment as the existing 161 kV line and would be built on double-circuit structures, allowing co-location of the new 345 kV and existing 161 kV transmission lines. The southernmost six miles of the Red Route generally follow field divisions and roads to the south and west to the Huntley Substation.

4.4 BLUE ROUTE

The Blue Route follows the existing Wilmarth – Dome Pipeline 115 kV transmission line north and east of the Wilmarth Substation for 3.7 miles through industrial and agricultural land use. In this segment of the Blue Route, Applicants propose that the new 345 kV line be constructed on double-circuit structures, allowing co-location of the new 345 kV transmission line and the existing 115 kV transmission line. Approximately 0.5-mile east of Highway 22, the Blue Route deviates from the existing 115 kV transmission line and turns to the southeast following a railroad/road corridor for 2.6 miles. After heading south from the rail corridor and crossing Highway 14, the Blue Route continues approximately 40 miles through farmland, primarily on field divisions and roads. In Barber Township, the Blue Route joins and follows an existing 161 kV line, continuing west for approximately six miles. This six-mile segment of new 345 kV transmission line is proposed to be constructed on double-circuit monopole structures, allowing co-location of the new 345 kV transmission line and the existing 161 kV transmission line. The last five miles of the Blue Route are shared with the Red Route and follow 160th Street to the Huntley Substation.

Figure 4.0-1 Project Overview Map



4.5 ALTERNATIVES, CONNECTORS, AND BYPASS ROUTE OPTIONS

In addition to the four routes described above, the Applicants identified alternative segments to address major routing constraints in the Project Study Area and provide routing options on the north end of the Project Study Area near the cities of North Mankato and Mankato, the Minnesota River, and Minneopa State Park. Connector options are also provided to cross between the Purple, Green, and Red routes. Figure 4.5-1 provides an overview of the alternatives and connectors in relation to the four main route options.

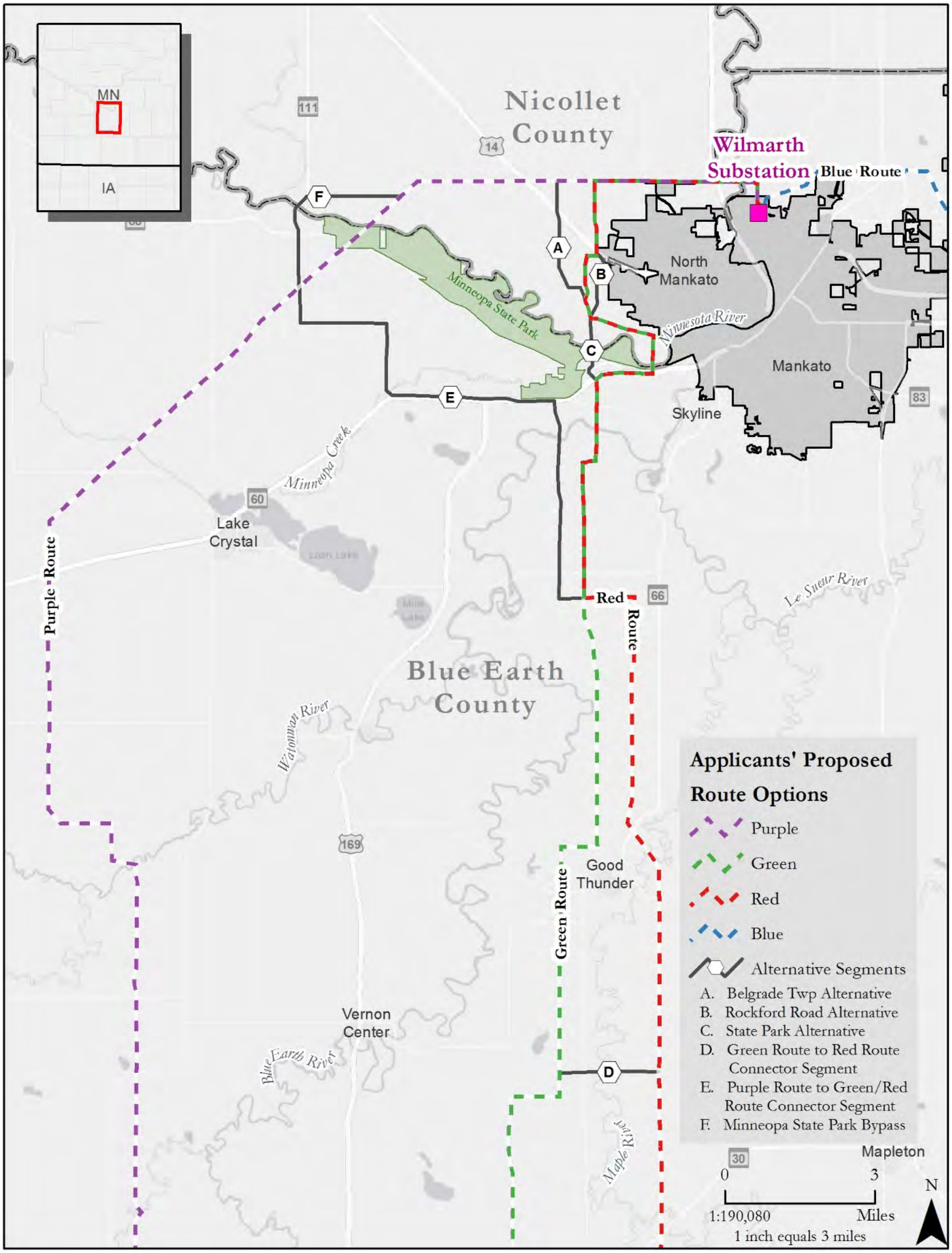
4.5.1 ROUTE SEGMENT ALTERNATIVES

4.5.1.1 Belgrade Township and Rockford Road Alternatives (Alternative Segments A and B)

The Applicants identified two route segment alternatives to address issues related to residential proximity and future development raised by the City of North Mankato and Belgrade Township. These alternatives follow the Green and Red routes which avoid crossing Minneopa State Park; however, in avoiding the state park, the routes cross the west and south sides of the City of North Mankato in areas that are pending annexation in Belgrade Township for future residential development. These alternative route segments are referred to as Alternative Segment A – Belgrade Township Alternative (Alternative Segment A) and Alternative Segment B – Rockford Road Alternative (Alternative Segment B).

Alternative Segment A diverges from the Green and Red routes and continues west following the same path as the Purple Route then turns to the south. It travels in a south/southeasterly direction until rejoining the Green and Red routes just south of Rockford Road.

Figure 4.5-1 Alternative and Connector Segments Overview



4.5.1.2 State Park Alternative Route (Alternative Segment C)

In developing the Red and Green Routes, Applicants avoided a crossing of the Minneopa State Park as both routes would require a new crossing of the park where no transmission line infrastructure currently exists. To avoid crossing the park, the Red and Green routes take a two-mile deviation around the park. To provide a more direct, shorter route option, Applicants identified an approximately 1.8-mile long alternative route segment, referred to as Alternative Segment C – State Park Alternative (Alternative Segment C), that diverges from the Green and Red routes and crosses the Minnesota River and Minneopa State Park.

Alternative Segment C diverges from the Green and Red routes after they cross Rockford Road and continues south, crossing Judson Bottom Road, to the Nicollet – Blue Earth county border and Minnesota River. After crossing the Minnesota River and into Blue Earth County, Alternative Segment C continues south and turns south/southwest to the west side of U.S. Highway 169. The alternative route then turns east and rejoins the Green and Red routes.

4.5.1.3 Purple Route Minneopa State Park Bypass Alternative (Alternative Segment F)

As an alternative to avoid crossing Minneopa State Park with the Purple Route, Applicants identified an approximately 3.8-miles-long bypass alternative segment. This segment, referred to as the Alternative Segment F – Minneopa State Park Bypass Alternative (Alternative Segment F), is depicted on Figure 4.5-1. Alternative Segment F continues west from the Purple Route, and crosses the Minnesota River to the south near the Town of Judson before rejoining with the Purple Route.

4.5.2 Connector Segments

In response to agency feedback that an option to cross between the Applicants' proposed routes would be useful during the route selection process, the Applicants identified two connector segments: Alternative Segment D – Green Route to Red Route Connector Segment (Alternative Segment D) and Alternative Segment E – Purple Route to Green/Red Route Connector Segment (Alternative Segment E). A description of each connector segment and the environmental features that are located along their routes is presented below. Tables detailing the environmental features along each connector segment are provided in Appendix F.

4.5.2.1 Green Route to Red Route Connector Segment (Alternative Segment D)

The Applicants identified an approximately 2.0-miles-long connector segment, referred to as Alternative Segment D. Alternative Segment D follows 137th Street on the west and T 61 on the east, crossing the Maple River along property line boundaries.

4.5.2.2 Purple Route to Green/Red Route Connector Segment (Alternative Segment E)

The Applicants identified an approximately 11.7-miles-long connector segment, referred to as Alternative Segment E. Alternative Segment E begins just before the Purple Route crosses County Road 42 and continues south and east before rejoining the Green and Red routes at the point where these routes diverge just south of the Township of Rapidan.

5.0 RIGHT-OF-WAY ACQUISITION, CONSTRUCTION, RESTORATION, AND MAINTENANCE PROCEDURES

The Applicants developed right-of-way acquisition, construction, restoration, and maintenance procedures for the Project. Although certain procedures will be site-specific based upon the final route design, general procedures are discussed in some detail in this Application.

5.1 RIGHT-OF-WAY ACQUISITION

Early in the detailed design process, after the route permit is obtained, the right-of-way acquisition process begins. For transmission lines, utilities typically acquire easement rights across the parcels to accommodate the facilities. The evaluation and acquisition process includes title examination, initial owner contacts, survey work, document preparation, and purchase.

Where the Project is expected to use existing rights-of-way and the terms of the existing easement are sufficient, the agent will work with the landowner to address any construction needs, impacts, or restoration issues.

For those segments of the Project where new or expanded rights-of-way will be necessary, the agent will identify all persons and entities that may have a legal interest in the affected real estate. The agent contacts each property owner to describe the need for the transmission facilities and how the Project may affect each parcel. The agent also seeks information from the landowner about any specific construction concerns.

To aid in the evaluation of each parcel, the agent may request permission to enter the property to conduct preliminary survey work. During this process, the location of the proposed transmission line or substation facility may be staked with permission of the property owner.

The agent will discuss the construction schedule and construction requirements with the owner. Special consideration may be needed for fences, crops, or livestock. Fences and livestock may need to be moved; temporary or permanent gates may need to be installed; and crops may need to be harvested early. In each case, the right-of-way agent and construction personnel coordinate these processes with the landowner.

Land value data will be collected based on the impact of the easement to the market value of each parcel. A fair market value offer will be developed. In rare instances, a negotiated settlement cannot be reached and the landowner chooses to have an independent third party determine the value of the rights taken. Such valuation is made through the utility's exercise of the right of eminent domain pursuant to Minnesota Statutes chapter 117. The process of exercising the right of eminent domain is called condemnation.

Before commencing a condemnation proceeding, the Applicant must obtain at least one appraisal and provide a copy to the property owner. The property owner may also obtain another property appraisal and the Applicant must reimburse the property owner for the cost of the appraisal according to the limits set forth in Minnesota Statutes section 117.036, subdivision 2(b). To start the formal condemnation process, a utility files a petition in the district court where the property is located and serves that petition on all owners of the property.

If the court grants the petition, the court then appoints a three-person condemnation commission that will determine the compensation for the easement. The three people must be knowledgeable of applicable real estate issues. The commissioners schedule a viewing of the property and then schedule a valuation hearing where the utility and landowners can testify as to the fair market value of the easement or fee. The Commission then makes an award as to the value of the property acquired and files it with the court. Each party has 40 days from the filing of the award to appeal to the district court for a jury trial. In the event of an appeal, the jury hears land value evidence and renders a verdict. At any point in this process, the case can be dismissed if the parties reach a settlement.

There may be instances where a landowner elects to require the Applicants to purchase their entire property rather than acquiring only an easement for the transmission facilities. The property owner is granted this right under Minnesota Statutes section 216E.12, subdivision 4, which is sometimes referred to as the "Buy-the-Farm Statute." The Buy-the-Farm Statute applies only to transmission facilities that are 200 kV or more; thus, the Buy-the-Farm Statute may apply to parcels crossed by the proposed 345 kV transmission line.

5.2 CONSTRUCTION PROCEDURES

Construction duration for this Project will be approximately 18 to 20 months and will employ approximately 100 to 150 construction workers.

Construction will begin after necessary federal, state, and local approvals are obtained and property and rights-of-way are acquired for that segment. Construction in areas where approvals are not needed or have already been obtained may proceed while approvals for other areas are in process. The precise timing of construction will take into account various requirements of permit conditions, environmental restrictions, availability of outages for existing transmission lines (if required), available workforce, and materials.

Construction will follow Xcel Energy's standard construction and mitigation best practices as developed to minimize temporary and permanent impacts to land and the environment. Construction typically progresses as follows:

- survey marking of the right-of-way;
- right-of-way clearing and access preparation;
- grading or filling if necessary;
- installation of culvert or concrete foundations;
- installation of poles, insulators and hardware;
- conductor stringing; and
- installation of any aerial markers required by state or federal permits.

Xcel Energy will design the transmission line structures for installations at the existing grades. Where a site slope requires (typically on slopes exceeding 10 percent), working areas may be graded or leveled with fill. If acceptable to the landowner, Xcel Energy proposes to leave the graded/leveled areas after construction to allow access for future maintenance activities. If not acceptable to the landowner, Xcel Energy will, to the best of its ability, return the grade of the site back to its original condition.

Construction will require the use of many different types of construction equipment including tree removal equipment, mowers, cranes, backhoes, digger-derrick line trucks, drill rigs, dump trucks, front-end loaders, bucket trucks, bulldozers, flatbed tractor-trailers, flatbed trucks, pickup trucks, concrete trucks, helicopters, and various trailers or other hauling equipment. Excavation equipment is often set on wheeled or track-driven vehicles. Construction crews will attempt to use equipment, when opportunities are available, that minimize impacts to lands.

Construction staging areas are usually established for transmission projects. Staging involves delivering the equipment and materials necessary to construct the new transmission line facilities. Construction of the Project will likely include two or more staging areas. Structures are delivered to staging areas and materials are stored until they are needed for the Project.

The Applicants will evaluate construction access opportunities by identifying existing transmission line easements, roads, or trails that run near the approved route. When feasible, the Applicants will limit construction activities to the easement area. In certain circumstances additional off-easement access may be required. Permission will be obtained from landowners prior to using off-easement access.

Improvements to existing access or construction of new access may be required to accommodate construction equipment. Field approaches and roads may be constructed or improved. Where applicable, the Applicants will obtain permits for new access from local road authorities. The Applicants will also work with appropriate road authorities to ensure proper maintenance of roadways traversed by construction equipment.

After right-of-way clearing and access preparation has been completed, pole and foundation installation will begin. Most structures for the Project will require either a drilled pier concrete foundation or an embedded culvert foundation.

Culverts are typically four feet in diameter and 15 to 20 feet deep. A hole is excavated and the culvert is placed vertically. The base of the pole is placed into the culvert and filled with an appropriate rock material.

Drilled pier foundations are typically between five to 10 feet in diameter and are typically 20 to 60 feet deep, depending on soil conditions. An angle or dead-end structure may require a foundation up to 12 feet in diameter. The actual diameter and depth of the hole (and foundation) depend on structure design and soil conditions that are determined during the initial survey and soil testing phases. Concrete is brought to the site by concrete trucks from a local concrete batch plant and filled around a steel rebar support cage and anchor bolts. Once the foundation is cured, the pole is bolted to the foundation.

Poles will be moved from staging areas and delivered to the foundation. Using a crane, the pole is lifted and placed. Insulators and other hardware are attached.

Conductor stringing is the last major component of transmission line construction. Stringing setup areas are typically located at two-mile intervals. These sites are located within the right-of-way, when possible, or on temporary construction easements. These operations require brief access to each structure to secure the conductor wire to the insulator hardware and the shield wire to clamps once final conductor sag, compliant with Xcel Energy procedures and minimum code clearances, is established. This access can be conducted by crane or helicopter.

After conductor installation is complete, conductor marking devices will be installed if required. These marking devices may include bird flight diverters or air navigational markers. The Applicants will work with the appropriate agencies to identify locations where marking devices will be installed.

Where the transmission line crosses streets, roads, highways, or other energized conductors or obstructions, temporary guard or clearance poles may be installed before conductor stringing. The temporary guard or clearance poles ensure that conductors will not obstruct traffic or contact existing energized conductors or other cables during stringing operations and also protects the conductors from damage.

Some soil conditions and environmentally-sensitive areas will require special techniques. The most effective way to minimize impacts to these areas will be to avoid placing poles in the sensitive areas by spanning over wetlands, streams, and rivers. When it is not feasible to avoid traversing sensitive areas, one or more of the following options will be used to minimize impacts, in consultation with the appropriate agencies:

- When possible, construction will be scheduled during frozen ground conditions.
- When construction during winter is not possible, construction mats will be used where wetlands and other sensitive areas would be impacted.
- Equipment fueling and other maintenance will occur away from environmentally-sensitive and wet areas. These construction practices help prevent soil erosion and ensure that fuel and lubricants do not enter waterways or impact environmentally-sensitive areas.
- Various best management practices (BMPs) will be identified in the Project's Stormwater Pollution Prevention Plan (SWPPP), including the use of silt fences, bio logs, erosion control blankets with embedded seeds, and other sound water and soil conservation practices to protect topsoil and adjacent water resources and to minimize soil erosion.

These techniques are also used to reduce impacts to private property, including driveways, yards, and drain tile.

5.3 RESTORATION AND CLEAN-UP PROCEDURES

Crews will attempt to minimize ground disturbance whenever feasible. Although these attempts will be made, areas will be disturbed during the normal course of work. Once construction is completed in an area, disturbed areas will be restored to their original condition to the maximum extent feasible. Temporary restoration before the completion of construction in some areas along the right-of-way may be required per National Pollution Discharge Elimination System (NPDES) and Minnesota Pollution Control Agency (MPCA) construction permit requirements.

After construction activities have been completed, a representative will contact the property owner to discuss any damage that has occurred as a result of the Project. This contact may not occur until after the Applicants have started restoration activities. If fences, drain tile, or other property have been damaged, the Applicants will repair damages or reimburse the landowner to repair the damages.

Farmers will be compensated for crops damaged during construction. The damaged area will be measured, yield determined in consultation with the farmer, and paid at current market rates. The Applicants will also make a payment for future year crop loss due to soil compaction. In addition, farmers will be compensated for their expense to deep rip compacted areas. If an individual does not have access to deep ripping equipment, the Applicant will provide this service.

Ground-level vegetation disturbed or removed from the right-of-way during construction of the Project will naturally reestablish to pre-construction conditions. Vegetation that is consistent with substation site operation outside the fenced area will be allowed to reestablish naturally at substation sites. Areas where significant soil compaction or other disturbance from construction activities occur will require additional assistance in reestablishing the vegetation stratum and controlling soil erosion. In these areas, the Applicants will use seed that is noxious weed free to reestablish vegetation.

Another aspect of restoration relates to the roads used to access staging areas or construction sites. After construction activities are complete, the Applicants will ensure that township, city, and county roads used for purposes of access during construction will be restored to their prior condition. The Applicants will meet with township road supervisors, city road personnel, or county highway departments to address any issues that arise during construction with roadways to ensure the roads are adequately restored, if necessary, after construction is complete.

5.4 MAINTENANCE PROCEDURES

Transmission lines and substations are designed to operate for decades and require only moderate maintenance, particularly in the first few years of operation. Xcel Energy will be responsible for the operation and maintenance of this Project. Xcel Energy performs aerial annual inspections of the 345 kV transmission line and inspects the line from the ground every six years. Typically, one to two workers are required to perform aerial inspections and two to five workers are required to perform the ground inspections. Any defects identified during these inspections will be assessed and corrected. Xcel Energy will also perform necessary vegetation management for the line. Vegetation maintenance generally occurs every four years.

The annual inspections are the principal operating and maintenance cost for transmission facilities. The aerial inspections cost approximately \$150-\$200 per mile and the ground inspections cost approximately \$400-\$600 per mile. Actual line-specific maintenance costs depend on the setting, the amount of vegetation management necessary, storm damage occurrences, structure types, materials used, and the age of the line.

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

The estimated service life of the proposed transmission line for accounting purposes varies among utilities. Xcel Energy and ITC Midwest use an approximately 60-year service life for its transmission assets. However, practically speaking, high voltage transmission lines are seldom completely retired.

5.5 ELECTRIC AND MAGNETIC FIELDS

"EMF" is an acronym for the terms electric and magnetic fields. For the lower frequencies associated with power lines (referred to as ELF), EMF should be considered separately – electric fields and magnetic fields, measured in kV/m and mG, respectively. Electric fields are dependent on the voltage of a transmission line and magnetic fields are dependent on the current carried by a transmission line. The strength of the electric field is proportional to the voltage of the line, and the intensity of the magnetic field is proportional to the current flow through the conductors. Transmission lines operate at a power frequency of 60 Hertz (cycles per second).

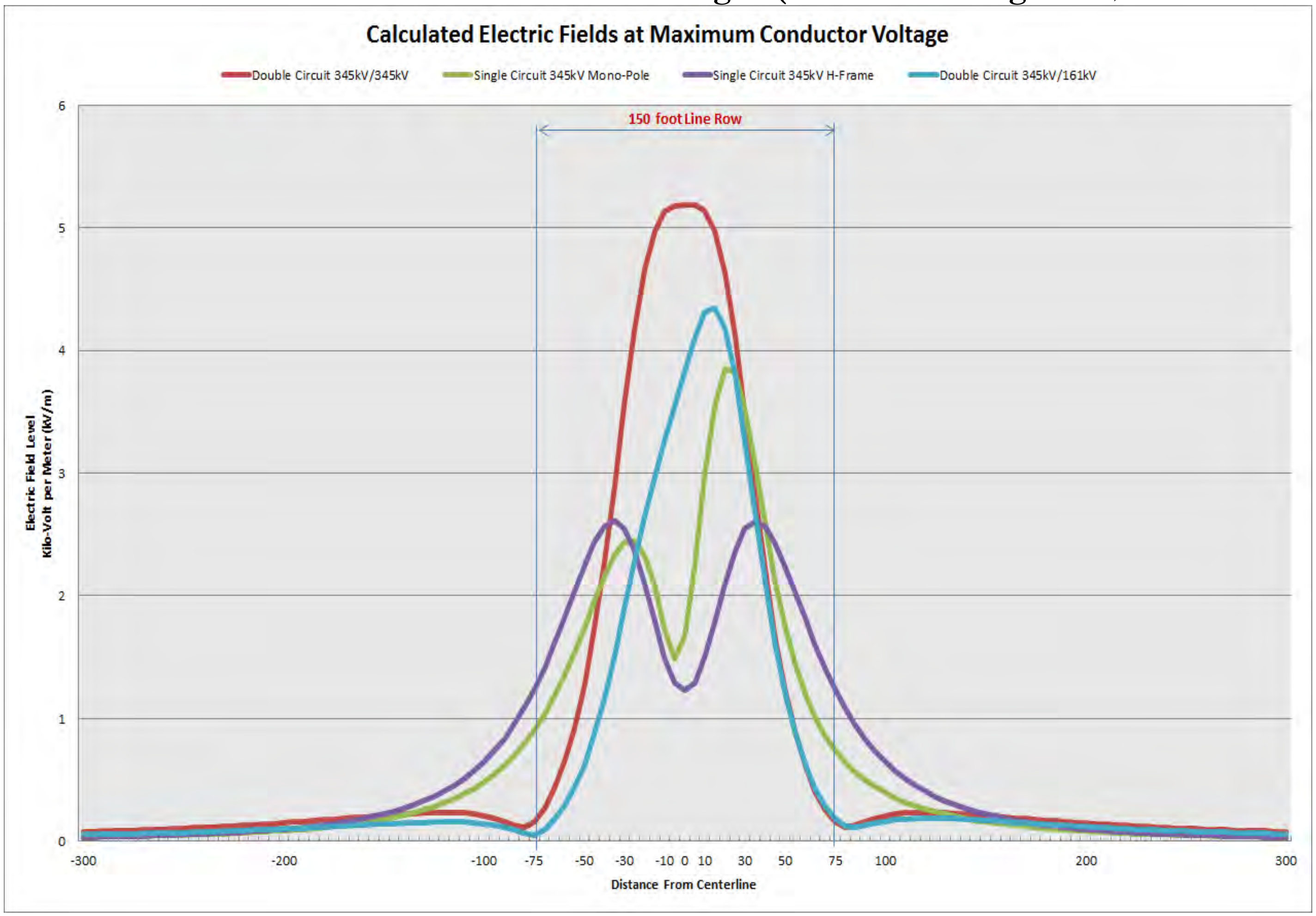
5.5.1 Electric Fields

There is no federal standard for transmission line electric fields. The Commission, however, has imposed a maximum electric field limit of 8 kV/m measured at one meter above the ground.[12] The standard was designed to prevent serious hazards from shocks when touching large objects parked under alternating current transmission lines of 500 kV or greater. Figure 5.5.1-1 provides the electric fields at maximum conductor voltage for the proposed 345 kV transmission line. Maximum

[12] *In the Matter of the Route Permit Application for a 345 kV Transmission Line from Brookings County, S.D. to Hampton, Minn.*, Docket No. ET2/TL-08-1474, ORDER GRANTING ROUTE PERMIT (Sept. 14, 2010) (adopting the Administrative Law Judge's Findings of Fact, Conclusions, and Recommendation at Finding 194).

conductor voltage is defined as the nominal voltage plus five percent. The maximum electric field, measured at one meter (3.28 feet) above ground, associated with the Project is calculated to be 5.19 kV/m. As shown in Figure 5.5.1-1, the strength of electric fields diminishes rapidly as the distance from the conductor increases. The electric field values of all of the design options at the edge of the transmission line right-of-way and sample points beyond are shown in Table 5.5.1-1.

Figure 5.5.1-1
Calculated Electric Fields (kV/m) for Proposed
345 Kilovolt Transmission Line Designs (3.28 feet above ground)[13]



[13] The colors in the figure represent different design options and do not represent route alternatives.

Table 5.5.1-1
Electric Field Calculations

Structure Type	Nominal Voltage	Distance to Proposed Centerline (feet)												
		-300	-200	-100	-75	-50	-25	0	25	50	75	100	200	300
345 kV Single-Circuit Monopole	362 kV	0.03	0.09	0.48	0.91	1.75	2.45	1.67	3.82	1.76	0.74	0.39	0.08	0.03
345 kV/345 kV Double-Circuit Monopole	362 kV	0.08	0.15	0.21	0.16	1.29	4.16	5.19	4.11	1.25	0.15	0.21	0.15	0.08
345 kV Single-Circuit H-frame	362 kV	0.03	0.10	0.65	1.24	2.25	2.37	1.23	2.37	2.25	1.24	0.65	0.10	0.03
345 kV/161 kV Double-Circuit Monopole[14]	362 kV -169 kV	0.05	0.10	0.14	0.05	0.63	2.28	3.83	3.79	1.22	0.18	0.16	0.12	0.06

[14] The 345/115 kV structure design will have similar (although slightly lower) electric field calculations as the 345/161 kV structure design.

5.5.2 Magnetic Fields

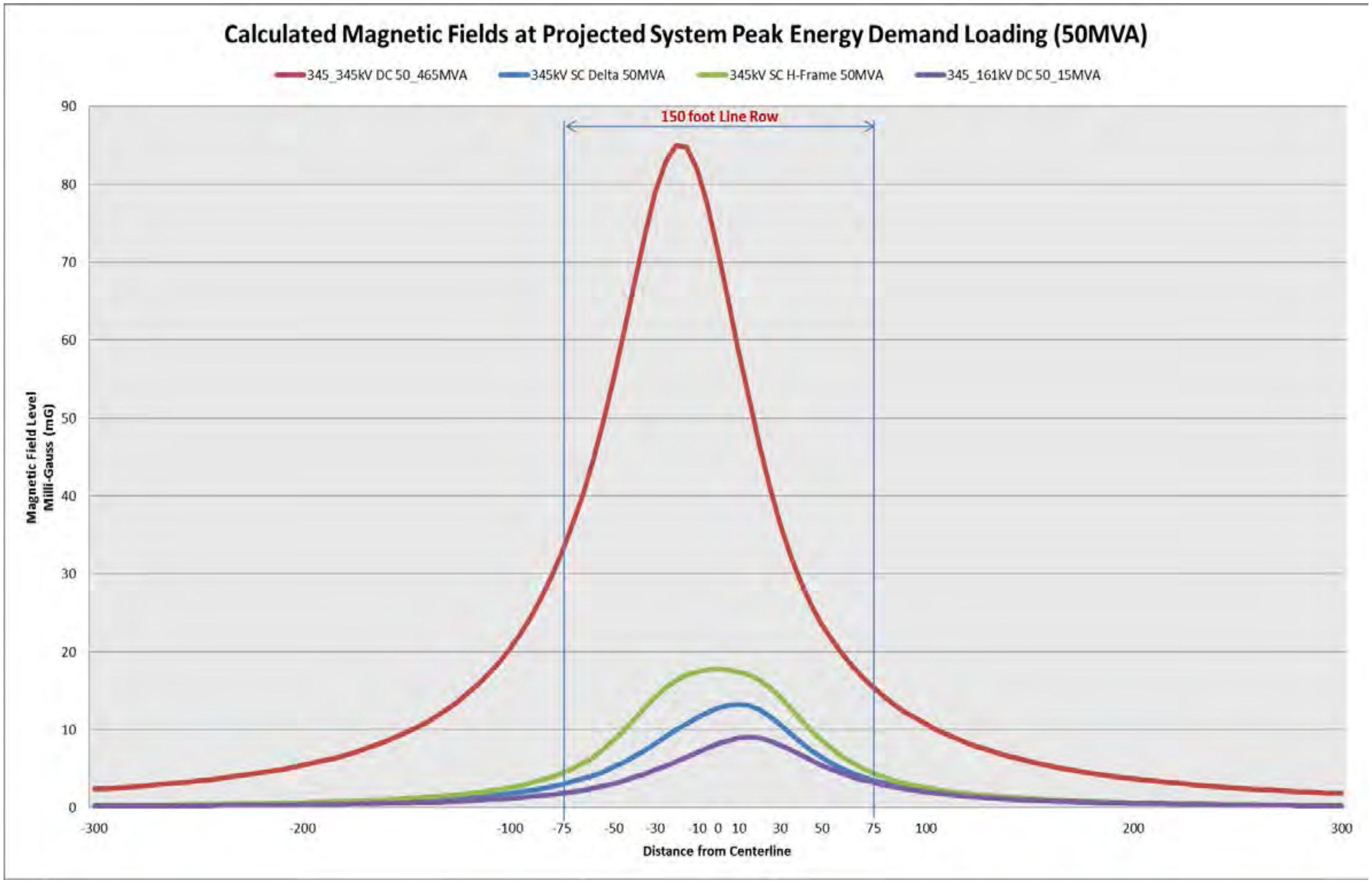
The projected magnetic fields for different structure and conductor configurations for the Project are provided in Figure 5.5.2-1, 5.5.2-2, and Table 5.5.2-1. Since magnetic fields are dependent on the current flowing on the line, magnetic fields were calculated for two different typical system conditions during the Project's first year in service (2022). These two scenarios are: (1) System Peak Energy Demand and (2) High Wind Utilization. The assumed current for each scenario is provided in amps or mega volt ampere (MVA).

The "System Peak Energy Demand" current flow (estimated loading of 50 MVA), represents the current flow on the line during the peak hour of system-wide energy demand and is shown in Figure 5.5.2-1 and Table 5.5.2-1. Typically, the peak hour of system-wide energy demand on the NSP system is characterized by a summer day with high temperatures and low levels of wind generation.

Magnetic fields were also calculated for "High Wind Utilization" current flow (estimated loading of 375 MVA), as shown in Figure 5.5.2-2 and Table 5.5.2-1. This scenario represents the current flow on the line during a non-peak time (winter months) when there are high levels of wind generation and the transmission system is intact (i.e., no outages).

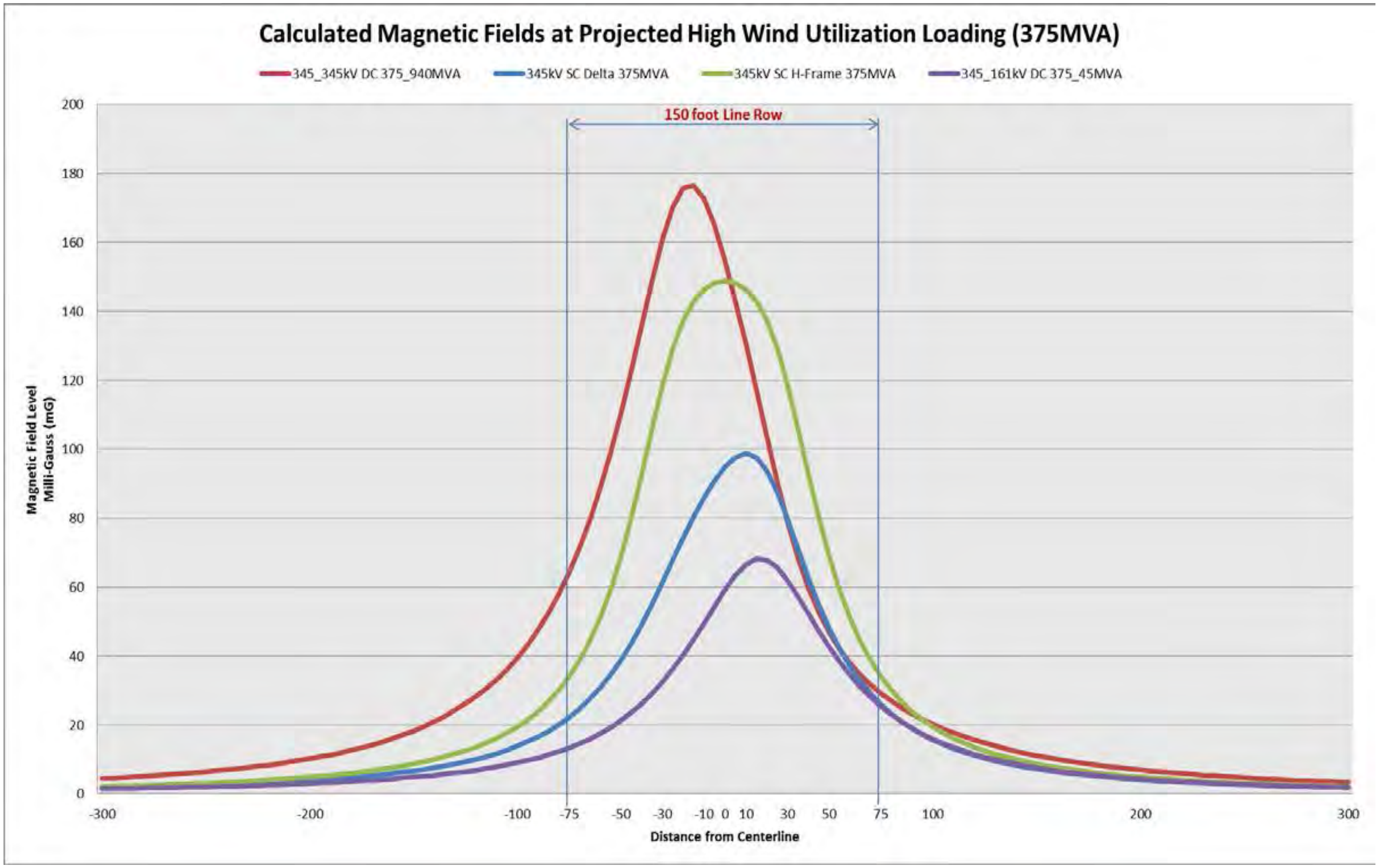
The magnetic field values for the two scenarios were calculated at a point where the conductor is closest to the ground. The magnetic field data shows that magnetic field levels decrease rapidly as the distance from the centerline increases (proportional to the inverse square of the distance from source). In addition, since the magnetic field produced by the transmission line is dependent on the current flow, the actual magnetic fields when the Project is placed in service will vary as the current flow on the line changes throughout the day.

Figure 5.5.2-1
Calculated Magnetic Flux density (mG) for Proposed 345 Kilovolt Transmission Line Designs at System Peak Energy Demand Loading (3.28 feet above ground) [15]



[15] The colors in the figure represent different design options and do not represent route alternatives.

Figure 5.5.2-2
Calculated Magnetic Flux density (mG) for Proposed 345 Kilovolt Transmission Line Designs at High Wind Utilization Loading (3.28 feet above ground)[16]



[16] The colors in the figure represent different design options and do not represent route alternatives.

Table 5.5.2-1
Magnetic Field Calculations

Structure Type	System Condition	Current (Amps)	Distance to Proposed Centerline (feet)												
			-300	-200	-100	-75	-50	-25	0	25	50	75	100	200	300
345 kV Single-Circuit Monopole	System Peak Energy Demand (50 MVA)	84	0.24	0.52	1.86	2.99	5.22	9.11	12.73	11.76	6.46	3.49	2.10	0.56	0.25
	High Wind Utilization (375 MVA)	628	1.78	3.90	13.92	22.31	38.92	67.94	94.86	87.58	48.21	26.06	15.70	4.16	1.86
345 kV/345 kV Double-Circuit Monopole	Peak System Energy Demand (50 MVA/465 MVA)	84/778	2.37	5.43	20.45	32.73	55.17	82.98	71.58	41.11	23.62	15.38	10.73	3.72	1.83
	High Wind Utilization (375 MVA/940 MVA)	682/1573	4.44	10.24	39.62	64.36	110.58	170.30	154.94	90.68	46.90	29.29	20.26	6.96	3.40
345 kV Single-Circuit H-frame	Peak System Energy Demand (50 MVA)	84	0.29	0.65	2.57	4.43	8.65	15.40	17.75	15.40	8.64	4.42	2.57	0.65	0.29
	High Wind Utilization (375 MVA)	628	2.17	4.90	19.52	34.13	69.16	129.36	148.73	129.32	69.12	34.11	19.51	4.89	2.17
345 kV/161 kV Double-Circuit Monopole[17]	Peak System Energy Demand (50 MVA/15 MVA)	84/54	0.19	0.38	1.21	1.86	3.12	5.39	8.16	8.59	5.48	3.24	2.03	0.55	0.24
	High Wind Utilization (375 MVA/45 MVA)	682/162	1.48	3.03	9.08	13.42	21.38	36.33	59.11	65.63	42.74	25.40	15.97	4.30	1.89

[17] The 345 kV/115 kV structure design will have similar magnetic field calculations to the 345 kV/161 kV structure design.

Applicants acknowledge that it is possible that the current flow on the proposed 345 kV line may, under certain system contingencies (i.e., lines are out of service), be higher than what is projected under these two scenarios. However, such system contingencies are rare and the high current flow will only persist for a limited time (i.e., no more than five minutes). The above two scenarios illustrate the typical current flow for the proposed 345 kV line.

There are presently no Minnesota regulations pertaining to magnetic field exposure. Applicants provide information to the public, interested customers, and employees so they can make informed decisions about magnetic fields. Such information includes the availability for measurements to be conducted for customers and employees upon request.

Considerable research has been conducted since the 1970s to determine whether exposure to power-frequency (60 hertz) magnetic fields causes biological responses and health effects. Public health professionals have also investigated the possible impact of exposure to EMF on human health for the past several decades. While the general consensus is that electric fields pose no risk to humans, the question of whether exposure to magnetic fields can cause biological responses or health effects continues to be debated.

Since the 1970s, a large amount of scientific research has been conducted on EMF and health. This large body of research has been reviewed by many leading public health agencies such as the U.S. National Cancer Institute, the U.S. National Institute of Environmental Health Sciences, and the World Health Organization (WHO), among others. These reviews do not show that exposure to electric power EMF causes or contributes to adverse health effects.

For example, in 2016, the U.S. National Cancer Institute summarized the research as follows:

> Numerous epidemiologic studies and comprehensive reviews of the scientific literature have evaluated possible associations between exposure to non-ionizing EMFs and risk of cancer in children (12–14). (Magnetic fields are the component of non-ionizing EMFs that are usually studied in relation to their possible health effects.) Most of the research has focused on leukemia and brain tumors, the two most common cancers in children. Studies have examined associations of these cancers with living near power lines, with magnetic fields in the home, and with exposure of parents to high levels of magnetic fields in the

> workplace. No consistent evidence for an association between any source of non-ionizing EMF and cancer has been found.[18]

Wisconsin, Minnesota, and California have all conducted literature reviews or research to examine this issue. In 2002, Minnesota formed an Interagency Working Group (Working Group) to evaluate the body of research and develop policy recommendations to protect the public health from any potential problems resulting from high voltage transmission line EMF effects. The Working Group consisted of staff from various state agencies and published its findings in a White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options in September 2002.[19] The report summarized the findings of the Working Group as follows:

> Research on the health effects of [MF] has been carried out since the 1970s. Epidemiological studies have mixed results – some have shown no statistically significant association between exposure to [MF] and health effects, some have shown a weak association. More recently, laboratory studies have failed to show such an association, or to establish a biological mechanism for how magnetic fields may cause cancer. A number of scientific panels convened by national and international health agencies and the United States Congress have reviewed the research carried out to date. Most researchers concluded that there is insufficient evidence to prove an association between [MF] and health effects; however, many of them also concluded that there is insufficient evidence to prove that [MF] exposure is safe.[20]

The Commission, based on the Working Group and WHO findings, has repeatedly found that "there is insufficient evidence to demonstrate a causal relationship between EMF exposure and any adverse human health effects."[21]

---

[18] NAT'L CANCER INSTITUTE, *Electromagnetic Fields and Cancer* (updated May 27, 2016), *available at* https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/electromagnetic-fields-fact-sheet.

[19] MINN. STATE INTERAGENCY WORKING GRP. ON EMF ISSUES, A WHITE PAPER ON ELECTRIC AND MAGNETIC FIELD (EMF) POLICY AND MITIGATION OPTIONS (Sept. 2002), *available at* www.capx2020.com/Images/EMFWhitePaper2002.pdf.

[20] *Id.* at 1.

[21] *In the Matter of the Application of Xcel Energy for a Route Permit for the Lake Yankton to Marshall Transmission Line Project in Lyon County*, Docket No. E002/TL-07-1407, FINDINGS OF FACT, CONCLUSIONS OF LAW AND ORDER ISSUING A ROUTE PERMIT TO XCEL ENERGY FOR THE LAKE YANKTON TO MARSHALL TRANSMISSION PROJECT at 7-8 (Aug. 29, 2008); *see*

5.5.3 Stray Voltage and Induced Voltage

"Stray voltage" is a condition that can potentially occur on a property or on the electric service entrances to structures from distribution lines connected to these structures—not transmission lines as proposed here. The term generally describes a voltage between two objects where no voltage difference should exist. More precisely, stray voltage is a voltage that exists between the neutral wire of either the service entrance or of premise wiring and grounded objects in buildings such as barns and milking parlors. The source of stray voltage is a voltage that is developed on the grounded neutral wiring network of a building and/or the electric power distribution system.

Transmission lines do not, by themselves, create stray voltage because they do not connect directly to businesses or residences. Transmission lines, however, can induce voltage on a distribution circuit that is parallel and immediately under the transmission line. If the proposed transmission lines parallel or cross distribution lines, appropriate mitigation measures can be taken to address any induced voltages. For additional information regarding stray voltage, please see the Minnesota Stray Voltage Guide that is available online at www.minnesotastrayvoltageguide.com or contact your electric utility provider.

5.5.4 Farming Operations, Vehicle Use, and Metal Buildings near Power Lines

The power lines will be designed to meet or exceed minimum clearance requirements with respect to electric fencing as specified by the NESC. Nonetheless, insulated electric fences used in livestock operations can be instantly charged with an induced voltage from transmission lines. The induced charge may continuously drain to ground when the charger unit is connected to the fence. When the charger is disconnected either for maintenance or when the fence is being built, shocks may result. The local electrical utility can provide site specific information about how to prevent possible shocks when the charger is disconnected.

Farm equipment, passenger vehicles, and trucks may be safely used under and near power lines. The power lines will be designed to meet or exceed minimum clearance requirements with respect to roads, driveways, cultivated fields, and grazing lands as

also In the Matter of the Application for a HVTL Route Permit for the Tower Transmission Line Project, Docket No. ET2, E015/TL-06-1624, FINDINGS OF FACT, CONCLUSIONS OF LAW AND ORDER ISSUING A ROUTE PERMIT TO MINNESOTA POWER AND GREAT RIVER ENERGY FOR THE TOWER TRANSMISSION LINE PROJECT AND ASSOCIATED FACILITIES at 23 (Aug. 1, 2007) ("Currently, there is insufficient evidence to demonstrate a causal relationship between EMF exposure and any adverse human health effects.").

specified by the NESC. Recommended clearances within the NESC are designed to accommodate a relative vehicle height of 14 feet.

Vehicles, or any conductive body, under high voltage transmission lines will be immediately charged with an electric charge. Without a continuous grounding path, this charge can provide a nuisance shock. Such nuisance shocks are a rare event because generally vehicles are effectively grounded through tires. Modern tires provide an electrical path to ground because carbon black, a good conductor of electricity, is added when they are produced. Metal parts of farming equipment are frequently in contact with the ground when plowing or engaging in various other activities. Therefore, the induced charge on vehicles will normally be continually flowing to ground unless they have unusually old tires or are parked on dry rock, plastic, or other surfaces that insulate them from the ground. Applicants can provide additional vehicle-specific methods for reducing the risk of nuisance shocks in vehicles.

Buildings are permitted near transmission lines but are generally discouraged within the right-of-way itself because a structure under a line may interfere with the safe operation of the transmission facilities. For example, a fire in a building within the right-of-way could damage a transmission line. The NESC establishes minimum electrical clearance zones from power lines for the safety of the general public and utilities often acquire easement rights that require clear areas in excess of these established zones. Utilities may permit encroachment into that easement for buildings and other activities when they can be deemed safe and still meet the NESC minimum requirements. Metal buildings may have unique issues due to induction concerns. For example, conductive buildings near power lines of 200 kV or greater must be properly grounded. Any person with questions about a new or existing metal structure can contact the Applicants for further information about proper grounding requirements.

6.0 ENVIRONMENTAL INFORMATION: ALL ROUTES

This section provides a general description of the environmental and human setting of Applicants' four proposed routes. Topics discussed in the following subsections include environmental setting, existing land cover and land use, soils, human settlement, land-based economies, archaeological and historical resources, hydrologic features, vegetation and wildlife, and rare and unique natural resources that are known to occur or may potentially occur along the four route options. In addition to identifying existing resources, the potential effects on those resources is discussed, and measures that can be used to avoid, minimize, or mitigate effects are included.

Where specific, quantified, impacts are discussed, the Applicants quantified these based on the Application alignments shown in Appendix C. These Application alignments were identified based on the best data available at the time of this Application. The Applicants anticipate that portions of the Application alignments will need to be modified either before a Route Permit is issued or before construction begins to address design, engineering, or stakeholder concerns, including those of agencies and landowners.

6.1 DESCRIPTION OF ENVIRONMENTAL SETTING

6.1.1 Purple Route

The MNDNR and the U.S. Forest Service have developed an Ecological Classification System (ECS) for ecological mapping and landscape classification in Minnesota that is used to identify, describe, and map progressively smaller areas of land with increasingly uniform ecological features (MNDNR, 2017a). Through the ECS, the State of Minnesota is split into Ecological Provinces, Sections, and Subsections. The first segment of the Purple Route in Blue Earth County is located within the Eastern Broadleaf Forest Province, while the remainder of the route in Blue Earth, Nicollet, Martin, and Faribault counties is located within the Prairie Parkland Province.

Within the Eastern Broadleaf Forest Province, the Purple Route begins in the Big Woods ecological subsection (222Mb) of the Minnesota and Northeast Iowa Morainal (222M) ecological section, then travels westward crossing into the Prairie Parkland Province in Nicollet County and the Minnesota River Prairie ecological subsection (251Ba) of the North Central Glaciated Plains (251B) ecological section and continues within this section and subsection until it reaches the terminus.

The Big Woods ecological subsection is characterized by large blocks of deciduous forest that were present at the time of Euro-American settlement within gently-to-moderately rolling topography. Soils in this subsection range from loam to clay loam that formed in thick deposits of gray limey glacial till left by the Des Moines lobe. The depth to bedrock in this subsection ranges from 100 to 400 feet. Annual precipitation in this subsection ranges from 29 inches in the west to 31 inches in the east and the growing season is approximately 145 to 150 days in length. Current land use in the subsection is predominantly agricultural (about 75 percent cropland and 5 to 10 percent pasture) with pockets of upland forest and wetlands (MNDNR, 2017b).

The Minnesota River Prairie ecological subsection is characterized by large till plains that are bisected by the broad valley of the Minnesota River (MNDNR, 2017c). The Minnesota River was formed by Glacial River Warren which drained Glacial Lake Agassiz. Topography outside of the river valley in this subsection consists of level to gently rolling ground moraine. Soils in this subsection are predominantly well- to moderately well-drained loams formed in gray calcareous till of the Des Moines lobe with some localized inclusions of clayey, sandy, and gravelly soils. Annual precipitation in this subsection ranges from 25 inches in the west to 30 inches in the east and the growing season is approximately 147 to 152 days in length. Prior to Euro-American settlement, vegetation in this subsection was predominantly tallgrass prairie interspersed by many islands of wet prairie and areas of deciduous forest along the margins of the Minnesota River, floodplains, and other small streams. Current land use in the subsection is dominated by agricultural activity and remnants of tallgrass prairie are rarely found (MNDNR, 2017c).

Most of the area crossed by the Purple Route is between 1,000 and 1,050 feet above mean sea level (amsl). However, the drainage channels within the landscape, such as the Minnesota, Blue Earth, and Le Sueur rivers, occur as abrupt gorges within the landscape. For example, the elevation of the uplands areas along the Minnesota River Valley at Mankato is about 975 feet amsl while the river valley is about 756 feet amsl.

6.1.2 Green Route

The Green Route begins at the Wilmarth Substation and follows the same path as the Purple Route for about 4.5 miles before turning south to continue through Nicollet and Blue Earth counties, finally crossing into Faribault County before reaching the terminus. The Green Route is located within the same ecological provinces, sections, and subsections as the Purple Route. As such, the description of the landforms, pre-settlement vegetation, soils, climate, and elevations provided in Section 6.1.1 also apply to the area crossed by the Green Route.

6.1.3 Red Route

The Red Route begins at the Wilmarth Substation and follows the same path as the Purple and Green routes for about 4.5 miles before turning south. For about 11.5 miles, the Red Route follows the same path as the Green Route through Blue Earth County, before turning to the east for about one mile south of Rapidan Township, then turning south and continuing through Blue Earth County, then finally crossing into Faribault County before reaching the terminus. The Red Route is located within the same ecological provinces, sections, and subsections as the Purple and Green routes. As such, the description of the landforms, pre-settlement vegetation, soils, climate, and elevations provided in Section 6.1.1 also apply to the area crossed by the Red Route.

6.1.4 Blue Route

The Blue Route begins at the Wilmarth Substation in Blue Earth County, but unlike the Purple, Green, and Red routes, it travels east/northeast for about 3.6 miles before beginning to travel in a southerly/southeasterly direction, eventually turning to the south and continuing to travel through Blue Earth County, then finally crossing into Faribault County before reaching the terminus. Although the Blue Route is further east than the other routes, it is located within the same ecological provinces, sections, and subsections as the Purple, Green, and Red routes. As such, the description of the landforms, pre-settlement vegetation, soils, climate, and elevations provided in Section 6.1.1 also apply to the area crossed by the Blue Route.

6.2 LAND COVER AND USE

The northern portion of all routes is located just north of the cities of Mankato and North Mankato, which are larger and more densely populated areas with multiple residential and commercial developments. However, the majority of the routes cross through rural areas with rural residences, farmsteads, commercial animal husbandry operations, agricultural support facilities, and commercial business are scattered throughout.

The Applicants reviewed land cover information available from the University of Minnesota Data Repository to identify existing land cover and uses along each of the application routes (Rampi, et al., 2016). The primary land cover type crossed by the application routes is agricultural, but some grasslands, wetlands, forested areas, developed areas, and open water are also present along each route option. Table 6.2-1 presents details about the amount of each land cover type crossed by the application routes.

Table 6.2-1
Land Cover Types Along the Application Routes

Land Cover/Use Category	Purple Route	Green Route	Red Route	Blue Route
Route Length (miles)	51.6	45.4	46.5	57.0
150-foot Right-of-Way (acres)	938	824	845	1,037
Land Cover				
Agricultural Land in 150-foot Right-of-Way (acres)	607	522	510	754
150-foot Right-of-Way Percent Agricultural Land	65	63	60	73
Wetlands in 150-foot Right-of-Way (acres)	59	39	54	53
Grasslands in 150-foot Right-of-Way (acres)	141	58	80	99
Forest Lands in 150-foot Right-of-Way (acres)	27	57	50	12
Developed Areas in 150-foot Right-of-Way (acres)	98	142	144	113
Open Water in 150-foot Right-of-Way (acres)	6	6	7	6

6.2.1 Purple Route

As noted in Table 6.2-1, approximately 607 acres of agricultural land would be within the 150-foot right-of-way for the Purple Route. Of the 331 non-agricultural acres of land within the 150-foot right-of-way, approximately 98 acres are developed land. The 150-foot right-of-way would include approximately 27 acres of forested land and 141 acres of grassland. Approximately 59 acres of wetlands and 6 acres of open water would be located within the right-of-way.

Typical crops grown in agricultural areas along the Purple Route include corn, soybeans, and forage crops (e.g., hay and green chop) (USDA, 2012). A more detailed discussion of the existing agricultural economy near the Purple Route is presented in Section 6.6.1 and a discussion of vegetation types found within non-agricultural areas is provided in Section 6.8.8.

The Purple Route crosses about 0.7 mile of Minneopa State Park; the entirety of this crossing is co-located with Xcel Energy's existing 345 kV Lakefield Junction – Wilmarth Line. Several small communities with more concentrated residential and commercial development occur within five miles of the Purple Route, such as Lake Crystal, Madelia, Vernon Center, Amboy, Winnebago, and Huntley. Based on a review of publicly available data, no cemeteries are located within the right-of-way of the Purple Route.

6.2.2 Green Route

As noted in Table 6.2-1, approximately 522 acres of agricultural land would be within the 150-foot right-of-way for the Green Route. Of the 302 non-agricultural acres of land within the 150-foot right-of-way, approximately 142 acres are developed land. The 150-foot right-of-way would include approximately 57 acres of forested land and 58 acres of grasslands. Approximately 39 acres of wetlands and 6 acres of open water would be located within the right-of-way.

Typical crops grown in agricultural areas along the Green Route include corn, soybeans, and forage crops (e.g., hay and green chop) (USDA, 2012). A more detailed discussion of the existing agricultural economy near the Green Route is presented in Section 6.6.1 and a discussion of vegetation types found within non-agricultural areas is provided in Section 6.8.8.

Several small communities with more concentrated residential and commercial development occur within five miles of the Green Route, such as Rapidan, Garden City, Good Thunder, Vernon Center, Amboy, Winnebago, and Huntley. Based on a review of publicly available data, no cemeteries are located within the Green Route's right-of-way.

6.2.3 Red Route

As noted in Table 6.2-1, approximately 510 acres of agricultural land would be within the 150-foot right-of-way for the Red Route. Of the 335 non-agricultural acres of land within the 150-foot right-of-way, approximately 144 acres are developed lands. The 150-foot right-of-way would include approximately 50 acres of forested land and 80 acres of grasslands. Approximately 54 acres of wetlands and 7 acres of open water would be located within the right-of-way.

Typical crops grown in agricultural areas along the Red Route include corn, soybeans, and forage crops (e.g., hay and green chop) (USDA, 2012). A more detailed discussion of the existing agricultural economy near the Red Route is presented in Section 6.6.1 and a discussion of vegetation types found within non-agricultural areas is provided in Section 6.8.8.

Several small communities with more concentrated residential and commercial development occur within five miles of the Red Route, such as Rapidan, Garden City, Good Thunder, Vernon Center, Mapleton, Amboy, Delavan, Winnebago, and Huntley. Based on a review of publicly available data, no cemeteries are located in the Red Route's right-of-way.

6.2.4 Blue Route

As noted in Table 6.2-1, approximately 754 acres of agricultural land would be within the 150-foot right-of-way for the Blue Route. Of the 283 non-agricultural acres of land within the 150-foot right-of-way, approximately 113 acres are developed lands. The 150-foot right-of-way would include approximately 12 acres of forested land and 99 acres of grasslands. Approximately 53 acres of wetlands and 6 acres of open water would be located within the right-of-way.

Typical crops grown in agricultural areas along the Blue Route include corn, soybeans, and forage crops (e.g., hay and green chop) (USDA, 2012). A more detailed discussion of the existing agricultural economy near the Blue Route is presented in Section 6.6.1 and a discussion of vegetation types found within non-agricultural areas is provided in Section 6.8.8.

Several small communities with more concentrated residential and commercial development occur within five miles of the Blue Route, such as Eagle Lake, St. Clair, Pemberton, Mapleton, Minnesota Lake, Easton, Delavan, Winnebago, and Huntley. Based on a review of publicly available data, no cemeteries are located in the Blue Route's right-of-way.

6.3 SOILS

Soil characteristics along the route options were assessed using the SSURGO database (USDA, 2017b). The SSURGO database is a digital version of the original county soil surveys developed by Natural Resources Conservation Service (NRCS) for use with GIS. It provides the most detailed level of soils information for natural resource planning and management.

Soil characteristics crossed by the rights-of-way of the four route options are presented in Table 6.3-1. The various soil types crossed by the route options are generally loamy, silty clay loam, or clay loam, are typically used for agricultural purposes, and range from very poorly-drained to well-drained.

Table 6.3-1
Summary of Soil Characteristics Along the Route Options

Soil Characteristics	Purple Route	Green Route	Red Route	Blue Route
Total Right-of-Way Acres	938.2	824.2	845.0	1,036.5
Prime Farmland (acres/percent) [a]	712.8 / 76%	661.7 / 80%	696.9 / 83%	898.9 / 87%
Farmland of Statewide Importance (acres/percent) [b]	117.7 / 13%	72.0 / 9%	55.4 / 7%	82.6 / 8%
Wind Erodible (acres/percent) [c]	58.5 / 6%	25.1 / 3%	57.8 / 2%	17.0 / 6%
Water Erodible (acres/percent) [d]	18.3 / 2%	37.8 / 5%	31.6 / 4%	8.0 / < 1%
Hydric (acres/percent) [e]	540.3 / 58%	438.2 / 53%	432.5 / 51%	671.5 / 65%
Revegetation Concerns (acres/percent) [f]	278.2 / 30%	201.6 / 25%	214.2 / 22%	189.1 / 21%
Compaction Prone (acres/percent) [g]	587.5 / 63%	532.6 / 65%	521.4 / 62%	729.1 / 70%

Note: Soils may have more than one characteristic.
[a] Includes soils that meet the prime farmland or prime farmland if a limiting factor is mitigated.
[b] Includes soils classified as farmland of statewide importance by SSURGO.
[c] Includes soils in wind erodibility group designation of 1 or 2.
[d] Includes soils with a slope greater than 15 percent or soils with a K value of greater than 0.35 and slopes greater than 5 percent.
[e] Includes soils that are classified as hydric by SSURGO.
[f] Includes soils with a non-irrigated land capability classification of 3 or greater.
[g] Includes soils in somewhat poor to very poor drainage classes with surface textures of clay loam and finer.

6.4 LINEAR FEATURE ROUTING

The Applicants attempted to co-locate the four route options to the extent practicable with existing linear infrastructure, including roads, railroads, and other transmission lines (refer to Figure 6.4-1). Locating the Project in and along existing rights-of-way reduces greenfield and aesthetic impacts. Refer to Table 6.4-1 for a breakdown of linear features with which the route options are co-located.

Table 6.4-1
Linear Features Co-located Along the Route Options

Co-location Type	Purple Route	Green Route	Red Route	Blue Route
Total Route Length (miles)	51.6	45.4	46.5	57.0
Studied as Double-circuit Existing Transmission Line (miles)	23.1 (if double-circuit)	0.8 [2]	29.4 [b]	9.6
Paralleling Existing Transmission Line (miles)	21.7 (if built parallel) [a]	4.6	0	0
Following Road or Rail, but not Transmission Line (miles)	11.7	12.4	5.6	9.4
Following Property Line, but not Transmission Line, Road, or Rail (miles)	13.3	21.5	6.8	29.6
Not Following Existing Linear Feature (miles)	3.7	6.2	4.7	8.5

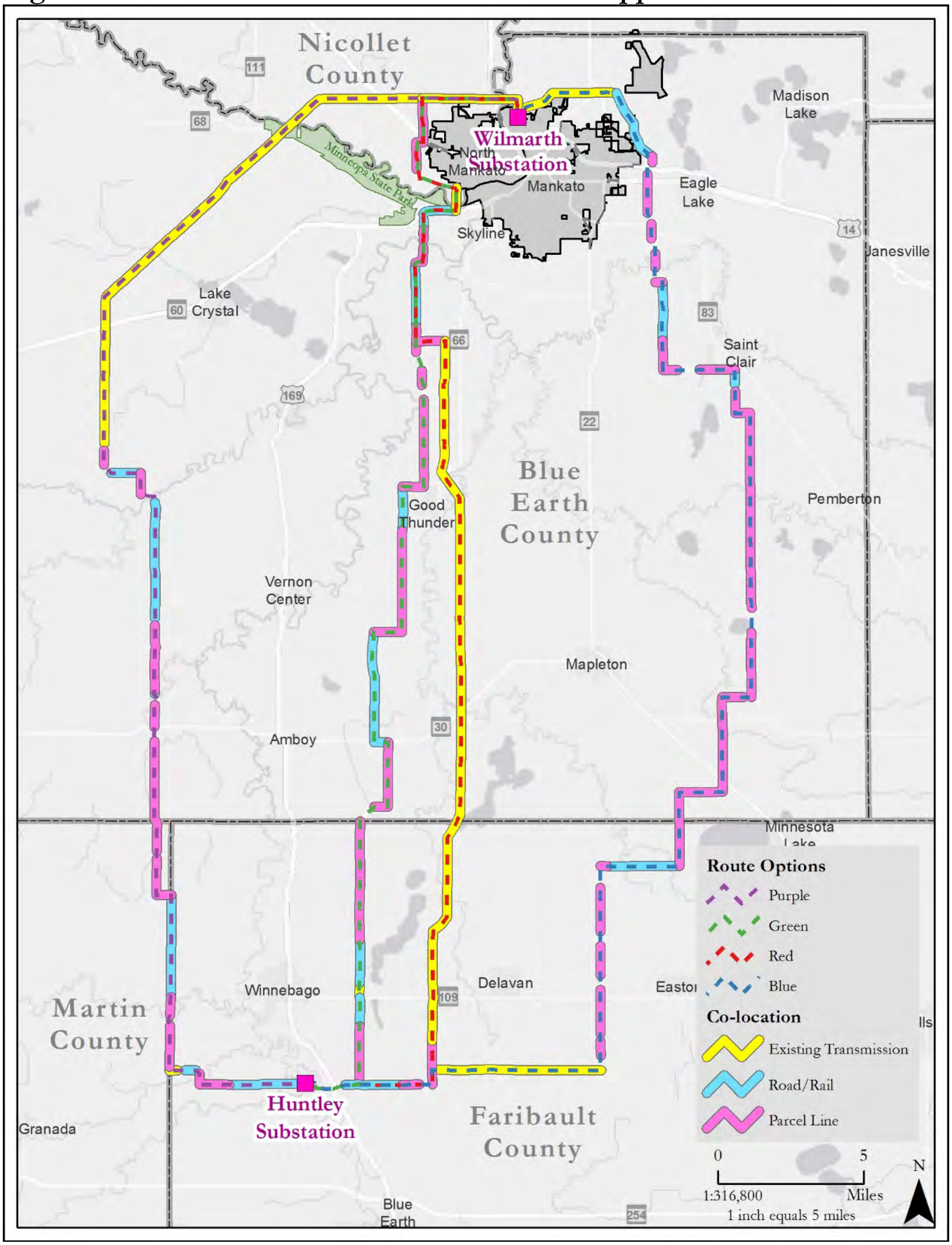
[a] Route requires double-circuit for 1.4 miles on federal and state park land.
[b] Route assumes double-circuit required across Minnesota River bottomland and Hwy 169.

- The Purple Route is approximately 51.6 miles long. It follows 23.1 miles of existing transmission lines. The Purple Route shares approximately 48.1 miles or 93.0 percent of its total length with existing linear features, including roads, railroads, other transmission lines, and field lines.
- The Green Route is approximately 45.4 miles. It follows 5.4 miles of existing transmission lines, and it shares approximately 39.3 miles or 86.5 percent of its total length with other existing linear features, including roads, railroads, other transmission lines, and field lines.
- The Red Route is approximately 46.5 miles long. It follows 29.4 miles of existing transmission lines. The Red Route shares approximately 41.8 miles or 89.8 percent of its total length with existing linear features, including roads, railroads, other transmission lines, and field lines.
- The Blue Route is approximately 57.0 miles. It follows 9.6 miles of existing transmission lines. The Blue Route shares approximately 48.6 miles or 85.0 percent of its total length with existing linear features, including roads, railroads, other transmission lines, and field lines.

6.4.1 Impacts and Mitigation

Overall the Applicants do not anticipate impacts to existing linear features. Section 6.5.9.7 provides information on impacts and mitigation related to existing utilities.

Figure 6.4-1 Linear Feature Co-Location Opportunities



6.5 HUMAN SETTLEMENT

Each route had different human settlement considerations and they are discussed in more detail below. Of the two substations that are part of the Project, only the Wilmarth Substation is located within a municipality (City of Mankato). The City of Blue Earth is located approximately 5.5 miles south of the Huntley Substation.

The Purple Route passes through Blue Earth, Nicollet, Martin, and Faribault counties. The Purple Route is within the City of Mankato boundary for less than one mile and is not located within a municipality for the rest of its length. Cities in close proximity to the Purple Route include North Mankato (adjacent), Judson (approximately one mile), Lake Crystal (approximately 2.3 miles), Winnebago (approximately 3.5 miles), and Huntley (approximately 0.5-mile). Outside these cities, human settlement is lightly distributed across the landscape at farmsteads.

The Green Route passes through Blue Earth, Nicollet, and Faribault counties. The Green Route is within the City of Mankato boundary for less than one mile and is not located within a municipality for the rest of the route. Cities in close proximity to the Green Route include North Mankato (adjacent), Skyline (approximately one mile), Rapidan (approximately 0.5-mile), Garden City (approximately 4.5 miles), Good Thunder (approximately 0.8-mile), Vernon Center (approximately 3.8 miles), Amboy (approximately 2.5 miles), and Winnebago (approximately 2.0 miles). Outside these cities, most of which are located along U.S. Highway 169, human settlement is lightly distributed across the landscape at farmsteads.

The Red Route passes through Blue Earth, Nicollet, and Faribault counties. The Red Route is within the City of Mankato boundary for less than one mile and is not located within a municipality for the rest of the route. Cities in close proximity to the Purple Route include North Mankato (adjacent), Skyline (approximately one mile), Rapidan (approximately 0.5-mile), Garden City (approximately 4.5 miles), Good Thunder (approximately 0.8-mile), Beauford (approximately 4.5 miles), Mapleton (approximately 4.0 miles), Delavan (approximately 2.4 miles), and Winnebago (approximately 4.0 miles). Outside these cities, human settlement is lightly distributed across the landscape at farmsteads.

The Blue Route passes through Blue Earth and Faribault counties. The Blue Route is within the City of Mankato boundary for less than one mile and is not located within a municipality for the rest of the route. Cities in proximity to the Blue Route include North Mankato (approximately 0.5-mile), Eagle Lake (approximately one mile), St. Clair (approximately 0.5-mile), Beauford (approximately 5.5 miles), Pemberton (approximately 3.3 miles), Mapleton (approximately four miles), Minnesota Lake (approximately 2.1 miles), Easton (approximately 2.5 miles), Delavan (approximately 3.1 miles), and Winnebago (approximately 3.4 miles).

6.5.1 Public Health and Safety

Public emergency services within the Project Study Area are provided by local law enforcement and emergency response agencies located in nearby communities. The county sheriff's offices and municipal police departments provide law enforcement, fire safety is provided by fire departments within municipalities, and ambulance services are provided by communities, such as Mankato and the Lake Crystal and Winnebago Ambulance Services to service the Project Study Area. Additionally, United Hospital District (Blue Earth) Ambulance may service portions of Blue Earth County.

There are ten towers that are a part of the Allied Radio Matrix for Emergency Response (ARMER) in the Blue Earth, Nicollet, Martin, and Faribault Counties (Minnesota Department of Public Safety, 2016). These ARMER towers are a part of Minnesota's Statewide Communication Interoperability Plan, which aims to improve communication for emergency responders. There are no ARMER towers within one mile of the Purple, Green, and Blue routes, but there is one tower within one mile of the Red Route (Minnesota Department of Public Safety, 2016). No impacts on ARMER towers are anticipated.

<u>Impacts and Mitigation – All Routes</u>

The influx of workers to construct the application routes would not be expected to influence emergency or public health services. Local law enforcement resources may be utilized for traffic control and law enforcement during construction activities.

Safety is of the highest concern for the design, construction, and operation of the Project. The Project will be designed to local, state, and NESC safety standards. The proposed transmission line will be equipped with protective devices to prevent damage from transmission line or pole falls or other potential accidents. Proper signage around the Project will warn the public of the safety risks associated with the energized equipment. The construction of the Project is not expected to have a negative impact on public health or safety. Construction crews will comply with Occupational Safety and Health Administration (OSHA) measures to ensure their own safety.

The Applicants will work with landowners as necessary to appropriately ground fences, gates, buildings, or other structures that may be subject to induced current from the line and educate landowners on these concerns and protective measures.

Should landowners identify safety concerns, the Applicants will investigate and take appropriate corrective action.

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

Regardless of which route is constructed, construction would occur in a relatively short amount of time and no construction workers are expected to relocate to the area permanently. Impacts to public health and safety are not anticipated.

6.5.2 Commercial, Industrial, and Residential Land Use

The Application routes pass through Nicollet, Blue Earth, Martin, and Faribault counties. Each county maintains zoning ordinances for purposes of commercial, industrial land use.

Nicollet County has several zoning districts, including agriculture, limited industry, several categories of residential, and highway business.

Blue Earth County has several zoning districts, including several categories within each commercial, residential, and industrial zone (Blue Earth County, 2012).

The Martin County Zoning Ordinance (2008) identifies six types of zoning districts including agricultural, floodplain, shoreland, single family residential, highway business, and industrial.

Faribault County's Zoning Ordinance (2007) identifies four types of zoning districts including agricultural (shoreland agriculture, and general agriculture), residence (rural residence, shoreland residential, and manufactured home park), business (highway service and general business), and industry (light industry and heavy industry).

6.5.2.1 Purple Route

The Purple Route extends through Blue Earth, Nicollet, Martin, and Faribault counties. Land use within the Purple Route is primarily agricultural and agriculture-related businesses (e.g., transportation, warehousing, and distribution) with typical crops including corn and soybeans.

The existing Wilmarth Substation is located within an area zoned as M-2 Industrial (City of Mankato Zoning, 2017). The Purple Route extends north and out of this zoning district immediately after exiting the Wilmarth Substation before turning west and crossing the Minnesota River into Nicollet County.

Within Nicollet County, the Purple Route will not cross any areas zoned as commercial, industrial, or residential (Nicollet County, 2016). The Purple Route will cross four zoning districts including floodplain, agriculture, shoreland, and conservancy areas associated with two crossings of the Minnesota River.

The Purple Route avoids the North Mankato municipal boundary. However, future growth plans for the City of North Mankato show the Purple Route passes through 1.2 miles of areas slated for future residential growth (City of North Mankato, 2016).

Within Blue Earth County, the Purple Route crosses agricultural and conservation zoning districts associated with the Minnesota and Watonwan Rivers (agricultural rivers) and a conservation district associated with Willow Creek (a tributary stream) (Blue Earth County, 2012).

The Purple Route crosses only agricultural district in Martin County (Chirpich, 2017).

The Purple Route is located primarily within the general agriculture district in Faribault County and also crosses shoreland agriculture districts associated with the Blue Earth River and its tributaries (Faribault County, 2008). The Purple Route does not cross business, industry, or residential zoning districts.

6.5.2.2 Green Route

The Green Route extends through Blue Earth, Nicollet, and Faribault counties starting at the Wilmarth Substation within the northern portion of the City of Mankato. Land use within Green Route is primarily agricultural and agriculture-related businesses (e.g., transportation, warehousing, and distribution) with typical crops including corn and soybeans.

The existing Wilmarth Substation is located within an area zoned as M-2 Industrial (City of Mankato Zoning, 2017). The Green route extends north and out of this zoning district immediately after exiting the Wilmarth Substation before turning west and crossing the Minnesota River into Nicollet County.

The Green Route avoids the North Mankato municipal boundary. However, future growth plans for North Mankato show the Green Route passes through 3.9 miles of areas slated for future residential growth (City of North Mankato, 2016).

At the Minnesota River Crossing from Nicollet to Blue Earth County, the Green Route will cross a conservation zoning district that is associated with the Minnesota River. Within Blue Earth County, the Green Route crosses a conservation district associated with the Minnesota River and then run within the U.S. Highway 169 right-of-way and adjacent to parcels zoned as heavy industry, rural townsite, rural residence, and highway business. The Green Route is not expected to impact these zoning districts. The Green Route turns south and crosses an area zoned as rural residence for approximately 0.8-mile. While zoned as rural residence, this area is currently used for cultivated crops. For the rest of the Route within Blue Earth County, the Green Route traverses areas zoned as agriculture and a conservation zoning district associated with the Blue Earth River (classified as an agricultural river) (Blue Earth County, 2017).

The Green Route is located primarily within the General Agriculture District in Faribault County and also crosses a Shoreland Agriculture District associated with the Blue Earth River. The Green Route does not cross business, industry, or residential zoning districts in Faribault County.

6.5.2.3 Red Route

The Red Route shares the same alignment as the Green Route for its northern third and is within the same three counties as the Green Route. Land use within Red Route is primarily agricultural and agriculture-related businesses (e.g., transportation, warehousing, and distribution) with typical crops including corn and soybeans.

The Red Route does not cross business, industry, or residential zoning districts in Faribault County.

6.5.2.4 Blue Route

The Blue Route extends through Blue Earth and Faribault counties. Land use within the Purple Route is primarily agricultural and agriculture-related businesses (e.g., transportation, warehousing, and distribution) with typical crops including corn and soybeans.

The Blue Route extends north and east out of an industrial zoning district immediately after exiting the Wilmarth Substation. After exiting the Mankato municipality boundary, the Blue Route runs adjacent and around the northern and northeastern edge of Mankato. Between Eagle Lake and Mankato, the Blue Route passes through 0.7-mile of an industrial/commercial zoning district, 0.6-mile of a residential zoning district., and 0.4-mile of an open space/parkland zoning district. The Blue Route also skirts the eastern edge of a platted commercial development.

The Blue Route does not cross areas zoned as commercial, industrial, or residential in Blue Earth County. Within the City of Mankato, the Blue Route crosses land zoned as industrial (City of Mankato, 2011).

6.5.2.5 Impacts and Mitigation – All Routes

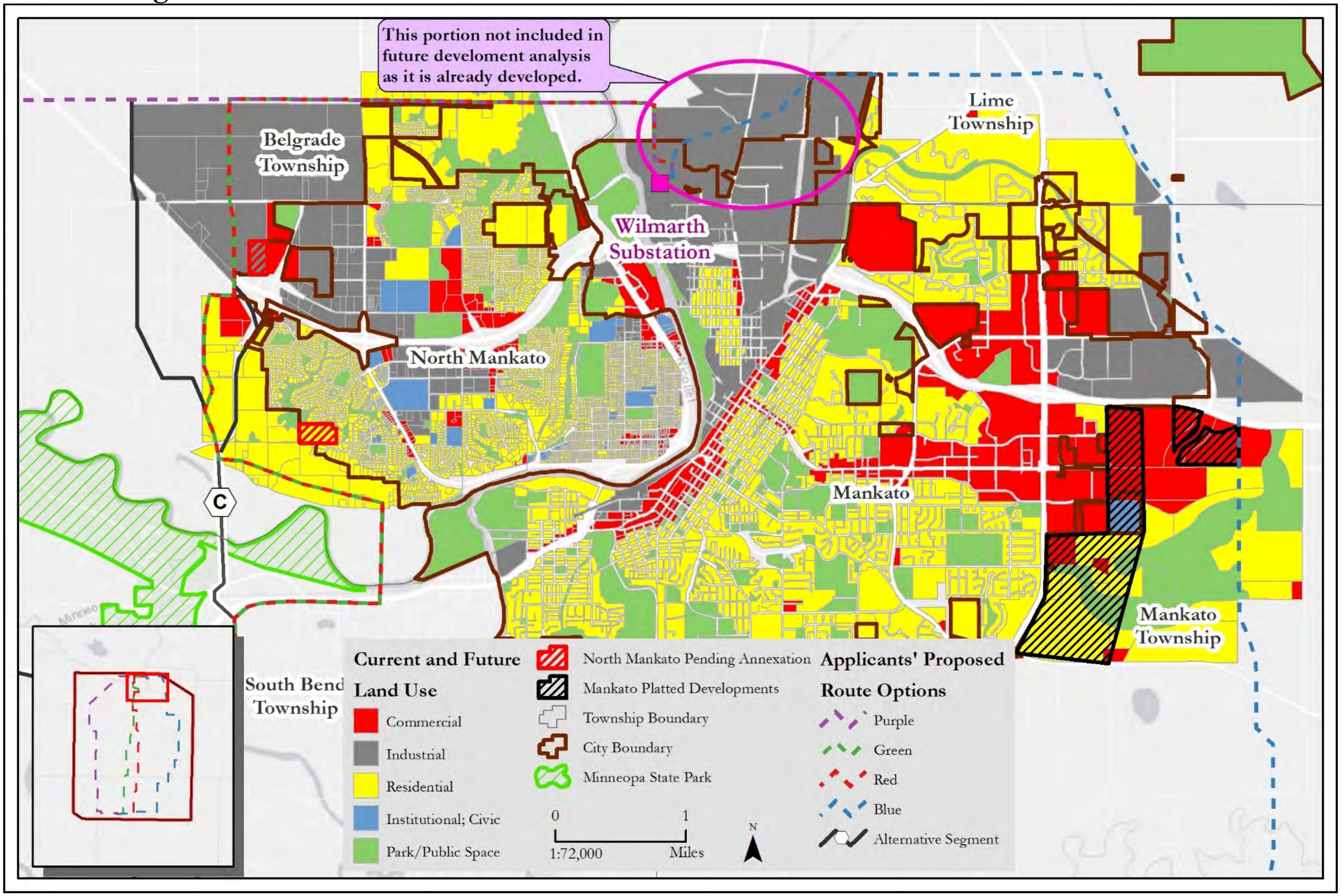
The land in proximity to the Purple Route is predominantly agricultural, as evidenced by the zoning districts crossed by this Route. The Purple Route would cross 1.2 miles of future residential growth area for the City of North Mankato. The Purple Route will not impact commercial/industrial zoned districts.

The routes would cross two areas in the planned growth area for the City of North Mankato: one planned as Future Industrial (approximately one mile) and one planned as Future Residential (approximately four miles). The Green and Red routes will also cross one small area zoned as Highway Business (approximately 0.2-mile) and a Rural Residential zoning district (approximately 0.8-mile), both in South Bend Township in Blue Earth County. As noted above, while these areas are zoned as Highway Business and Rural Residential, they are currently cultivated crop fields. The Applicants will coordinate with both the City of North Mankato and Blue Earth County on planned growth plans in the vicinity of the Green and Red routes (refer to Figure 6.5.2-1).

The Applicant will coordinate with both the cities of Mankato and Eagle Lake on planned growth areas in the vicinity of the Blue Route (refer to Figure 6.5.2-1).

Impacts specific to residential displacement are discussed below in Section 6.5.3 for each route; impacts to the agricultural economy along each route are summarized in Section 6.6.1.

Figure 6.5.2-1 Cities of North Mankato and Mankato Current and Future Land Use



6.5.3 Proximity to Residences

All four routes presented in this Application avoid densely populated areas. No displacement of any residences or business properties is anticipated if any of the these routes is selected by the Commission. Table 6.5.3-1 summarizes the number of residences within and up to 500 feet from the Application alignments.

Table 6.5.3-1
Proximity of Residences to the Application Alignments

Residence Proximity (Feet)	Purple Route	Green Route	Red Route	Blue Route
0-75	0	0	0	0
76-150	0	11	11	1
151-300	7	15	20	4
301-500	9	44	38	10
Total Residences	**16**	**70**	**69**	**15**

There are no residences within 150 feet of the Purple Route's Application alignment and 16 residences within 500 feet of the Purple Route alignment. The closest residence to the Purple Route alignment is 168 feet.

There are no residences within 75 feet of the Green Route's Application alignment and 70 residences within 500 feet of the Green Route alignment. The closest residence to the Green Route alignment is 111 feet.

There are no residences within 75 feet of the Red Route's Application alignment and 69 residences within 500 feet of the Red Route alignment. The closest residence to the Red Route alignment is 111 feet.

There are no residences within 75 feet of the Blue Route's Application alignment and 15 residences within 500 feet of the Blue Route alignment. The closest residence to the Blue Route alignment is 142 feet.

<u>Impacts and Mitigation – All Routes</u>

Displacement is defined as compelling a person or persons to leave their home; no displacement of homes is anticipated as a result of construction of the Project. The Application alignments were developed to avoid displacement of residential or non-residential structures. There are no residences within the right-of-way or within 100 feet of the Application alignments.

6.5.4 Noise

Sound is caused by the vibration of air molecules and is measured on a logarithmic scale with units of decibels (dB). The MPCA defines noise as undesired sound. 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 range of frequencies that the average human ear perceives, and deemphasizes frequencies that people do not hear as well, such as very high and very low 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 levels of with some common noise sources are listed in Table 6.5.4-1.

Table 6.5.4-1
Common Noise Sources

Sound Pressure Level (dBA)	Common Noise Source
110	Rock band at 5 m
100	Jet flyover at 300 m
90	Gas lawn mower at 1 m
85	Food blender at 1 m
75	Shouting at 1 m
70	Vacuum cleaner at 3 m
60	Normal speech at 1 m
55	Large business office
50	Dishwasher in next room, quiet urban daytime
40	Library, quiet urban nighttime
30	Bedroom at night
20	Quite rural nighttime
0	Threshold of hearing

Source: Minnesota Pollution Control Agency, 2008

The MPCA has promulgated noise standards in Minnesota Rules Chapter 7030. These standards limit the level of sound based on the noise area classifications (NAC) determined at the location of the person who hears the noise. Residences are in the most restrictive NAC and are classified as NAC 1, business areas are classified as NAC 2, and industrial/agricultural areas are classified as NAC 3. A fourth area, NAC 4, is defined as undeveloped and unused land, but no noise standards apply to this land class. The noise standards specify the maximum allowable noise levels at a receptor, including ambient noise and individual noise sources, and cannot be exceeded for more than 10 percent of an hour (L_{10}) or 50 percent of an hour (L_{50}). The MPCA's noise standards for daytime hours and nighttime hours are shown in Table 6.5.4-2.

Table 6.5.4-2
MPCA State Noise - Standards Hourly A-Weighted Decibels

Noise Area Classification	Daytime (7:00 a.m. – 10:00 p.m.)		Nighttime (10:00 p.m. – 10:00 a.m.)	
	L_{10}	L_{50}	L_{10}	L_{50}
1 – Residential	65	60	55	50
2 – Commercial	70	65	70	65
3 - Industrial	80	75	80	75

Source: Minn. R. § 7030.0040

Ambient sound levels can be highly variable and are influenced by the sound sources in the immediate area. Existing noise levels in the Project Study Area would be largely influenced by levels of traffic on roads, agricultural activity during planting and harvest seasons, and suburban sounds like barking dogs and lawn mowers, or natural sounds from wind or insects. Typical ambient day-night averaged noise levels can be estimated based on the dominant land usage of an area, as shown in Table 6.5.4-3.

Table 6.5.4-3
Estimated Ambient Noise Levels at Noise Receptors

Land Use Category	L_{dn} Range*	Typical L_{dn}*	L_d	L_n
Noisy commercial and industrial areas	>67	70	69	61
Moderate commercial, industrial, and noisy residential areas	62-67	65	64	57
Quiet commercial, industrial, and normal urban and noisy suburban areas	57-62	60	58	52
Quiet urban and normal suburban residential	52-57	55	53	47
Quiet suburban residential	47-52	50	48	42
Very quiet suburban and rural residential	<47	45	43	37

* L_{dn} means "day night", L_d means "daytime average", L_n means "nighttime average".
Source: ANSI S12.9-1993/Part 3

Construction will involve the use of construction equipment and noise will occur during the installation of the Project facilities. Construction noise is highly variable as the types of equipment in use at a construction site change with the construction phase and the type of activities. The typical noise levels of construction equipment generally used in construction activities are presented in Table 6.5.4-4.

Table 6.5.4-4
Typical Noise Levels of Major Construction Equipment

Generic Construction Equipment	Sound Level at 50 ft, dBA
Backhoe	80
Compactors (rollers)	80
Compressor (air)	80
Concrete Mixer Truck	85
Cranes (movable)	85
Dozers	85
Front End Loaders	80
Generators	82
Graders	85
Jack Hammers and Rock Drills	85
Pavers	85
Pumps	77
Scrapers	85
Tractors	84

Source: FHWA, 2017

Impacts and Mitigation – All Routes

Construction and operation of the Project will cause audible noise (refer to Table 6.5.4-4). Noise from construction activities may be noticeable at nearby residences; however, because of the temporary nature of construction noise, no long-term effects are anticipated.

Construction noise would only occur when active construction is taking place. Construction activity would only be present at a particular location for a few days at a time but on multiple occasions throughout the period between right-of-way clearing and restoration. As such, construction noise would be highly localized, temporary, and minor. Additionally, construction will typically occur between 7 a.m. and 7 p.m. Construction will occur in accordance with Minnesota Rules Chapter 7030 and there are no significant impacts anticipated by the construction of the Purple, Green, Red, or Blue routes.

During fair conditions, noise from the transmission line is anticipated to be inaudible. The transmission line may produce noise during rainy conditions due to the corona effect, a type of electrical conduction that occurs in the atmosphere near the conductor that may result in an audible hissing and cracking sound. It is likely however, that most of the time when climatic conditions result in corona, the noise levels of falling rain would exceed the corona noise making the noise from the transmission line inaudible. Figure 6.5.4-1 and Table 6.5.4-5 provide representative noise data for typical structures and spans for the 345 kV line. Noise levels may vary.

Figure 6.5.4-1
Noise Calculations

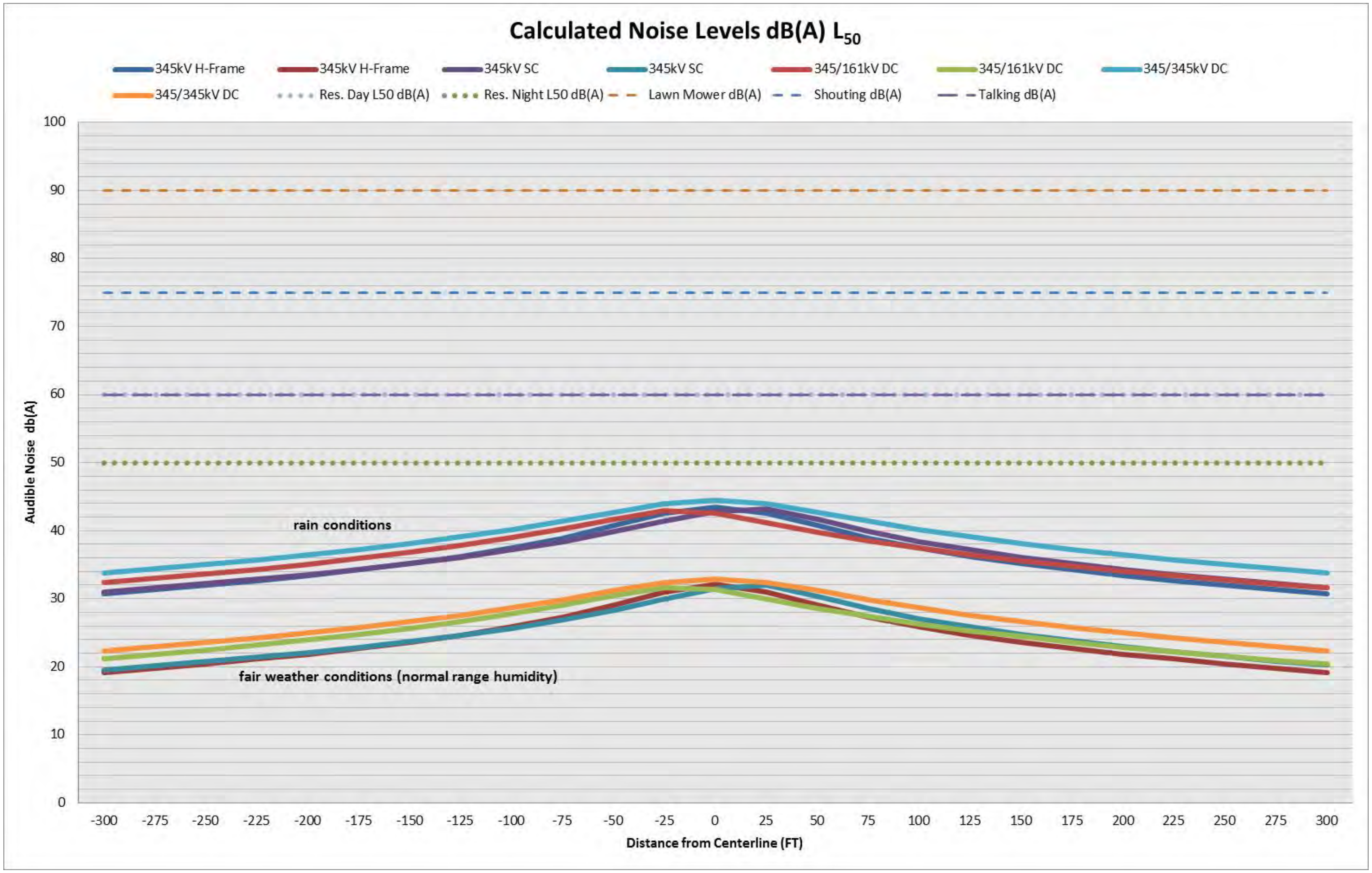


Table 6.5.4-5
Noise Levels (L_{50}) for Typical Structures and Span Distances

Operating Voltage	Noise L_{50} *			
	0 feet	75 feet	150 feet	300 feet
345 kV Single-Circuit H-frame	43.5	38.9	35.2	30.7
345 kV Single-Circuit Monopole	42.9	39.9	36.1	31.6
345/161 kV Double-Circuit Monopole	42.6	38.6	35.6	31.6
345/345 kV Double-Circuit Monopole	44.4	41.4	38.1	33.8

*L_{50} is defined as the noise level exceeded 50 percent of the time, or for 30 minutes in an hour.

Audible noise from the transmission line would only be expected during quiet, foggy, or rainy conditions and would be rare. Even in these rare cases, noise levels would be well below state standards. Therefore, noise impacts resulting from the operation of the Purple, Green, Red, or Blue routes would not be expected and therefore no mitigation would be required.

Noise associated with substations includes the operation of transformers and switchgear. The transformers produce a constant low-frequency humming noise while the switchgear produces an impulsive or short duration noise during infrequent activation of the circuit breakers. Due to the infrequent operation of the switchgear, the noise generated would be considered temporary in nature and is not predicted to exceed MPCA noise limits. The additions to the Huntley and Wilmarth substations will be designed such that the MPCA noise limits identified above will be met at the edge of the substation property. No mitigation will be required for the audible noise generated by the two substations.

6.5.5 Aesthetics

The topography of the Project Study Area is generally flat, with areas of rolling plains. The vegetation cover is uniformly low, making the topography in some areas susceptible to visual disruptions. In other areas, such as riparian zones surrounding many streams and rivers, there is more topography and higher vegetative cover.

While predominately open space, the landscape is already dotted with various structures. The settlements in the vicinity are rural residences and farm buildings (inhabited and uninhabited farmsteads) scattered along rural county roads. These structures are focal points in the dominant open space of the Project vicinity.

Throughout the vicinity of all four route options there are residences, farmsteads, communication towers, and distribution and transmission lines that are visible. As noted in Section 6.5.3, there are residences located within 500 feet of each application alignment; however, the nearest residence to each application alignment is greater than 100 feet from the alignment and the majority of residences are greater than 300 feet away. Additionally, wind turbines are visible from many locations along the route options. The Big Blue Wind Farm, comprised of 18 2.0 megawatt turbines, is located approximately five miles south of the Huntley Substation. The Corn Plus Wind Site, which includes two 2.1 megawatt turbines is located immediately east of the City of Winnebago, approximately one mile west of the Green Route.

Impacts and Mitigation – All Routes

The Project will result in an alteration of the current landscape through construction of single pole or H-frame structures of approximately 75 to 170 feet in height. The Purple, Green, Red, and Blue Routes mitigate visual disruptions in the predominantly rural landscape by siting the route along existing roadway corridors and section lines.

As discussed in Section 6.4, the Applicants sited each route along linear features to the extent practicable including existing transmission, roads, section lines, and property lines (see Table 6.4-1). By siting the routes along linear features, the Applicants have minimized impacts to the viewshed from homes to the greatest extent possible.

The Purple Route crosses Minneopa State Park along an existing 345 kV transmission line corridor; however, the proposed double-circuit single pole structures would be higher than the existing structures which will have a minor increase on viewshed impacts. Refer to Section 4.5.1.2 for a detailed discussion of the Minneopa State Park Alternative Segment C.

6.5.6 Socioeconomics

The area of study for the socioeconomic analysis includes Blue Earth, Faribault, Martin, and Nicollet counties in southern Minnesota. The existing socioeconomic conditions within the Project Study Area are reported based on data from the U.S. Census Bureau, 2010 Census and 2011-2015 American Community Survey 5-Year Estimates, and the Minnesota State Demographic Center Population Projections. Data is reported as township and county level-data to characterize the socioeconomic conditions in the area along each route and at the state level for the purpose of comparison.

The four counties in the Project Study Area have very small populations compared to the State of Minnesota as a whole, comprising less than three percent (2.5 percent) of the state's total population. Projections indicate that while the state's population will increase by 12 percent between 2015 and 2040, the population in Blue Earth and Nicollet counties will increase by 10 and 5 percent respectively, while Faribault and Martin counties will decrease by 12 and 11 percent, respectively during this same time period (Robertson, 2012).

A large majority of the population in the Project Study Area is Caucasian. The percentage of total minority residents is lower in the Project Study Area counties and townships along each route option as compared to the State of Minnesota as a whole. However, Faribault County has a slightly higher percentage of Hispanic residents compared to the state.

In the State of Minnesota, the top three industries in terms of employment are "educational services, and health care and social assistance" at 24.8 percent, "manufacturing" at 13.5 percent, and "retail trade" at 11.3 percent. In the four counties and the combined townships along each route option, the top three industries by employment are the same as the state (U.S. Census Bureau, 2010). Table 6.5.6-1 includes income and employment information for the counties and townships in the Project Study Area.

Table 6.5.6-1
Economic Characteristics within the Project Study Area

Location	Median Household Income	Unemployment Rate	Percent of Population Below Poverty
Blue Earth County	**$50,061**	**4.9%**	**19.1%**
Butternut Valley Township	$78,000	3.8%	9.4%
Ceresco Township	$61,875	5.8%	16.5%
Judson Township	$69,583	4.0%	5.1%
Lime Township	$78,864	6.0%	8.4%
Lincoln Township	$73,750	4.0%	0.5%
Mankato Township	$82,011	3.1%	2.6%
Pleasant Mound Township	$44,375	5.7%	6.4%
South Bend Township	$54,018	4.2%	15.2%
Faribault County	**$47,540**	**4.2%**	**13.5%**
Verona Township	$66,250	2.2%	5.9%
Winnebago Township	$73,125	2.2%	6.6%
Martin County	**$51,391**	**3.5%**	**11.4%**
Center Creek Township	$63,333	1.3%	5.9%
Nashville Township	$56,827	0.0%	6.1%
Nicollet County	**$58,640**	**4.0%**	**12.4%**
Belgrade Township	$81,000	5.0%	1.2%
Nicollet Township	$77,321	3.2%	2.1%
Minnesota	**$61,492**	**5.6%**	**11.3%**

Source: U.S. Census Bureau, 2016

6.5.6.1 Purple Route

The total population of the townships through which Purple Route extends is 8,662 (Table 6.5.6-2). Household incomes in the townships along Purple Route tend to be higher than the Project Study Area county averages, ranging from $44,375 to $81,000 (Table 6.5.6-1). Compared to the state, 11 of the townships have higher median household incomes and three townships have lower median household incomes. Unemployment rates are slightly lower in the Project Study Area counties and townships compared to the state. Poverty rates are generally lower in the townships along the Purple Route compared to the poverty rates for the Project Study Area counties and the state as a whole.

Table 6.5.6-2
Population Characteristics – Purple Route

Location	Total Population	Caucasian	Black or African American	Asian	Other	Hispanic	Total Minority
Purple Route [a]	8,662	98.9%	1.3%	0.4%	0.3%	3.3%	5.3%
Blue Earth County	65,125	94.0%	4.1%	2.8%	0.5%	2.9%	10.3%
Faribault County	14,230	98.5%	0.5%	0.5%	0.5%	6.1%	7.6%
Martin County	20,350	98.6%	0.7%	0.9%	0.3%	3.9%	5.8%
Nicollet County	33,086	94.8%	2.9%	2.0%	1.1%	4.1%	10.1%
State	5,419,171	87.2%	6.7%	5.2%	1.7%	5.0%	19.6%
[a] Includes Butternut Valley, Ceresco, Judson, Lime, Lincoln, Mankato, Pleasant Mound, and South Bend Townships in Blue Earth County; Verona and Winnebago Townships in Faribault County; Center Creek and Nashville Townships in Martin County, and Belgrade and Nicollet Townships in Nicollet County.							

Source: U.S. Census Bureau, 2010

6.5.6.2 Green and Red Routes

The total population of the townships through which the Green and Red routes extend is 10,574 (Table 6.5.6-3). Household incomes in the townships along the Green and Red routes tend to be higher than the Project Study Area county averages, ranging from $54,018 to $85,000 (Table 6.5.6-1). Compared to the state, 12 of the townships have higher median household incomes and four townships have lower median household incomes. Unemployment rates are lower in the Project Study Area counties and in all but two of the townships; compared to the state. Poverty rates are generally lower in the townships along the Green and Red routes compared to the poverty rates for the Project Study Area counties and the state as a whole.

Table 6.5.6-3
Population Characteristics – Green and Red Routes

Location	Total Population	Caucasian	Black or African American	Asian	Other	Hispanic	Total Minority
Green and Red Routes [a]	10,574	98.6%	0.9%	0.8%	0.1%	1.7%	3.5%
Blue Earth County	65,125	94.0%	4.1%	2.8%	0.5%	2.9%	10.3%
Faribault County	14,230	98.5%	0.5%	0.5%	0.5%	6.1%	7.6%
Nicollet County	33,086	94.8%	2.9%	2.0%	1.1%	4.1%	10.1%
State	5,419,171	87.2%	6.7%	5.2%	1.7%	5.0%	19.6%

[a] Includes Decoria, Judson, Lime, Lyra, Mankato, Mapleton, Rapidan, South Bend, and Sterling Townships in Blue Earth County; Barber, Delevan, Lura, Prescott, Verona and Winnebago Townships in Faribault County, and Belgrade Township in Nicollet County.

Source: U.S. Census Bureau, 2010

6.5.6.3 Blue Route

The total population of the townships through which the Blue Route extends is 7,566 (Table 6.5.6-4). Household incomes in the townships along the Blue Route tend to be higher than the Project Study Area county averages, ranging from $57,500 to $85,000 (Table 6.5.6-1). Compared to the state, 11 of the townships have higher median household incomes and three townships have lower median household incomes. Unemployment rates are lower in the three counties along the Blue Route and in all but three of the townships; compared to the state. Poverty rates are generally lower in the townships along the Blue Route compared to the poverty rates for the Project Study Area counties and the state, as a whole.

Table 6.5.6-4
Population Characteristics – Blue Route

Location	Total Population	Caucasian	Black or African American	Asian	Other	Hispanic	Total Minority
Blue Route [a]	7,566	99.2%	0.6%	0.7%	0.0%	1.5%	2.8%
Blue Earth County	65,125	94.0%	4.1%	2.8%	0.5%	2.9%	10.3%
Faribault County	14,230	98.5%	0.5%	0.5%	0.5%	6.1%	7.6%
Nicollet County	33,086	94.8%	2.9%	2.0%	1.1%	4.1%	10.1%
State	5,419,171	87.2%	6.7%	5.2%	1.7%	5.0%	19.6%

[a] Includes Danville, Decoria, Lime, Mankato, Mapleton, McPherson, and Medo Townships in Blue Earth County; Barber, Delavan, Lura, Prescott, Verona and Winnebago Townships in Faribault County, and Belgrade Township in Nicollet County.

Source: U.S. Census Bureau, 2010

6.5.6.4 Impacts and Mitigation – All Routes

Construction and operation of the proposed Project would not directly result in a change in the population size or demographic in the Project Study Area. The construction and operation of any of the routes is not anticipated to create or remove jobs in the Project Study Area or result in the permanent relocation of individuals to or from the area. Construction would occur over approximately one year with workers likely commuting instead of relocating to the area. The Project would, however, help to provide for the electrical needs of the local residents, businesses, and industries. The increased reliability of the electrical infrastructure in the area would provide for current needs and future growth.

Construction and operation of the line would not significantly affect employment or income in the Project Study Area. The construction work force would be small and temporary. Workers would likely come from outside the Project Study Area and would commute on a daily or weekly basis. The presence of additional workers and increased employment would result in a slight increase in retail sales in the Project Study Area due to purchases of lodging, food, fuel, construction materials (lumber, concrete, aggregate), and other merchandise. Any additional activity, however, would likely be insignificant and would be easily accommodated by current retail staffing. No additional permanent staff are expected for line operations and maintenance. Therefore, the transmission line is not expected to change population trends, economic indicators, or employment.

6.5.7 Cultural Values

Cultural values include those shared community attitudes expressed within a given area. These cultural value features which provide a framework for community unity. The Project Study Area is rural in nature with an agriculture-based economy. Corn and soybean crop production, livestock operations, and associated industries drive the local agricultural economy. While manufacturing and service industries (restaurants, hotels, repair shops, convenience and retail stores) are concentrated in the urban areas located in the northern portion of the Project Study Area. Farming and protection of agriculture, the land, and the ability to continue to farm and support livelihoods through agriculture are strong values within the Project Study Area.

Manufacturing and service industries (restaurants, hotels, repair shops, convenience, and retail stores) are concentrated in the urban areas located in the northern portion of the Project Study Area. The North Mankato / Mankato area is a regional hub for health care, arts and culture. The Mankato Clinic is one of the largest private clinics in the state, with more than 100 physicians. The Mankato area also has five colleges, Bethany Lutheran College, Gustavus Adolphus College, Rasmussen College, South Central College and Minnesota State University, Mankato.

Numerous natural amenities, including lakes, rivers, and WMAs, attract local and regional recreational users along all four route options (refer to Section 6.5.8). These areas are also important to the identity of the area and provide opportunities for various recreational activities such as fishing, hunting, and snowmobiling which are also part of the identity of area residents.

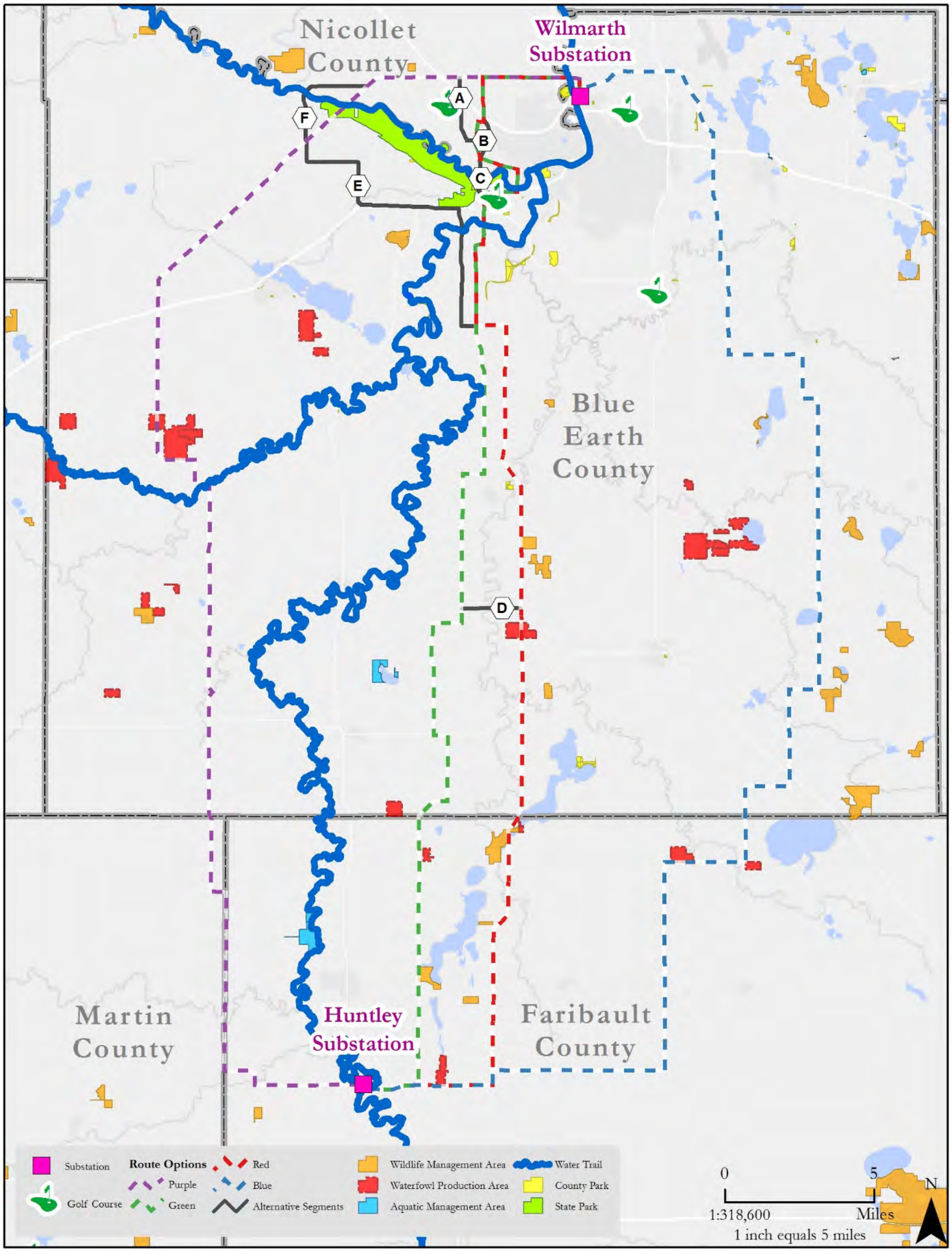
Impacts and Mitigation – All Routes

Construction of the Project is not expected to conflict with the cultural values along any of the four route options. The area is rural in nature with an agriculture-based economy and is anticipated to remain so after construction. None of these aspects of the culture of the area are anticipated to be significantly impacted or changed as a result of the construction and operation of Project.

6.5.8 Recreation

There are many recreational opportunities in the Project Study Area. Recreational opportunities at public lands including Minneopa State Park, MNDNR WMAs, USFWS WPAs, Aquatic Management Areas (AMAs), State Water Trails, county parks, and golf courses (refer to Figure 6.5.8-1). Each of these public lands offers many recreation opportunities that attract residents and tourists.

Figure 6.5.8-1 Recreation Opportunities in the Project Study Area



6.5.8.1 Purple Route

Minneopa State Park is in the Purple Route vicinity, located in the Minnesota River Valley west of North Mankato. This park is approximately 2,600 acres of blufflands, waterfalls, prairies, and wetlands (MNDNR, 2016). In the park, there are many trails for biking (0.2 miles), hiking (4.5 miles), and snowshoeing (anywhere in the park); a picnic area; and several other activities for campers and those who visit the park on a day pass. The Purple Route crosses the northern portion of the park within an existing transmission line easement. Recreation in this portion of the park is limited to passive recreation; there are no hiking, skiing, biking, or other trails, campgrounds, camper cabins, RV sites, picnic shelters, or historic sites in this portion of the Park (MNDNR, 2016).

WMAs are managed to provide wildlife habitat, improve wildlife production, and provide public hunting and trapping opportunities. These MNDNR lands were acquired and developed primarily with hunting license fees. There is one WMA parcel within one mile of the Purple Route alignment. A 40-acre parcel of the Swan Lake WMA is located approximately 0.2-mile north of the Purple Route alignment in Nicollet County, approximately 0.3-mile west of U.S. Highway 14. There's an additional 441 acres of the Swan Lake WMA located 3.5 miles west, primarily along the Minnesota River.

WPAs are managed by the USFWS to protect breeding, forage, shelter, and migratory habitat for waterfowl or wading birds, such as ducks, geese, herons, and egrets. WPAs provide opportunities for viewing wildlife and intact ecosystems, as well as fishing, hunting, and trapping. The Purple Route alignment crosses an unnamed WPA paralleling an existing alignment approximately 5.5 miles southwest of Lake Crystal in Blue Earth County. Approximately two route miles later, the Purple Route alignment is adjacent to a different unnamed WPA parcel; however, the alignment is on the opposite side of 164th Street.

AMAs are designated to protect, develop, and manage aquatic systems that are critical for fish and other aquatic life. The MNDNR acquires and maintains the AMAs for angling and nonmotorized recreation. The closest AMA to the Purple Route alignment is the Blue Earth River AMA located approximately one-mile northwest of Winnebago and 2.5 miles east of the Purple Route alignment along the Blue Earth River. The Purple Route will not impact this AMA.

The Minnesota River, Watonwan River, and Blue Earth River State Water Trails are all in close proximity to the Purple Route. The Minnesota River State Water Trail spans 318 miles from Big Stone Lake in Ortonville to its confluence with the Mississippi River (MNDNR, 2017d). The Watonwan State Water Trail begins at

Madelia and ends 30 miles east at its confluence with the Blue Earth River at Garden City. The Blue Earth River State Water Trail starts north of Faribault and stretches 105 miles to its confluence with the Minnesota River near Mankato. All three of these State Water Trails have opportunities for camping, boating, canoeing, and kayaking.

The Purple Route crosses the Minnesota River in two locations: one after exiting the Wilmarth Substation and the other near Judson. Both crossings will be in existing easements. The Watonwan River State Water Trail will be crossed in a manner that minimizes impacts to the minimizes impacts to the riparian zone. The Purple Route will not cross the Blue Earth River State Water Trail, but is within 0.5-mile of the River in two locations.

The Purple Route will cross four snowmobile trails: the Minnesota River Valley Trail in Nicollet County 0.3-mile east of County Road 13, the Riverside Trail in Blue Earth County as the Purple Route crosses 132nd Street (County Highway 25), the Blue Earth River Trail in Blue Earth County as the route crosses 200th Street (County Highway 12) and parallel on the east side of County State Aid Highway 1, and the Prairieland Trail as the route crosses County Road 44 east of Winnebago. The Blue Earth River Trail is on both the north and south side of 200th Street. Note that immediately adjacent to the west of County State Aid Highway 1, in adjacent Martin County, is the Prairieland Trail on both sides of Martin County Highway 44. The Purple Route will not cross any bike trails.

There are city parks in the Purple Route vicinity associated with Mankato and North Mankato. The Kiwanis Recreational Area is located within Mankato along the Minnesota River approximately 0.3-mile west of the Wilmarth Substation. Benson Park, located in North Mankato, is located approximately 0.8-mile south of the Purple Route alignment.

The North Links Golf Course is located approximately 0.8-mile south of the Purple Route alignment in Nicollet County, west of North Mankato. Riverside County Club is located approximately 0.1-mile south of the Purple Route and between the Blue Earth River and U.S. Highway 169 in Faribault County.

6.5.8.2 Green Route

Recreational opportunities at public lands along the Green Route include Minneopa State Park, WMAs, WPAs, AMAs, State Water Trails, county parks, and golf courses. Each of these public lands offers many recreation opportunities that attract residents and tourists.

The Green Route is sited to avoid crossing Minneopa State Park, instead routing around the east side of the Park and crossing the Minnesota River along an existing transmission right-of-way.

The Green Route would be adjacent to the Rice Lake WMA, which is approximately 2.5 miles east of Winnebago. The alignment may cross a portion of this WMA due to a residence on the opposite side of 375th Avenue. There are no other WMAs within one mile of the Green Route.

The Green Route does not cross and is not adjacent to any WPAs. There are three WPAs within one mile of the Green Route: the Shelby WPA in southern Blue Earth County and the Prescott and an unnamed WPA in Faribault County.

There are no AMAs within one mile of the Green Route.

The Minnesota River and Blue Earth River State Water Trails are both crossed by the Green Route twice. The Minnesota River State Water Trail is crossed by the Green Route after exiting the Wilmarth Substation and crossing into Nicollet County, and again west of North Mankato, within Minneopa State Park. The Green Route crosses the Blue Earth River State Water Trail 0.5-mile south of County Highway 90 in Blue Earth County and again before entering the Huntley Substation in Faribault County.

The Green Route crosses two snowmobile trails: the Minnesota River Valley Tail in Nicollet County 0.3-mile east of County Highway 13 and two crossings of the Blue Earth River Trail in Blue Earth County, on either side of County Highway 30. The Green Route also runs adjacent to this snowmobile trail for 0.3-mile on the south side of County Highway 30 between 542nd Avenue and 546th Avenue.

The Green Route will cross three bike trails in Blue Earth County near Mankato: the Minneopa Trail, South Route Trail, and the Red Jacket Trail. The Minneopa Trail is a 2.5-mile trail that links Sibley Park and Land of Memories Park with Minneopa State Park, primarily along U.S. Highway 169. The South Route Trail is an 8.0-mile trail that runs from Minneopa State Park and connects to the Red Jacket Trail. The Red Jacket Trail is a 13.0-mile bike trail on an abandoned railroad grade between Mankato and Rapidan Township.

One county park, Schimek Park, is located 0.8 mile southeast of the Green Route in Blue Earth County, just north of the Town of Good Thunder along the Maple River. There are city parks in the Green Route vicinity associated with Mankato and North Mankato. The Kiwanis Recreational Area is located within Mankato along the Minnesota River approximately 0.3-mile west of the Wilmarth Substation. Benson

Park, located in North Mankato, is located approximately 0.8-mile south of the Green Route alignment.

Golf courses in vicinity to Green Route include the North Links Golf Course and the Minneopa Golf Club. The Green Route would be approximately 0.3-mile east of the North Links Golf Course in Nicollet County and 0.3-mile west of the Minneopa Golf Club in Mankato. Additionally, the Riverside County Club is located 0.1-mile south of the Green Route immediately west of U.S. Highway 169 in Faribault County.

6.5.8.3 Red Route

Recreational opportunities at public lands along the Red Route include Minneopa State Park, MNDNR WMAs, WPAs, AMAs, State Water Trails, city and county parks, and golf courses. Each of these public lands offers many recreation opportunities that attract residents and tourists.

The Red Route in Nicollet County is the same as the Green Route. Therefore, the Red Route is sited to avoid crossing Minneopa State Park. The Red Route would cross the Smith WMA in Blue Earth County. The crossing would be through the narrowest portion of the WMA and would double-circuit with the existing 161 kV Huntley/South Bend Line. The Applicants would improve the existing route by removing the pole north of the WMA and combining the existing route with the Red Route, routing it along the roadside (405th Avenue). The Maple River WMA and the George & Elizabeth Lange WMA, both in Blue Earth County, and the Rice Lake WMA and the Charlotte Hynes WMA, both located in Faribault County, are all located within one mile of the Red Route.

The Red Route crosses the Roberts WPA in Blue Earth County. The Roberts WPA crossing will be double-circuit with an existing transmission line. The Red Route is also adjacent to the Prescott WPA and the Lura Lake WPA in Faribault County.

There are no AMAs within one mile of the Red Route.

The Minnesota River and Blue Earth River State Water Trails are both crossed by the Red Route twice. The Minnesota River State Water Trail is crossed by the Red Route after exiting the Wilmarth Substation and crossing into Nicollet County, and again west of North Mankato, within Minneopa State Park. The Red Route crosses the Blue Earth River State Water Trail 0.5-mile south of County Highway 90 in Blue Earth County and again before entering the Huntley Substation in Faribault County.

The Red Route crosses two snowmobile trails: the Minnesota River Valley Tail in Nicollet County 0.3-mile east of County Highway 13 and two crossings of the Blue

Earth River Trail in Blue Earth County, on either side of County Highway 30. In Faribault County, the Red Route parallels the Faribault County/Sno Rovers/Stateliners Trail for approximately 3 miles south of 190th Street and 0.5-mile west of 405th Avenue.

Similar to the Green Route, the Red Route will also cross three bike trails in Blue Earth County near Mankato: the Minneopa Trail, South Route Trail, and the Red Jacket Trail.

One county park, Schimek Park, is located 0.2 mile west of the Red Route in Blue Earth County, just north of the Town of Good Thunder. There are city parks in the Red Route vicinity associated with Mankato and North Mankato. The Kiwanis Recreational Area is located within Mankato along the Minnesota River approximately 0.3-mile west of the Wilmarth Substation. Benson Park, located in North Mankato, is located approximately 0.8-mile south of the Red Route alignment.

Golf courses in vicinity to Red Route include the North Links Golf Course in and the Minneopa Golf Club. The Red Route would be approximately 0.3-mile east of the North Links Golf Course in Nicollet County and 0.3-mile west of the Minneopa Golf Club in Mankato. Additionally, the Riverside County Club is located 0.1-mile south of the Red Route immediately west of U.S. Highway 169 in Faribault County.

6.5.8.4 Blue Route

Recreational opportunities along the Blue Route at public lands include Minneopa State Park, WMAs, WPAs, AMAs, State Water Trails, State Trails, city or county parks, and golf courses. Each of these public lands offers many recreation opportunities that attract residents and tourists.

Unlike the Purple, Green, and Red routes, the Blue Route avoids crossing Minneopa State Park and the Minnesota River.

The Blue Route would be adjacent to the Pick WMA, which is approximately 5 miles southeast of Mapleton. The Blue Route would turn from south to west at the northwest corner of this property; a corner structure would not be on the WMA. The Latourelle WMA, Thompson Slough, and Hobza WMA are within one mile of the Blue Route.

The Blue Route is adjacent to the Minnesota Lake, Maple River, and Prescott WPAs in Faribault County. A corner structure would be placed adjacent to the Minnesota Lake WPA; the Blue Route is on the opposite side of the road from the Maple River and Prescott WPAs. There are no AMAs within one mile of the Blue Route.

The Blue Route crosses the Blue Earth State Water Trail immediately before entering the Huntley Substation. Additionally, the Blue Route crosses the Sakatah Singing Hills State Trail east of Mankato on the north side of North Victory Drive. This trail is 39 miles long on a converted rail-trail generally running from Mankato to Faribault. The Blue Route would cross this trail paralleling an existing railway.

The Blue Route crosses several snowmobile trails. In the northern portion of the Route, it crosses the Sakatah Singing Hills State Trail, which can be utilized for snowmobiling during the winter and a bike trail seasonally. Further south near Mapleton, the Blue Route crosses the Blue Earth River Trail three times: on either side of County Highway 30, County Highway 22, and County Highway 46 on the border with Faribault County. In Faribault County, the Blue Route crosses the Faribault County/Sno Rovers/Stateline Trail approximately 0.3-mile west of 460th Avenue and one mile north of 190th Street and parallels this Trail for 1.5 miles west of 450th Avenue.

There are city parks in the Blue Route vicinity associated with Mankato. The Kiwanis Recreational Area is located within Mankato along the Minnesota River approximately 0.3-mile west of the Wilmarth Substation.

There is one golf course near the Blue Route, which is the Riverside County Club, located 0.1-mile south of the Blue Route immediately west of U.S. Highway 169 in Faribault County.

6.5.8.5 Impacts and Mitigation – All Routes

The Applicants have incorporated MNDNR input into the design of the Purple Route, particularly at the crossings of the State Water Trails. The crossings included in this Application reflect MNDNR comments on minimizing tree clearing, crossing locations, and wetland impacts at these State Water Trails (refer to Section 7.3).

The Red Route crossing of the Smith WMA would create an opportunity for improving infrastructure alignments. In coordination with the MNDNR, the Applicants would improve the existing 161 kV Huntley – South Bend Line by removing the pole north of the WMA and combining the existing route with the Red Route, to instead route it along the roadside (405th Avenue).

Construction of the Project is not anticipated to permanently impact available recreational opportunities. Impacts to recreation would mostly be related to Project construction, which will be temporary and isolated to specific areas throughout the Route. The Applicants will continue to coordinate with the MNDNR and USFWS on the potential crossings at Minneopa State Park, WMAs, and WPAs. Construction may result in some recreation areas being temporarily off limits for safety reasons. Some activities, such as hunting on WMAs and WPAs, may be also limited depending on the time of year. To the extent practicable, the Applicants will plan the construction timeline for winter, to avoid the higher volume recreation seasons at these public lands.

6.5.9 Public Services

6.5.9.1 Police, Fire, and Ambulance Services

Public services in the Project Study Area are provided by local law enforcement and emergency response agencies of nearby communities. The sheriff's offices and municipal police departments in nearby towns provide law enforcement in the area. Nicollet, Blue Earth, Faribault, and Martin counties all have well equipped sheriff departments that provide services to their respective counties. Additionally, the cities of Mankato, North Mankato, Lake Crystal, Garden City, Amboy, Minnesota Lake, and Winnebago all have local police departments. Fire services within the area are provided by city and community fire departments. Mankato, North Mankato, Lake Crystal, Mapleton, Amboy, and Winnebago all have fire departments that service the surrounding cities and townships. Ambulance districts provide emergency medical response services to the Project. The Lake Crystal Area Ambulance Service provides response services to Lake Crystal, Garden City, and Vernon Center. The Winnebago Area Ambulance Service provides response services to the towns of Amboy, Delavan, Winnebago, and other surrounding townships. Emergency medical response is also available from local hospitals, such as the Mayo Clinic Health System and the Mankato Clinic, both located in the City of Mankato.

6.5.9.2 Hospitals

Large hospitals in the Project Study Area include the Mankato Clinic and Mayo Clinic Health System in Mankato and United Hospital District in the cities of Blue Earth and Winnebago. Smaller medical centers in the area include Medelia Community Hospital and Clinic located approximately five miles west of the Purple Route in adjacent Watonwan County, and various dental offices, eye clinics, and chiropractors.

6.5.9.3 Water and Wastewater Services

In the rural areas within the Project Study Area, residents often utilize privately-owned septic systems and wells. Blue Earth, Nicollet, Martin, and Faribault counties all provide septic system services to rural areas that don't have access to water treatment facilities. In the more urban areas, municipal water and sewer services provide water and wastewater services. Mankato, North Mankato, Lake Crystal, Good Thunder, Mapleton, St. Clair, Pemberton, and Winnebago have municipal water and sewer services. The majority of residences in the Project Study Area have private septic systems.

6.5.9.4 School Districts

There are several school districts in the Project Study Area including Mankato Area Public School District (Independent School District [ISD] 077), Lake Crystal-Wellcome Memorial School District (ISD 2071), St. Clair (ISD 075), Janesville-Waldorf-Pemberton (ISD 2835), Maple River School District (ISD 2135), United South Central (ISD 2134), Granada-Huntley-East Chain School District (ISD 2536), and Blue Earth Area School District (ISD 2860).

6.5.9.5 Utilities

Electric utilities in the Project Study Area are provided by BENCO Electric Cooperative (BENCO), Xcel Energy, Steele-Waseca Cooperative Electric, Federated Rural Electric Association, and South Central Electric Association. Natural gas for the Project Study Area is provided by CenterPoint Energy.

In addition to CenterPoint Energy facilities, several bulk transportation pipelines have been identified from the National Pipeline Mapping System:

- The Purple Route crosses two Northern Natural Gas pipelines (6- and 16-inch-diameter pipelines) and one 8-inch-diameter Mid-America Natural Gas pipeline in Blue Earth County. This Route also crosses a 6-inch-diamater Northern Natural Gas pipeline three times: once in Martin County, and twice in Faribault County.
- The Green Route also crosses two Northern Natural Gas pipelines (6- and 16-inch-diameter pipelines), one Magellan ammonia pipeline, and one Enterprise pipeline in Blue Earth County.
- The Red Route also crosses a 16-inch-diameter Northern Natural Gas pipeline and an 8-inch-diameter Enterprise pipeline in Blue Earth County. In Faribault County, the Red Route crosses one 6-inch-diameter Magellan ammonia pipeline.
- The Blue Route crosses several pipelines in Blue Earth County including those operated by Northern Natural Gas, Magellan, Enterprise, and Southern.

6.5.9.6 Other Public Services

There are many other public services that are provided in the Project Study Area, primarily within municipalities. Public works and utility departments design, construct, and maintain sanitary sewers, streets and sidewalks, parks, public landscaping, and water mains. Many public facilities exist within incorporated areas in the Project Study Area, including swimming pools, ice rinks, parks, and libraries.

6.5.9.7 Impacts and Mitigation – All Routes

Although unlikely, damage to existing pipelines could occur during grading activities. The Applicants will utilize the Gopher State One-Call system to locate and mark all existing underground utilities prior to construction to avoid impacts on pipelines. If crossing an underground utility is required, the Applicants will use BMPs to protect existing infrastructure while using heavy equipment during construction (e.g., construction matting).

The Applicants will work with the appropriate authorities (including emergency services) and utility providers to determine where facilities exist and how to best ensure the proper safety precautions are being met. The Applicants may meet with residents and utility providers to prevent direct or indirect impacts to their services. Overall, public service and facilities are not anticipated to be impacted by the construction and operation of the Purple, Green, Red, or Blue routes.

6.5.10 Radio, Television, Cellular Phone, and GPS

6.5.10.1 Radio

There are numerous Amplitude Modulation (AM) and Frequency Modulation (FM) radio broadcasting stations such as KYSM-FM (103.5 FM), KDOG (96.7 FM), KATO (93.1 FM), KNGA (90.5 FM), KMSU (89.7 FM), KTLK (1130 AM), and KTOE (1420 AM). These stations operate or can be heard within the Project Study Area.

6.5.10.2 Television

There are more than 60 channels broadcast in the Project Study Area, these channels would be received from cities including Mankato, St. Peter, Janesville, New Ulm, Waseca, Lewisville, Madelia, and Blue Earth, Minnesota.

6.5.10.3 Cellular Phone

There are eight cellular phone towers located within the Project Study Area. Several cellular phone service providers operate in the vicinity of the Purple Route, including Metro PCS and Cricket Wireless. Larger carriers such as Verizon Wireless, Sprint, T-Mobile, and AT&T, offer service in the area and have stores located nearby in Mankato and Albert Lea.

6.5.10.4 GPS

Global Positioning System (GPS) applications are important components of daily life, used in aviation, vehicle navigation, surveying, and agricultural activities. GPS equipment relies on satellites and typically mobile receiver equipment to provide locational information for navigation between endpoints, as well as geographic orientation for farm and other equipment. GPS equipment is likely used throughout the Project Study Area.

6.5.10.5 Impacts and Mitigation - All Routes

No impacts on radio, television, cellular phones, or GPS units are expected from construction or operation of any of the four route options. Corona, as well as spark discharge, from transmission line conductors can generate electromagnetic "noise" at the same frequencies that some AM radio signals are transmitted. This noise can cause interference with the reception of these signals depending on the frequency and strength of the radio and television signal. Interference from a spark discharge source can be found and corrected. AM radio frequency interference typically occurs immediately under a transmission line and dissipates rapidly within the right-of-way to either side. If radio interference from transmission line corona does occur, satisfactory reception from AM radio stations previously providing good reception can be restored by appropriate modification of (or addition to) the receiving antenna system.

6.5.11 Transportation

6.5.11.1 Purple Route

Roadways

U.S. Highway 169, U.S. Highway 14, State Highway 68, State Highway 60, and State Highway 30 are the main roadways crossed by the Purple Route. U.S. Highway 169 extends north to south across Nicollet, Blue Earth, and Faribault counties, and passes through the cities of St. Peter, Mankato, and Blue Earth and Town of Winnebago.

U.S. Highway 14 extends east to west across Nicollet County and passes through the City of Mankato and Town of Nicollet. State Highway 68 begins west of the City of Mankato in Blue Earth County and extends west toward Judson Township. State Highway 60 extends east to west across Blue Earth and Nicollet counties and passes through the City of Mankato and Town of Lake Crystal. State Highway 30 extends east to west across Blue Earth County and passes through the Town of Amboy. Multiple paved county roads are crossed by or exist within the Project Study Area for the Purple Route, along with numerous other paved and unpaved roads.

Traffic volumes are relatively low on most roads crossed by the Purple Route, given the rural nature of the area (refer to Table 6.5.11-1). Annual Average Daily Traffic (AADT) rates are highest near Mankato and Blue Earth and lower in outlying areas. While still relatively low for a U.S. highway, U.S. Highway 169 sustains the largest volume of traffic in the Project Study Area, with an AADT rate of 14,700 vehicles, followed by Highway 14, Highway 60, and Highway 68.

Table 6.5.11-1
Annual Average Daily Traffic on Roads Crossed by or Co-located with the Purple Route

Road	AADT	Traffic Count Year	Co-located Distance (feet)
County Road (CR) 105	65	2009	1,488
CR 109	660	2009	1,355
CR 111	70	2009	1,356
CR 122	70	2009	1,055
CR 123	65	2009	150
CR 124	40	2009	1,000
CR 128	85	2009	6,659
CR 135	35	2009	1,911
CR 138	50	2009	1,000
CR 146	110	2009	1,000
CR 77	80	2011	1,040
County State Aid Highway (CSAH) 13	820	2011	1,000
CSAH 5	95	2011	1,000
U.S. Highway (Hwy.) 14	9,300	2011	1,452
CSAH 10	105	2013	1,000
CSAH 11	450	2013	1,374
CSAH 13	415	2013	1,000
CSAH 20	840	2013	1,349
CSAH 32	170	2013	1,167
CSAH 40	95	2013	382
CSAH 42	640	2013	1,339
CSAH 6	425	2013	1,476
Hwy.60	8,900	2013	1,041
Hwy.68	1,750	2013	1,188
CR 148	75	2014	388
CSAH 38	520	2014	496
CSAH 44	390	2014	391
CSAH 52	475	2014	1,000
CSAH 63	115	2014	3,865
CSAH 1	570	2015	17,083
CSAH 10	670	2015	504
CSAH 12	500	2015	610
CSAH 41	310	2015	1,317
CSAH 6	115	2015	1,346
Hwy.169	14,700	2015	1,043
State Highway 30	560	2015	1,000

Source: MNDOT, 2016

Future highway projects near the Purple Route include the Highway 14 Mankato Bypass resurfacing project across North Mankato scheduled for 2018 and the U.S.

Highway 169 improvement project between St. Peter and Le Sueur scheduled for 2018-2019 (MNDOT, 2017).

Railroads

There are three active rail lines crossed by the Purple Route: one Union Pacific (UP) rail line and two separate Dakota, Minnesota and Eastern (DME) rail lines. The Purple Route crosses the UP rail line west of the Town of Lake Crystal, one DME rail line east of Judson Township, and the other DME rail line west of the Town of Huntley.

Airports and Airstrips

There are no operating public-use airports within three miles of the Purple Route. There are two active private use airstrips near the route. The Zarn airstrip is a privately-owned grass runway located near Amboy which runs parallel to and is located about 0.8-mile west of the Purple Route. Burk airstrip is a privately-owned grass runway located near Amboy which also runs parallel to and is located about 1.4 miles west of the route. Two historical runways which are no longer in operation, the Budde and Brinkman airstrips, were privately owned grass runways located near Mankato about 0.5-mile south and 3.8 miles north of the Purple Route, respectively.

Aerial crop dusting can be an important part of agricultural activities within the Project Study Area and various fields crossed by the route may be subject to these activities. The Purple Route is co-located with multiple existing electric transmission lines for which crop dusting operations have already accommodated.

The only private heliport within five miles of the Purple Route is the Immanuel-St Joseph's Hospital Heliport in Mankato, which is located 2.8 miles southeast of the route. The Madelia Helipad and the Blue Earth United Hospital District Heliport are both located more than six miles away from the Purple Route.

6.5.11.2 Green Route

Roadways

U.S. Highway 169, U.S. Highway 14, State Highway 68, State Highway 60, and State Highway 30 are the main roadways crossed by the Green Route. These roadways and their locations are described under the Purple Route. Multiple paved county roads are crossed by or exist within the Green Route, along with numerous other paved and unpaved roads.

Traffic volumes are relatively low on most roads crossed by the Green Route and AADT rates are similar to those described in Table 6.5.11-1.

Future highway projects near the Green Route are the same as those described under the Purple Route.

Railroads

The Green Route would cross a UP rail line and a DME rail line west of Mankato, and another DME rail line east of Winnebago.

Airports and Airstrips

There are no operating public use airports or private airstrips within three miles of the Green Route. Two historical runways no longer in operation, the Budde and Brinkman airstrips, were privately owned grass runways located near Mankato about 1.2 miles west and 3.8 miles north of the Green Route, respectively.

The only private heliport within five miles of the Green Route is the Immanuel-St Joseph's Hospital Heliport in Mankato, which is located 2.8 miles southeast of the route. The Blue Earth United Hospital District Heliport is located more than six miles south of the Green Route.

Effects on aerial crop dusting and wind turbine operations would be similar to those described under the Purple Route.

6.5.11.3 Red Route

Roadways

U.S. Highway 169, U.S. Highway 14, State Highway 68, State Highway 60, and State Highway 30 are the main roadways crossed by the Red Route. These roadways and their locations are described in Section 6.5.11.1. Multiple paved county roads are crossed by or exist within the Red Route, along with numerous other paved and unpaved roads.

Traffic volumes are relatively low on most roads crossed by the Red Route and AADT rates are similar to those described in Table 6.5.11-1.

Future highway projects near the Red Route are the same as those described under the Purple Route.

Railroads

The Red Route would cross a UP rail line and a DME rail line west of Mankato, and another DME rail line west of Delavan.

Airports and Airstrips

There are no operating public airports or private air strips within three miles of the Red Route. Two historical runways no longer in operation, the Budde and Brinkman airstrips, were privately owned grass runways located near Mankato about 1.2 miles west and 3.8 miles north of the Red Route, respectively.

The Blue Earth Municipal Airport is more than eight miles south of the Red Route.

The only private heliport within five miles of the Red Route is the Immanuel-St Joseph's Hospital Heliport in Mankato, which is located 2.8 miles southeast of the route. The Blue Earth United Hospital District Heliport is located more than six miles south of the Red Route.

Effects on aerial crop dusting and wind turbine operations would be similar to those described under the Purple Route.

6.5.11.4Blue Route

Roadways

U.S. Highway 169, U.S. Highway 14, State Highway 83, and State Highway 30 are the main roadways crossed by the Blue Route. These roadways and their locations are described under the Purple Route, except for State Highway 83, which extends north to south across Blue Earth county starting in Mankato and passes through the towns of St. Clair and Pemberton. Multiple paved county roads are crossed by or exist within the Blue Route, along with numerous other paved and unpaved roads.

Traffic volumes are relatively low on most roads crossed by the Blue Route and AADT rates are similar to those described in Table 6.5.11-1.

Future highway projects near the Green Route are the same as those described under the Purple Route.

Railroads

The Blue Route would cross a UP rail spur, UP rail line, and a DME rail line (twice) north and east of Mankato, and another DME rail line west of Easton.

Airports and Airstrips

The Mankato Regional Airport is a public-use airport with asphalt/concrete runways located outside of Mankato about 1.3 miles east of the route. The Blue Route was designed and routed with the same facilities and setbacks defined in FAR Part 77, Minnesota Rules Chapter 8800, and Federal Aviation Administration (FAA) Order 6820.10 (see Section 6.5.11.1). Applicants prepared an airspace analysis for the Blue Route where it is near the Mankato Airport (Appendix K).

The City of Mankato has developed the Mankato Regional Airport Zoning Ordinance that limits the height of structures built near the airport. The Blue Route crosses through Zone C, within which no structure can exceed an elevation of the airport's Horizontal Zone (or 1,171 feet amsl). The height of any structures located within Zone C will be designed to meet this criterion.

For any future permitting, the Applicants would electronically file Form 7460-1 Notice of Construction/Alteration to the FAA for each structure and follow the same process described under the Purple Route.

An unnamed airstrip that is a privately-owned grass runway is located about 0.6 mile to the east and situated perpendicularly to the route near St. Clair. The Eagles Nest Aerodrome is a privately-owned grass runway and seaplane base located south of Eagle Lake about 2.0 miles east of the route. B&D Flyers International is a privately-owned grass runway located south of Minnesota Lake about 2.8 miles east of the route. A historical runway no longer in operation, the Mankato Farmstrip, is a privately-owned grass runway located southeast of Mankato about 0.4 mile west of the route.

The only private heliport within five miles of the Blue Route is the Immanuel-St Joseph's Hospital Heliport in Mankato, which is located 2.8 miles southeast of the route. The Blue Earth United Hospital District Heliport is located more than six miles south of the Blue Route.

Effects on aerial crop dusting and wind turbine operations would be similar to those described under the Purple Route.

6.5.11.5 Impacts and Mitigation – All Routes

Roadways

Construction activities are not expected to permanently impact transportation. Construction could create a minor increase in traffic from construction vehicles and material/equipment delivery along these and other roadways within the Project Study Area; however, this increase would be temporary and return to normal conditions once construction activities are completed. Line and construction maintenance at crossing locations could also cause temporary delays if maintenance vehicles are present. To minimize overall impacts, the Applicant will limit vehicle traffic to the Project right-of-way and existing access points to the greatest extent feasible.

Temporary road or lane closures may occur during the construction process to ensure safety of the construction crews and the traveling public. While the line is constructed, the electrical conductors would be strung on support structures using a pulley system or a tensioner mounted on the back of a digger/derrick truck. At road crossings, roads or lands may be temporarily closed for safety purposes when stringing electrical conductors between support structures. These closures could range in duration from minutes to hours based on the width of the road and the complexity of the crossing. Temporary closings are not expected to have significant impacts on transportation in the area because of the generally rural nature of the area and subsequent low traffic levels on most roads. Once an aerial crossing is completed, the road would be reopened to allow normal traffic flow.

The Green and Red Routes parallel U.S. Highway 169 on the south side of the eastbound lane for approximately 1.2 miles after crossing the Minnesota River. Any occupation of state highway right-of-way requires a Utility Permit from MNDOT, per Minnesota Rule 8810.3100-3600. MNDOT has issued an Accommodation Policy that provides requirements and guidelines for utilities seeking to install facilities in and along MNDOT rights-of-way, which the Project was developed to meet. The Applicants will continue to work with MNDOT throughout the Route Permit process to ensure that the application alignment meets MNDOT guidelines.

As noted in Section 5.3, after the completion of construction, the Applicants will ensure that township, city, and county roads used for purposes of access during construction are returned to either the condition they were in, or better, before right-of-way clearing began. The Applicants will meet with township road supervisors, city road personnel, or county highway departments to address any issues that arise during construction with roadways to ensure the roads are adequately restored, if necessary, after construction is complete.

Railroads

The Applicants will obtain all necessary railroad crossing permits from UP and DME for their respective rail lines. The Applicants will also coordinate with the appropriate railroad personnel during construction to coordinate electrical conductor stringing over the rail line for the safety of construction personnel and rail line operations.

Airports and Airstrips

The Applicants will continue to coordinate with the FAA, MNDOT, the City of Mankato, and privately-owned airstrip operators to address any Project-related concerns for aviation activities as the Project progresses and more detailed design information becomes available, including specific structure locations and heights above ground (refer to Appendix K).

Applicants have discussed potential routes with owners of private airstrips and have adjusted routes to avoid impacts to any known airstrips. Crop dusting operations servicing fields crossed by existing transmission lines will have already been developed to accommodate the presence of a transmission line. Where the Project is not co-located with existing transmission lines, the Applicants will mail notice of the Route Permit Application filing to aerial applicators registered with the Minnesota Agricultural Aircraft Association in the Project Study Area. The Applicants will also inform the owners of affected private airstrips when construction will occur.

Construction and operation of the Project is not expected to impact heliports operating from hospitals in Mankato, Madelia, and Blue Earth. The Applicants will coordinate with the FAA for appropriate notifications associated with Project construction as necessary.

6.5.12 Electric and Magnetic Fields

Electric and magnetic fields are discussed above in Section 5.5. No impacts to human health are anticipated as a result of electric or magnetic fields from the Project. The Project will be designed to keep electric fields below the 8 kV/m standard set by the Commission (refer to Section 5.5).

6.6 LAND BASED ECONOMIES

6.6.1 Agriculture

As described in Section 6.2, the predominant land cover type in Blue Earth, Nicollet, Martin, and Faribault counties is agricultural. Roughly 90 percent of the soil in the Project Study Area is identified as prime farmland. In 2012, the average farm size in the four counties is similar, averaging 350 acres, and generally slightly larger than the average size of 352 acres for all Minnesota farms (Table 6.6.1-1). Crop sales account for a larger percentage of total market value of agricultural products compared to the livestock sales in Blue Earth ($262 million/$244 million, annually), Faribault ($323 million/$91 million, annually), and Martin ($330 million/$289 million, annually) counties. In Nicollet County, however, livestock sales ($208 million, annually) account for a slightly larger percentage of total market value of agricultural products compared to crop sales ($178 million, annually).

Hog barns and pork production are common in all four counties in proximity to the four route options. The hog and pig inventory in Blue Earth, Nicollet, Martin, and Faribault counties accounted for 25 percent of the total hog and pig inventory in Minnesota in 2012. Additionally, Blue Earth and Martin counties are in the top ten counties for hog and pig sales in the United States (USDA, 2012). Agricultural statistics for the counties that the four route options pass through are summarized in Table 6.6.1-1.

Table 6.6.1-1
Agricultural Statistics of Counties Crossed by the Route Options

Route	County	Number of Farms	Average Farm Size	Land in Farms	Crop Sales	Livestock Sales
All Routes	Blue Earth	1,070	352 acres	376,460 acres (76.8 % of county)	$262 million (51.7 %)	$244 million (48.3 %)
Purple, Green, and Red Routes	Nicollet	764	359 acres	274,217 acres (91.7 % of county)	$178 million (46.1 %)	$208 million (53.9 %)
Purple Route	Martin	897	478 acres	428,672 acres (91.8 % of county)	$330 million (53.3 %)	$289 million (46.7 %)
All Routes	Faribault	824	473 acres	390,139 acres (84.4 % of county)	$323 million (77.9 %)	$91 million (22.1 %)
State of Minnesota		**74,542**	**349 acres**	**26 million acres (46.7 % of state)**	**$14 billion (65.2 %)**	**$7 billion (34.8 %)**

Source: USDA, 2012

Specialty crops typically include nurseries, vineyards, orchards, citrus groves, dairies, aquaculture, and tree farms. The Applicants will continue to work with individual landowners through the easement process to identify any specialty crops that may be impacted by the route options. If any specialty crops are identified, the Applicants will work with landowners to determine measures to avoid and minimize impacts to these resources.

As shown in Table 6.3-1 in Section 6.3, each of the four application routes crosses soils that are classified as "Prime Farmland" and "Farmland of Statewide Importance". Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pasture, woodland, or other lands). Urbanized land and open water cannot be designated as prime farmland. Prime farmland typically contains few or no rocks, is permeable to water and air, is not excessively erodible or saturated with water for long periods, and is not subject to frequent or prolonged flooding during the growing season. Soils that do not meet the above criteria may be considered prime farmland if the limiting factor is mitigated (e.g., by draining or irrigating).

Prime farmlands are subject to protection under the Farmland Protection Policy Act (FPPA). As discussed in Section 6.3, there are 831.1 acres of prime farmland (all categories) within the Purple Route right-of-way; 734.2 acres of prime farmland within the Green Route right-of-way; 752.7 acres of prime farmland within the Red Route right-of-way; and 982.3 acres of prime farmland within the Blue Route right-of-way.

The NRCS also recognizes farmlands of statewide importance, which are defined as lands other than prime farmland that are used for production of specific high-value food and fiber crops (e.g., citrus, tree nuts, olives, fruits, and vegetables). Farmland of statewide importance is similar to prime farmland but with minor shortcomings such as greater slopes or less ability to store soil moisture. The methods for defining and listing farmland of statewide importance are determined by the appropriate state agencies, typically in association with local soil conservation districts or other local agencies.

Some of the agricultural areas along the Purple Route are enrolled in the Conservation Reserve Enhancement Program (CREP). The CREP is an offshoot of the Conservation Reserve Program (CRP) which is a land conservation program established by the U.S. Department of Agriculture (USDA) and administered by the Farm Service Agency (FSA) that pays farmers a yearly rental fee for agreeing to take environmentally sensitive land out of agricultural production in an effort to improve environmental health and quality (USDA, 2017a). Minnesota implemented the CREP to target state-identified, high-priority conservation issues by offering payments to farmers and agricultural landowners to retire environmentally sensitive land using the Reinvest in Minnesota (RIM) Reserve Program (MN BWSR, 2017). Enrollment in the CRP and CREP is voluntary.

Five CREP parcels are located along the Purple Route. Of these, three CREP parcels are within the 150-foot right-of-way of the Purple Route and one of these CREP parcels is also part of the RIM program. There are eight CREP parcels along the Green Route; of these, seven are within the 150-foot right-of-way. Two of the CREP parcels within the 150-foot right-of-way are also part of the RIM program.

Five CREP parcels are located along the Red Route; all of the CREP parcels are within the 150-foot right-of-way and two of these are also part of the RIM program.

Nineteen CREP parcels are located along the Blue Route. Of these, 15 are within the 150-foot right-of-way and six of these parcels are also part of the RIM program.

6.6.1.1 Impacts to Farmland

Temporary construction impacts on agricultural land could include soil compaction and rutting, accelerated soil erosion, crop disturbance, disruption to normal farming activities, and introduction of noxious weeds to soil surface. Construction would occur throughout the year, with many structures being constructed outside of farming season. During the winter, impacts are not anticipated to affect agricultural activities as crop fields are unplanted and the ground is frozen. Applicants will implement measures to reduce compaction, soil erosion, and sedimentation and will compensate producers for crop damage. Post-construction restoration efforts will include restoration of any temporary access modifications and deep plowing to remove compaction. Both crop and livestock activities will be able to continue around Project facilities after construction.

While routes were developed with attention to minimizing farmland impacts, permanent impacts to farmland will occur where structures are placed in cultivated fields. Structures in fields act as barriers and can hinder efficient operation of large machinery. Both crop and livestock activities will be able to continue around Project facilities after construction, but at an increased difficulty to the farmer. Structures will be placed approximately 1,000 feet apart to minimize the number of structures on farmland.

Applicants used preliminary design information and counted the approximate number of structures that would affect farm operations. These structure counts are presented in Table 6.6.1-2 below.

Structure configuration can influence the degree of permanent impacts. Where a route follows a road, structures are placed approximately 10 feet into the field from the road right of way and were therefore counted as impacting farmland. Where routes follow property lines, a monopole would be constructed on the property line and therefore were not counted as an impact. On property lines, h-frame structures were counted as an impact because at least one of the two legs would be placed approximately 10 to 20 feet from edge of field.

Table 6.6.1-2
Summary of Impacts of the Route Options on Farmland

Resource		Purple Route	Green Route	Red Route	Blue Route
Farmland Area Comparison					
Route Length (miles)		51.6	45.4	46.5	57.0
Right-of-Way (acres)		938	824	845	1,037
Cropland in 150-Foot Right-of-Way (acres)		609.9	518.8	508.7	752.1
Additional structures in cultivated fields	h-frame configuration [a]	215	195	-5 [c]	240
	monopole configuration [b]	75 if double-circuit 175 if parallel	120	-25 [c]	125

[a] H-frame design counts are higher because H-frame structures are counted if along property lines; monopoles were assumed to be located on the property line and not counted as being in a cultivated field.

[b] Monopole design would be placed in the property line and was not counted as an impact to agriculture.

[c] Red Route results in a net decrease of structures in agricultural fields because the proposed 345 kV line has fewer structures per mile than the existing 161 kV line it would replace.

Table 6.6.1-2 shows that all routes have a high percentage of farmland in proposed right-of-way. The number of new structures that would be placed in fields varies from 240 for the H-frame configuration on the Blue Route to a net decrease of 25 structures for the monopole configuration on the Red Route. This decrease is primarily the result of the longer spans of the new double-circuit line compared to the shorter spans of the existing 161 kV Huntley to South Bend line.

Applicants are working with the MNDOA to develop an Agriculture Impact Mitigation Plan. This plan will outline best practices to minimize and mitigate for agriculture impacts including measures to protect farmland.

6.6.2 Forestry

The Purple, Green, Red, and Blue routes are dominated by agricultural lands and minimal forestland. There are forested riparian areas at larger streams and rivers such as the Minnesota, Watonwan, and Blue Earth rivers. Additionally, there are wood lots surrounding rural farmsteads, but no commercial forestry operations have been identified along the four route options.

Because there are no known commercial forestry operations in the vicinity of the Purple, Green, Red, or Blue Routes, there are no anticipated impacts to commercial forestry operations with the construction and operation of the routes.

6.6.3 Tourism

Tourism in the vicinity of the Purple, Green, Red, and Blue routes centers around outdoor recreational opportunities described in Section 6.5.8 and various festivals and activities hosted by the larger cities near the route options, namely Mankato and Blue Earth. Outside these municipalities, residents and tourists enjoy recreational opportunities at the WMAs, WPAs, Minneopa State Park, city parks, Minnesota River and Blue Earth River State Water Trails, Sakatah Singing Hills State Trail, snow mobile trails, and golf courses. Table 6.6.3-1 provides a comparison of tourism and recreational opportunities along each route option.

Table 6.6.3-1
Summary of Impacts of the Route Options on Tourism

Resource	Purple Route	Green Route	Red Route	Blue Route
Tourism Comparison				
State Water Trails Crossed by Right-of-Way	3	4	4	1
Snowmobile Trails Crossed by Right-of-Way	4	2	4	4
State Parks Crossed by Right-of-Way	1	0	0	0
WMAs Crossed by Right-of-Way	0	1	2	1
WPAs Crossed by Right-of-Way	1	0	2	2
AMAs Crossed by Right-of-Way	0	0	0	0
County Parks Crossed by Right-of-Way	0	0	0	0
Golf Courses Crossed by Right-of-Way	0	0	0	0

Construction of the Project is not anticipated to affect available tourism and recreational opportunities. Impacts to tourism would mostly be related to Project construction, which will be temporary and isolated to specific areas throughout the Route. The Applicants will coordinate with the USFWS and MNDNR on utility crossings of these recreation lands. Construction may result in some recreation areas temporarily being off limits for safety reasons. Some activities, such as hunting on WMAs and WPAs, may be also limited. To the extent practicable, the Applicants will plan the construction timeline for winter, to avoid the higher volume recreation seasons at these public lands.

6.6.4 Mining

Mining does not comprise a major industry in the Project counties. Sand and gravel operations are found throughout the Project counties. Sand and gravel are primarily mined for local use such as making concrete for highways, roads, bridges, and buildings. These mining operations are owned either by citizens, private companies, or MNDOT.

Based on MNDOT County Pit Maps and Aggregate Sources data, there are no active gravel pits within any of the routes. There are, however nearby or inactive mining resources as follows:

- There are three inactive gravel pits in Section 25 of Township 105N, Range 29W in southern Blue Earth County within the same section as the Purple Route (MNDOT, 2003 and MNDOT, 2015).
- There is an active commercial aggregate pit 0.8 mile east of the Green Route in Section 34 of South Bend Township of Blue Earth County.
- There is one active gravel pit within one mile of the Green and Red routes in Section 29 of South Bend Township, and there is another within one mile of the Red Route in Section 16 of Sterling Township (MNDOT, 2003 and MNDOT, 2015).
- Six rock quarries and three active gravel pits are located in the northeastern portion of Blue Earth County, adjacent to the Minnesota River and north of the Blue Route (MNDOT, 2003 and MNDOT, 2015). One of these rock quarries is within the route corridor, but appears to be inactive based on a review of recent aerial photography.

6.7 ARCHAEOLOGICAL AND HISTORIC RESOURCES

Background research on known cultural resources was conducted in June 2017 at the Minnesota State Historic Preservation Office (SHPO) in St. Paul. This initial investigation was based on the Project Study Area, within which alternative routes would be developed.

Data regarding known cultural resources information resulting from previous professional cultural resources surveys and reported archaeological sites and architecture inventory resources was collected and reviewed. "state site" or "state archaeological site" reviewed during analysis consisted of lands or water areas where artifacts or other archaeological materials are recorded. The archaeological assemblage includes Native American mounds and earthworks, prehistoric burial grounds and habitation sites, historical remains, and other archaeological features.

In August and September 2017, the data were further analyzed based on specific routes retained for the analysis and additional research was conducted in public online records. Routes generally 1,000 feet wide were established to allow for route adjustments in the design. This information was used to identify types of archaeological sites that may be encountered and landforms or geographic features that have a higher potential for containing significant cultural resources.

The four route options are located within the Prairie Lakes Archaeological Region (Region 2), which covers most of southwestern and south-central Minnesota. It includes Big Stone, Blue Earth, Brown, Carver, Chippewa, Cottonwood, Faribault, Freeborn, Jackson, Lac Qui Parle, Le Sueur, Lyon, McLeod, Martin, Nicollet, Redwood, Renville, Scott, Sibley, Stevens, Swift, Watonwan, and Yellow Medicine counties and portions of Douglas, Grant, Kandiyohi, Lincoln, Meeker, Nobles, Otter Tail, Pipestone, Pope, Rice, Steele, Traverse, and Waseca counties. The region extends into northeastern South Dakota and north central Iowa (Anfinson, 1997).

Regionally, archaeological sites are generally located in proximity to established water resources. Early prehistoric sites may be deeply buried in the colluvium and alluvium along major river valleys. Middle to late Prehistoric sites can be found on the islands and peninsulas of moderate to large-sized lakes, as well as in the wooded areas of galley forests along the major rivers. Late Prehistoric sites include large agricultural village sites located on terraces of the major river systems. Small campsites and special activity sites from all periods are scattered throughout the region. It is important to note that some deeply buried Late Prehistoric period sites may also be present in the Minnesota River valley.

Historic village sites associated with the Dakota are concentrated along the Minnesota River. Posts were concentrated for the most part along the upper Minnesota River between 1750-1800. By the early 1800s they were established by American traders at wooded locations in the interior.

6.7.1 Previously Recorded Archaeological and Architectural Resources

6.7.1.1 Purple Route

Two previously documented archaeological sites were identified within the Purple Route (refer to Table 6.7.1-1). Neither of the previously recorded archaeological resources has been evaluated for listing in the National Register of Historic Places

(NRHP). No previously documented architectural resources were identified within the Purple Route.

Table 6.7.1-1
Archaeological Resources within the Purple Route

Site Number/Site Name/Site Type	Site Significance
21 FA 0046 / unnamed site / Prehistoric Artifact Scatter	Unevaluated
21 BE be / Pleasant Mound / Historic Documented Ghost Town	Unevaluated

6.7.1.2 Green Route

One previously documented archaeological site and one previously documented architectural resource were identified within the Green Route (refer to Table 6.7.1-2). The previously recorded archaeological resource has not been evaluated for listing in the NRHP. The previously recorded architectural resource is the "Adams H. Bullis House". This historic resource is a single residential structure constructed ca. 1875. The building is representative of the Italianate Style. The building was nominated to the National Register in 1979 and listed in 1980. It is considered significant in its representation of a distinct architectural style and its connection to a person of regional historic significance.

Table 6.7.1-2
Archaeological and Architectural Resources within the Green Route

Site Number/Site Name/Site Type	Site Significance
21 FA 0109 / Riverside Country Club Site / Prehistoric Lithic Scatter	Unevaluated
FA-DVT-011 / Adam H. Bullis House / Historic Residence	Listed on the National Register of Historic Places

6.7.1.3 Red Route

Three previously documented archaeological sites were identified within the Red Route (refer to Table 6.7.1-3). None of the previously recorded archaeological resources has been evaluated for listing in the NRHP. No previously documented architectural resources were identified within the Red Route.

Table 6.7.1-3
Archaeological and Architectural Resources within the Red Route

Site Number/Site Name/Site Type	Site Significance
21 FA 0058 / unnamed site / Prehistoric Lithic Scatter	Unevaluated
21 FA 0109 / Riverside Country Club Site / Prehistoric Lithic Scatter	Unevaluated
21 FA f / Bass Lake / Historic Documented Ghost Town	Unevaluated

6.7.1.4 Blue Route

Three previously documented archaeological sites and one previously documented architectural resource were identified within the Blue Route (refer to Table 6.7.1-4). None of the previously recorded resources has been evaluated for listing in the NRHP.

Table 6.7.1-4
Archaeological and Architectural Resources within the Blue Route

Site Number/Site Name/Site Type	Site Significance
21 BE 0302 / unnamed site / Prehistoric Single Artifact Find Location	Unevaluated
21 FA 0109 / Riverside Country Club Site / Prehistoric Lithic Scatter	Unevaluated
21 FA ad / unnamed site / Prehistoric Single Artifact Find Location	Unevaluated
BE-LIM-003 / unnamed site / Historic Farmstead	Unevaluated

6.7.2 Impacts and Mitigation – All Routes

Information regarding the location of previously documented cultural resource sites was taken into consideration during initial route design. The Applicants made efforts to design the routes to avoid any physical impacts to all previously documented cultural resources either by route alteration or by structure placement.

Selection of the Green Route near the Adam H. Bullis House followed a comparable protocol. Efforts were made to place the route in areas where the proposed transmission line would be shielded from view by vegetation surrounding the residential site. Where vegetation cover is lacking, the route selected follows previously established infrastructure routes in order to minimize impacts. Following final route selection, the Applicants will initiate consultation with SHPO to determine if additional mitigation efforts would be required.

It is understood that the area surrounding the four route options also has potential to contain additional, previously undocumented cultural resources. Archaeological resources would most likely be located on or near elevated landforms and areas near permanent water sources. For this Project, the Applicants will conduct a Phase I Cultural Resource Reconnaissance survey and work cooperatively with SHPO in concert with the field investigations proposed for the Project.

The Phase I Cultural Resource Reconnaissance survey will focus on areas proposed for Project construction, including transmission structure locations, associated construction access roads, and workspace areas. These investigations will be conducted by a professional archaeologist meeting the Secretary of the Interior's

Standards for Archaeology as published in Title 36 Code of Federal Regulations Part 6. Survey strategies (pedestrian and/or shovel probing and/or deep testing) for the archaeological resource inventory will depend on surface exposure and the characteristics of the landforms proposed for development. After receiving the proposed final Project route and layout, archaeologists will design an appropriate survey strategy for archaeological resources. This proposed survey strategy will be shared with SHPO to gather their input on the methodology prior to completing the study. The Applicants plan to conduct a Phase I Cultural Resource Reconnaissance survey, when ground surface visibility is optimum for visual survey.

If cultural resources are identified as a result of the Phase I survey, avoidance is the primary mitigation measure to avoid impacts to archaeological and historic architectural resources during construction of the Project. Avoidance of resources may include minor adjustments to the Project design and designation of environmentally sensitive areas to be left undisturbed or spanned by the Project. If archaeological resources are discovered during construction, construction activity would be halted in that location, the SHPO would be notified, and appropriate measures would be implemented to protect the resource. Additionally, if unanticipated human remains are discovered during construction, they will be reported to the State Archaeologist per Minnesota Statutes Section 307.08 and construction will cease in that area until adequate mitigation measures have been developed between the Applicants and the State Archaeologist.

6.8 NATURAL ENVIRONMENT

6.8.1 Air Quality

Section 109(b) of the Clean Air Act (CAA) requires that the U.S. Environmental Protection Agency (EPA) establish National Ambient Air Quality Standards (NAAQS) "requisite to protect" public health and welfare (40 CFR Part 50). The CAA identifies two classes of NAAQS: primary standards, which are limits set to protect the public health of the most sensitive populations, such as asthmatics, children and the elderly; and secondary standards which are limits set to protect public welfare, such as protection against visibility impairment or damage to vegetation, wildlife and structures. The EPA has promulgated NAAQS for six criteria pollutants: ozone (O_3), particulate matter ($PM_{10}/PM_{2.5}$), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), and lead (Pb). Minnesota has been in compliance with the primary and secondary NAAQS for all criteria pollutants since 2002 (MPCA, 2017).

6.8.1.1 Impacts and Mitigation – All Routes

Construction of the Project will result in intermittent and temporary emissions of criteria pollutants. These emissions generally include dust generated from soil disturbing activities, such as earthmoving and wind erosion associated with right-of-way clearing and construction, combustion emissions from construction machinery engines, and indirect emissions attributable to construction workers commuting to and from work sites during construction. These emissions would be dependent upon weather conditions, the amount of equipment at any specific location, and the period of operation required for construction at that location. Air pollutants from the construction equipment will be limited to the immediate vicinity of the construction area and will be temporary. Therefore, it is not anticipated that construction activities will independently cause or significantly contribute to an emission level that results a violation of NAAQS.

The amount of dust generated would be a function of construction activity, soil type, soil moisture content, wind speed, precipitation, vehicle traffic, vehicle types, and road surface characteristics. Emissions would be greater during dry periods and in areas where fine-textured soils are subject to surface activity. If construction activities generate problematic dust levels, the Applicants may employ construction-related practices to control fugitive dust such as application of water or other commercially-available dust control agents on unpaved areas subject to frequent vehicle traffic, reducing the speed of vehicular traffic on unpaved roads, and covering open-bodied haul trucks.

During operation of the line, air emissions would be minimal. A small amount of ozone is created due to corona from the operation of transmission lines (EPRI, 1982). A corona signifies a loss of electricity, so the Applicants have engineered the transmission lines so as to limit the corona. The production rate of ozone due to corona discharges decreases with humidity and less significantly with temperature. Rain causes an increase in ozone production, but also accelerates the decay of ozone. Ozone production by high voltage transmission lines is not detectable during fair weather above ambient conditions. Ozone production under wet-weather conditions is detectable with special efforts, but is still considered insignificant.

Design of the transmission line also influences ozone production rate. The production rate decreases significantly as the conductor diameter increases and is greatly reduced for bundled conductors over single conductors. The production rate of ozone increases with applied voltage. The emission of ozone from the operation of a transmission line of the voltages proposed for the Project is not anticipated to have a significant impact on the environment.

6.8.2 Primary Water Resources

The four route options occur within the Minnesota River Watershed. Table 6.8.2-1 lists the watersheds crossed by each route option denoted by the 8-digit Hydrologic Unit Codes (HUC) as assigned by U.S. Geologic Survey (USGS). Major rivers in the Project Study Area include the Minnesota, Blue Earth, and Watonwan rivers (refer to Figure 6.8.2-1).

Table 6.8.2-1
Watersheds (HUC-8) Crossed by the Route Options

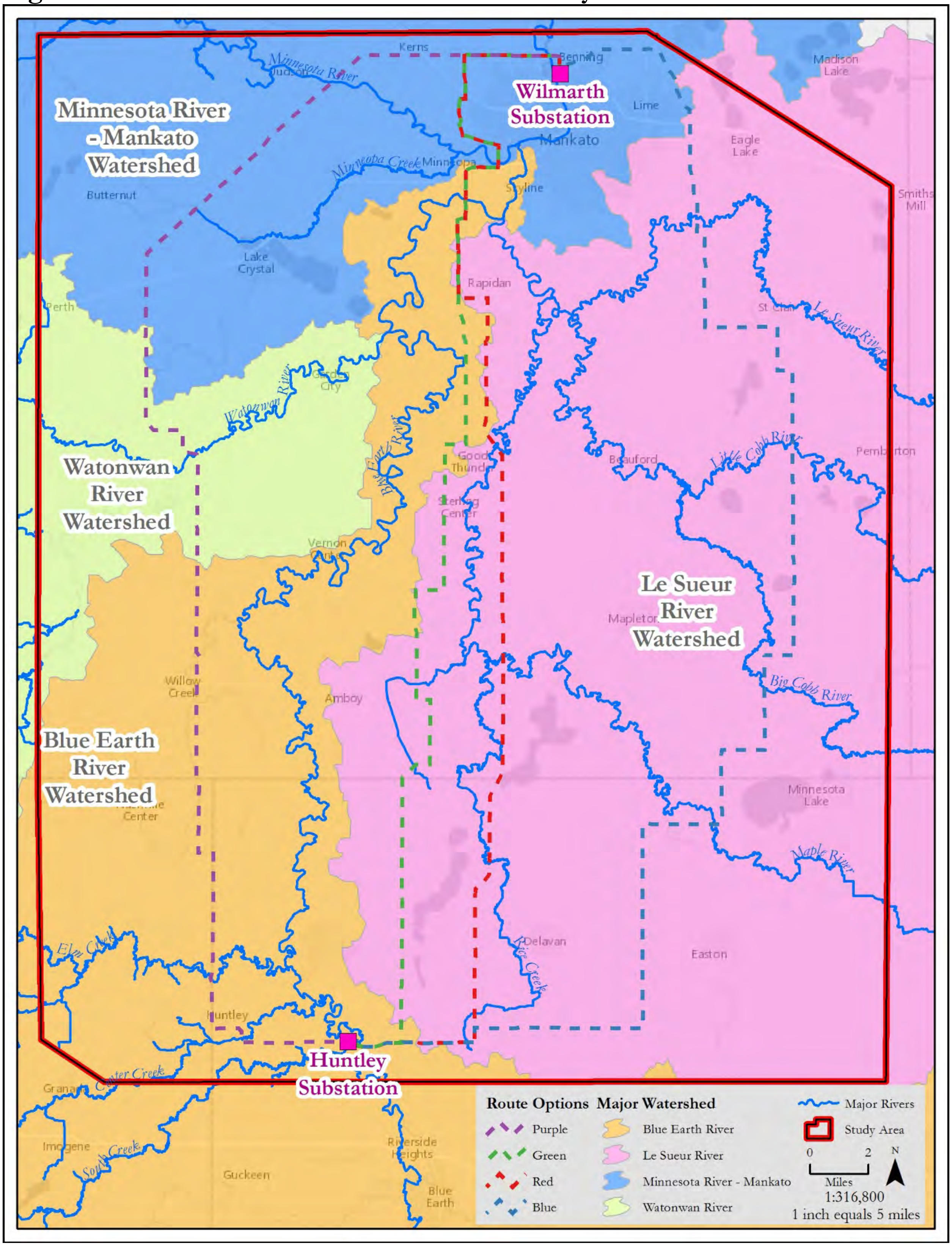
Watershed Name	8-digit HUC-8	Purple Route Crossing Length (miles)	Green Route Crossing Length (miles)	Red Route Crossing Length (miles)	Blue Route Crossing Length (miles)
Minnesota River – Mankato	07020007	20.4	9.0	9.0	6.1
Watonwan	07020010	9.3	N/A	N/A	N/A
Blue Earth	07020009	21.9	14.3	9.3	2.5
Le Sueur	07020011	N/A	22.0	28.1	48.4

The Project Study Area contains several sizable lakes, many being greater than 160 acres (an NRCS primary sample unit size). However, many of these are shallow perched lakes. Some of the named lakes in the Project Study Area include Rice Lake, Lake Crystal, Loon Lake, Mills Lake, Lily Lake, Lura Lake, and Minnesota Lake.

6.8.2.1 Impacts and Mitigation – All Routes

Impacts to primary water resources, where anticipated along the Purple, Green, Red, and Blue routes, and applicable mitigation, are discussed in the sections that follow.

Figure 6.8.2-1 HUC-8 Watersheds Crossed by the Routes



6.8.3 Floodplains

The application routes cross Federal Emergency Management Administration (FEMA) designated 100-Year and 500-Year floodplain areas. FEMA designated 100-Year floodplain areas are associated with major rivers along the application routes such as the Minnesota, Blue Earth, and Watonwan rivers while 500-Year floodplain areas are primarily located along terraces associated with the Minnesota River near Mankato and North Mankato. Table 6.8.3-1 provides the total acres of each application route's 150-foot right-of-way that would cross FEMA designated floodplains.

Table 6.8.3-1
FEMA Designated 100- and 500-Year Floodplain Areas Crossed by the Route Options

Floodplain Category	Purple Route Crossing (acres/percent)	Green Route Crossing (acres/percent)	Red Route Crossing (acres/percent)	Blue Route Crossing (acres/percent)
100-Year	32.2/3.0	31.3/4.0	41.9/5.0	23.3/2.0
500-Year	14.5/1.0	14.7/2.0	14.7/2.0	0.8/< 1.0

6.8.3.1 Impacts and Mitigation – All Routes

The Project may require transmission line structures be placed within FEMA-designated 100-year or 500-year floodplains. The placement of transmission line structures in floodplains are not anticipated to alter the flood storage capacity of the floodplain based on the minimal size of individual transmission line structures.

6.8.4 Lakes, Rivers, Streams, and Ditches

Section 404 of the Clean Water Act (CWA), prohibits any discharge of dredged or fill materials into jurisdictional waters of the U.S. without a permit from the USACE. Many of the rivers, streams, and lakes crossed by the Project are likely to be jurisdictional waters of the United States. Navigable waters are defined by 33 CFR Part 329 as those waters that are subject to the ebb and flow of the tide and/or are presently used, have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Navigable waters are designated by the USACE and regulated under Section 10 of the Rivers and Harbors Act of 1899. According to the USACE, the Minnesota River is considered navigable throughout the length of the river, and therefore subject to USACE jurisdiction.

The Applicants reviewed the USGS National Hydrography Dataset (NHD) waterbody data, MNDNR lake data, and MNDOT basemap lake delineations to assess the presence of lakes along the four route options. The USGS NHD and USGS 7.5-

minute quadrangle maps were reviewed to assess the presence of streams and rivers classified as perennial and intermittent.

In Minnesota, rivers, streams, and lakes may be designated as Public Waters (Minn. Stat. § 103G.005, subd. 15). These waters are listed in the Public Waters Inventory (PWI) and meet the criteria set forth in Minnesota Statute, Section 103G.005, Subdivision 15. A license from the MNDNR is required to cross PWI waters with an electric transmission line (Minn. Stat. § 84.415) and a permit from the MNDNR is required to alter the course, current, or cross-section of any PWI water pursuant to the Minnesota Public Waters Work Permit Program (Minn. Stat. § 103G.245, subd. 1(2). The MNDNR PWI was reviewed to identify Public Waters along all four route options.

Certain surface waters are designated as trout streams or lakes by the State of Minnesota, according to Minnesota Statutes Section 6264.0050. No designated trout streams or lakes are crossed by any of the four route options. Table 6.8.4-1 provides a summary of waterbodies crossed by each of the Application Routes.

Table 6.8.4-1
Waterbodies Crossed by the Application Routes

Waterbody Feature	Purple Route	Green Route	Red Route	Blue Route
Number of Stream and River Crossings by 150-foot Right-of-Way	24	18	22	45
Number of PWI Stream and River Crossings by 150-foot Right-of-Way	14	8	14	17
Number of PWI Basins within 150-foot Right-of-Way	0	1	2	0
Number of PWI Basins over 1,000 feet Crossed by 150-foot Right-of-Way	0	0	0	0
Number of Shallow Lakes within 150-foot Right-of-Way	0	1	1	1

6.8.4.1 Purple Route

The Purple Route has 24 waterbody crossings (refer to Appendix C). These crossings include 6 intermittent and 18 perennial streams. Of these streams, the following are PWI waters: Minnesota and Watonwan Rivers; Center, Elm, and Minneopa Creeks; and six unnamed streams. There are no PWI lakes crossed by the Purple Route alignment. Furthermore, there are no MNDNR-designated shallow lakes within one mile of the Purple Route. Two rivers and two creeks crossed by the Purple Route are listed as impaired on the 303(d) list (discussed further in Section 6.8.5).

6.8.4.2 Green Route

One PWI lake, Rice Lake, is crossed by the Green Route. Two shallow lakes, Rice Lake and an unnamed basin are within one mile of the Green Route. No shallow lakes would be crossed by the 150-foot right-of-way. The Green Route crosses 18 waterways including 3 intermittent and 15 perennial streams. Of these, the following are PWI waters: Blue Earth and Minnesota Rivers; Providence Creek; one unnamed stream; and Rice Lake. Two rivers crossed by the Green Route are listed as impaired on the 303(d) list (discussed further in Section 6.8.5).

6.8.4.3 Red Route

Three PWI lakes are crossed by the Red Route including Lura Lake and two unnamed basins. Two designated shallow lakes would be crossed by the Red Route. The Red Route crosses 22 waterways including 2 intermittent and 20 perennial streams. Of these, the following are PWI waters: Minnesota, Maple, and Blue Earth Rivers; Rice Creek; three unnamed streams; Lura Lake; and one unnamed basin. Three Rivers and one creek crossed by the Red Route are listed as impaired on the 303(d) list (discussed further in Section 6.8.5).

6.8.4.4 Blue Route

The Blue Route crosses 45 waterways including 17 intermittent and 28 perennial streams. Of these, the following are PWI waters: Blue Earth, Cobb, Le Sueur, Little Cobb, and Maple Rivers; and ten unnamed streams. Four rivers and one creek crossed by the Blue Route are listed as impaired on the 303(d) list (discussed further in Section 6.8.5).

6.8.4.5 Impacts and Mitigation – All Routes

The Project will have minor, mostly short-term, effects on surface water resources. The Applicants will design the Project to minimize or avoid impacts to surface water resources to the extent feasible. The Project will be designed to span surface water resources and floodplains where practicable and to minimize the number of structures in surface water resources where these resources cannot be spanned. The Applicants will work with the MNDNR to ensure all proper licenses and approvals are obtained for PWI crossings by the Project. Through the license approval process, the Applicants and the MNDNR will determine the appropriate mitigation measures for PWI crossings. Other mitigation measures for the crossing of streams, rivers, and ditches are discussed in Section 6.8.5.

An NPDES permit from the MPCA will be obtained by the Applicants for construction of the Project. The Applicants will also develop a SWPPP that complies with MPCA rules and guidelines. All waterways crossed would be maintained for proper drainage through the use of temporary culverts or other temporary crossing devices, according to BMPs and permit requirements. If tree removal is required along waterways, trees would be cut so that the root system is not disturbed to retain bank stability. Sediment barriers, if deemed necessary, would be used along waterways and slopes during construction to protect from soil erosion and sedimentation. Additionally, if new access roads for vehicles and equipment are required, access roads would be selected to avoid disturbance to stream banks. No permanent impacts to surface water resources are anticipated.

6.8.5 Water Quality

Under Section 303(d) of the CWA, states are required to assess all waters of the state to determine if they meet water quality standards, list waters that do not meet standards and update the list biannually, and conduct total maximum daily load studies (TMDL) to set pollutant-reduction goals needed to restore waters to the extent that they meet water quality standards for designated uses. The list, known as the 303(d) list, is based on violations of water quality standards. The majority of impairments to surface waters in the Project Study Area are caused by agricultural sources (fecal coliform, dissolved oxygen, turbidity, excess nutrients/eutrophication). The MPCA has jurisdiction over determining 303(d) waters in the State of Minnesota.

Table 6.8.5-1 summarizes waterbodies crossed by the four route options that are listed by the MPCA Inventory of Impaired Waters, and their impairments. The Minnesota Statewide Mercury TMDL addresses mercury in waterbodies throughout Minnesota, including the Minnesota River (MPCA, 2007). The TMDL attributes 99 percent of mercury load to Minnesota's lakes and streams to atmospheric deposition and attributes none to the operation of electric transmission lines.

Table 6.8.5-1
Impaired Waterbodies Crossed by the Route Options

Waterbody Name	Impairment	Route Option			
		Purple (No. of Crossings)	Green (No. of Crossings)	Red (No. of Crossings)	Blue (No. of Crossings)
Minnesota River	mercury, PCB's, turbidity	2	2	2	--
Blue Earth River	fecal coliform, mercury, turbidity, fish bioassessment	--	3	3	2
Watonwan River	fecal coliform, mercury, turbidity	1	--	--	--
Cobb River	fish bioassessment, turbidity	--	--	--	1
Le Sueur River	E. coli, turbidity	--	--	--	1
Little Cobb River	fecal coliform, mercury, turbidity, fish bioassessment, dissolved oxygen	--	--	--	1
Elm Creek	fecal coliform, turbidity, fish bioassessment	1	--	--	--
Maple River	Turbidity, Fecal Coliform		--	2	--
Center Creek	fecal coliform, turbidity, fish bioassessment, ammonia	1	--	--	--
Rice Creek	Fish Bioassessments, turbidity	--	--	4	1

Under the CWA, states have the primary responsibility for establishing, reviewing, and revising water quality standards, which consist of the designated uses of a waterbody, the numerical values or narrative water quality criteria necessary to protect those designated uses, and an antidegradation policy per 40 CFR §§ 131.10 - 131.12 and 131.4.

The MPCA is the agency charged with classifying waterbodies in Minnesota. Consistent with the requirements of the CWA, the MPCA has established water quality standards, including the identification of beneficial uses of the state's waters, numeric standards and narrative criteria, and non-degradation protections for high-quality or unique waters. Minnesota advances the CWA's presumption that a waterbody should attain healthy aquatic life and recreation uses and groups the waters of the state into one or more of the following seven designated use classifications per Minnesota Rules 7050.0140:

Section 401 of the CWA grants state agencies the authority to require projects that discharge to jurisdictional waters, to obtain a Water Quality Certification and comply with state and federal water quality regulations. The MPCA is granted the authority to implement Section 401 regulations.

Willow and Elm creeks are classified in Minnesota Statute 7050.0470 as a Class 2C waterbody (i.e., their beneficial uses are aquatic life and recreation). As unnamed tributaries and ephemeral drainages, the other waterbodies crossed by the Project are defined by default in Minnesota Statute 7050.0430 as Class 2B (aquatic warm water community), 3C (industrial consumption), 4A (irrigation), 4B (livestock and wildlife), 5 (aesthetic enjoyment and navigation), and 6 (other uses) waters.

Minnesota designates some surface waters as outstanding resource value waters (ORVWs) because of their exceptional qualities. As specified in Minnesota Rules, wild, scenic, and recreational river segments comprise a part of the definition of ORVWs. The Minnesota River was added to Minnesota's Wild & Scenic Rivers Program in 1977; however, the designated stretch does not extend into the Project Study Area.

6.8.5.1 Impacts and Mitigation – All Routes

Construction of the proposed transmission line could potentially impact water quality. Rivers, streams, and ditches, crossed by the Purple, Green, Red, and Blue routes are narrow enough to be spanned with normal spacing of the structures so that all structures can be placed outside of these features. Short-term, minor, Project-related water quality impacts may occur during the construction of the proposed Project even though mitigation measures will be implemented to prevent sedimentation. These impacts would be associated with the soils from areas disturbed during construction being washed by stormwater into adjacent waters during rainstorm events. Increased turbidity and localized sedimentation of the stream bottom may occur from the runoff. If any of these events occur, however, these impacts would be temporary and would not significantly alter water quality conditions due to the minimal soil disturbance that is expected to occur in any one location during construction of the Project. The construction and maintenance of the transmission line is not expected to disturb any subsurface waters.

Mitigation measures would be implemented to prevent or minimize surface water impacts. The MPCA, through the NPDES under the Clean Water Act, regulates construction activities that may impact stormwater runoff. An NPDES permit is required for construction activity disturbing: 1) one acre or more of soil; 2) less than one acre of soil, but part of a "larger common plan of development or sale" that is greater than one acre; or 3) less than one acre of soil, but that the MPCA determines poses a risk to water resources.

As discussed above, the Applicants will apply for an NPDES permit from the MPCA and will develop a SWPPP that will identify BMPs to be implemented during construction to minimize erosion and sedimentation impacts to surface waters. Erosion and sedimentation abatement measures, for example, would be employed to decrease impacts to the hydrology of the Project Study Area. No fueling or maintenance of vehicles or application of herbicides would occur within 100 feet of streams, ditches, and waterways to protect against introduction of these materials into surface or groundwater systems. Materials such as fuels, lubricants, paints, and solvents required for construction would be stored away from surface water resources according to appropriate regulatory standards. Any spills or leaks would be cleaned up immediately and leaking equipment removed from the area for proper maintenance.

6.8.6 Groundwater Resources

Minnesota is divided into six groundwater provinces based on bedrock and glacial geology. The aquifers within these provinces occur in two general geologic settings: bedrock, and unconsolidated sediments deposited by glaciers, streams, and lakes. The four route options would cross the South-Central Province, which is characterized by thick clayey glacial drift with a limited extent of sand aquifers overlying Paleozoic sandstone, limestone, and dolostone aquifers. In this province, groundwater within the sedimentary bedrock aquifers is commonly used as a water source. (MNDNR, 2001).

The Applicants reviewed the four route options for EPA designated sole source aquifers (SSA), wells listed on the Minnesota County Well Index (CWI), and Minnesota Department of Health (MDH) wellhead protection areas.

The EPA defines a SSA or principal source aquifer area as one that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer, where contamination of the aquifer could create a significant hazard to public health, and where there are no alternative water sources that could reasonably be expected to replace the water supplied by the aquifer (EPA, 2016). There are currently no EPA-designated SSAs crossed by any of the four route options (EPA, 2017).

The CWI is the most complete record of well construction and location in Minnesota and is kept up-to-date and maintained by the Minnesota Geological Survey (MGS), in cooperation with the MDH. A search of the CWI (MDH, 2017a) identified the following number of water supply wells located within 150 feet of each route options right-of-way:

- Purple Route – 2 wells
- Green Route – 22 wells
- Red Route – 18 wells
- Blue Route – 4 wells

Under the Safe Drinking Water Act (SDWA), each state is required to develop and implement a Wellhead Protection Program to identify the land and recharge areas contributing to public supply wells and prevent the contamination of drinking water supplies. The SDWA was updated in 1986 with an amendment requiring the development of a broader-based Source Water Assessment Program, which includes the assessment of potential contamination to both groundwater and surface water through a watershed approach. A Wellhead Protection Area (WHPA) encompasses the area around a drinking water well where contaminants could enter and pollute the well.

Public and non-public community water supply source-water protection in Minnesota is administered by the MDH through the Wellhead Protection program. WHPAs for public and community water-supply wells are delineated based on a zone of capture for 10-year groundwater time-of-travel to the well and are available through a database maintained by MDH (2017b). A search for WHPAs in the MDH database indicated that the Purple Route crosses one WHPA, the Huntley Well Corporation WHPA, approximately 0.5-mile southwest of the Town of Huntley. This WHPA is ranked as low for vulnerability to contamination. The Green, Red, and Blue routes do not cross any WHPAs.

6.8.6.1 Impacts and Mitigation – All Routes

Wells in the area range from 105 feet to 450 feet deep. Structure foundations will generally range from 25 feet to 60 feet in depth. All foundation materials would be non-hazardous materials. The Applicants do not anticipate any impacts to groundwater resources during construction or operation of the Project as groundwater resources along the Purple, Green, Red, and Blue routes are at depths greater than proposed foundation depths. If shallow depths to groundwater resources are identified during geotechnical investigations, specialty structures requiring wider, but shallower, excavation for foundations may be used. The Applicants will continue to work with the landowners to identify springs and any additional wells near the Project.

6.8.7 Wetlands

The USFWS National Wetlands Inventory (NWI), as updated by the MNDNR, was reviewed to assess the presence of wetlands along the four application routes (refer to Appendix C). Wetland complexes and small isolated wetlands are scattered throughout the Project Study Area. Many of these wetlands are riverine and floodplain forest wetlands associated with the Minnesota, Blue Earth, and Watonwan rivers and their tributaries. Several glacial ice block lake depressions are present in the area and are characterized as lacustrine unconsolidated bottom wetlands. Palustrine type wetlands are present in depressions on moraines, till plains, lake plains, flood plains, and seeps in the Project Study Area and include emergent, forested, unconsolidated bottom, and scrub-shrub wetlands.

The MNDNR PWI was also reviewed to identify Public Water Wetlands and State-protected calcareous fens along the four application routes. No records of calcareous fens exist along any of the four route options. In addition, land ownership and management data were reviewed for lands managed as natural wetland areas under the control of the USFWS (refer to Section 6.5.8). Table 6.8.7-1 summarizes the wetland impacts associated with each of the application routes.

Table 6.8.7-1
Wetlands Crossed by the Application Routes

Wetland Feature	Purple Route	Green Route	Red Route	Blue Route
Right-of-Way Acres	938	824	845	1,037
Total Wetlands in the 150-foot Right-of-Way (acres)	59.1	45.0	60.9	56.9
Non-forested Wetlands in 150-foot Right-of-Way (acres)	52.9	38.1	48.0	43.0
Forested Wetlands in 150-foot Right-of-Way (acres)	6.2	6.9	12.9	13.9
Number of PWI Wetlands Crossed by 150-foot Right-of-Way	0	0	0	1
Number of Poles in Wetlands Based on Preliminary Design	17	14	18	15

6.8.7.1 Purple Route

Of the total 938 acres of right-of-way that will be needed for the Purple Route, approximately 59.1 acres of NWI-mapped wetlands occur within the Purple Route right-of-way, including 6.2 acres of forested wetlands (Appendix C). None of the wetlands crossed by the Purple Route 150-foot right-of-way are PWI wetlands. Seventeen structures are anticipated to be placed in wetlands along the Purple Route.

6.8.7.2 Green Route

Of the total 824 acres of right-of-way, 45.0 acres of NWI-mapped wetlands would occur within the Green Route's right-of-way, including 6.9 acres of forested wetlands (Appendix C). None of the wetlands crossed by the Green Route 150-foot right-of-way are PWI wetlands. Fourteen structures are anticipated to be placed in wetlands along the Green Route.

6.8.7.3 Red Route

Of the total 845 acres of right-of-way, 60.9 acres of NWI-mapped wetlands would occur within the right-of-way for the Red Route, including 12.9 acres of forested wetlands (Appendix C). None of the wetlands crossed by the Red Route 150-foot right-of-way are PWI wetlands. Eighteen structures are anticipated to be placed in wetlands along the Red Route.

6.8.7.4 Blue Route

Of the total 1,037 acres of right-of-way, only 56.9 acres of NWI-mapped wetlands would occur within the required right-of-way for the Blue Route, including 13.9 acres of forested wetlands (Appendix C). One of the wetlands crossed by the Blue Route 150-foot right-of-way is a PWI wetland. Fifteen structures are anticipated to be placed in wetlands along the Blue Route.

6.8.7.5 Impacts and Mitigation – All Routes

Wetlands located in the 150-foot-wide right-of-way would be spanned and placement of structures within wetlands would avoided to the extent practicable (refer to Section 3.2.2). Where it is not possible to span a wetland, the Applicants identified several mitigation strategies to minimize impacts to wetlands including:

- Scheduling construction during frozen conditions;
- Use of construction mats when construction during frozen conditions is not feasible;
- Use of all-terrain construction equipment that is designed to minimize soil impact in damp areas;
- Use of the shortest route to the pole location in the wetland; and
- Assembling structures in upland areas, when feasible, before they are brought to the site for installation.

Wetlands impacted by construction will be restored as required by the USACE. Vegetation maintenance requirements under transmission lines prohibit trees for establishing. Existing trees must be removed throughout the right-of-way that are determined by the Applicants to pose a hazard to transmission line operation, including those in forested wetlands. Any mitigation required would be determined through consultation with USACE. The Applicants will obtain all appropriate permits and approvals from the USACE, MNDNR, local government unit(s), and watershed districts (if necessary) for any actions determined to occur in wetlands.

6.8.8 Flora

The Project Study Area lies within both the Prairie Parkland Province and the Eastern Broadleaf Forest Province as defined by the ECS of Minnesota (MNDNR, 2017a). More specifically, much of the Project Study Area lies within the Minnesota River Prairie Subsection. Prior to European settlement, vegetation in this area was primarily associated with tallgrass prairie; dominant grasses on upland sites included big bluestem (*Andropogon gerardii*), prairie dropseed (*Sporobolus heterolepis*), and little bluestem (*Schizachyrium scoparium*). The area harbored islands of wet prairie as well, characterized by big bluestem and prairie cordgrass (*Spartina pectinata*), as well as a variety of sedge (*Carex*) species. Riparian and floodplain forests comprised of silver maple (*Acer saccharinum*), cottonwood (*Populus* spp.), elm (*Ulmus* spp.), and willow (*Salix* spp.) could be found along the Minnesota River and other streams. Vegetation in these areas is now dominated by agricultural and low intensity urban land use, as described in Section 6.2; tallgrass prairie remnants are rare and isolated (MNDNR, 2017c; USACE, 2010).

A smaller portion of the Project Study Area falls within the Big Woods Ecological Subsection. At the time of European settlement, oak (*Quercus* spp.) woodland and maple-basswood forests dominated, and elm, basswood (*Tilia* spp.), sugar maple (*Acer saccharum*), and aspen (*Populus* spp.) were common. Vegetation in this subsection is now dominated by cropland and pasture, and less than 15% remains as upland forest or wetland (MNDNR, 2017b).

Agricultural areas found within the Project Study Area include active row crop fields interspersed with wind breaks, woodlots, fence rows, and grassland swales associated with drainage ditches. Suitable habitat for a variety of at-risk plant and animal species may be present in these areas. The MNDNR RIM critical habitat match program provides funds and incentives to private landowners and groups to encourage the maintenance or enhancement of threatened or endangered populations of native plant, fish, and wildlife species and communities.

The Blue Route crosses a larger portion of the Big Woods Subsection than the other route options; however, as noted above, much of this region is now farmed and dominated by cropland and pasturelands. Remnant woods are primarily found in riparian areas along streams and rivers and in woody wetlands. Refer to section 6.2 for more information on CRP, CREP, and RIM easements crossed by the four route options. Section 6.9.2 discusses Sites of Biodiversity Significance (SOBS) and native plant communities (NPCs) as they relate to each route option.

6.8.8.1 Impacts and Mitigation – All Routes

The acreage of each land cover type crossed by the Purple, Green, Red, and Blue routes is provided in Section 6.2 (refer to Table 6.2-1). Impacts to flora along the four route options will primarily be associated with impacts to agricultural areas; see Section 6.6.1 for a discussion of impacts and mitigation measures that would be used in cropland and pasturelands.

Impacts to flora associated with WMAs, WPAs, AMAs, State Water Trails, county parks, state parks, golf courses, and other recreational areas crossed by the Purple, Green, Red, and Blue routes are discussed in Section 6.5.8.

Other impacts to flora may be related to wind breaks, woodlots, fence rows, grassland swales, and other areas that may provide suitable habitat for a wide range of wildlife, including protected species. Much of this disturbance would be temporary in nature, and would be related to construction activities. Disturbance to these areas would be minimized by limiting vehicle traffic to the extent practicable to roads and pathways along the right-of-way and within previously disturbed areas, restricting equipment to narrow paths within the right-of-way, spanning sensitive areas, installing the line as a double-circuit with an existing transmission line, and routing parallel or adjacent to existing rights-of-way. See Section 5.0 for a discussion of construction methods and operation and maintenance procedures, and Section 6.9.1 for a discussion of impacts to protected species.

6.8.9 Fauna

The wildlife species that inhabit the Project Study Area are typical of those found in agricultural, rural, exurban, and suburban areas. Wind breaks, woodlots, fence rows, and grassland swales associated with farmsteads provide habitat for a variety of wildlife species, as do areas of non-forested wetland, upland deciduous hardwood forest, oak savanna, and lowland deciduous forest. Species common to the Project Study Area are shown in Table 6.8.9-1. These species are well-adapted for the dominant agricultural and developed habitats in the Project Study Area.

Table 6.8.9-1
Wildlife Species Common to the Project Study Area

Common Name	Scientific Name
Mammals	
Red fox	*Vulpes vulpes*
Northern racoon	*Procyon lotor*
Striped skunk	*Mephitis mephitis*
Beaver	*Castor canadensis*
River otter	*Lontra canadensis*
White-tailed deer	*Odocoileus virginianus*
Gray squirrel	*Sciurus carolinensis*
Coyote	*Canis latrans*
Eastern cottontail	*Sylvilagus floridanus*
Birds	
Wild turkey	*Meleagris gallopavo*
Mallard	*Anas platyrhynchos*
Blue-winged teal	*Anas discors*
Wood duck	*Aix sponsa*
Ring-necked pheasant	*Phasianus colchicus*
American robin	*Turdus migratorius*
Common yellowthroat	*Geothlypis trichas*
Red-winged blackbird	*Agelaius phoeniceus*
Brown-headed cowbird	*Molothrus ater*
Fish	
Large-mouth bass	*Micropterus salmoides*
Northern pike	*Esox lucius*
Bluegill	*Lepomis macrochirus*
Reptiles and Amphibians	
American toad	*Anaxyrus americanus*
Western chorus frog	*Pseudacris maculata*
Painted frog	*Chrysemys picta*
Common garter snake	*Thamnophis sirtalis*

The National Audubon Society works to identify, monitor, and protect habitat for bird species throughout the United States, in part by designating sites as Important Bird Areas (IBAs). IBAs are designated when they meet certain criteria, including providing habitat for at least one of the following (NAS, 2013):

- Species of conservation concern (e.g., threatened and endangered species);
- Range-restricted species (species vulnerable because they are not widely distributed);

- Species that are vulnerable because their populations are concentrated in one general habitat type or biome; and/or
- Species, or groups of similar species (such as waterfowl or shorebirds), that are vulnerable because they occur at high densities due to their congregatory behavior.

Audubon works to identify and implement conservation strategies within IBAs to minimize the effects of habitat loss on birds and, by extension, other species (NAS, 2015).

The Project crosses the Upper Minnesota River Valley IBA which extends along the Minnesota River Valley from Le Sueur in the northeast to LacQui Parle Lake. The river valley provides valley, floodplain, riparian, marsh and swamp habitats for a wide variety of resident and migratory bird species (NAS, 2017).

The Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703-712) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests. Additionally, the Bald and Golden Eagle Protection Act (BGEPA; 16 USC 668-668d) specifically prohibits the taking or possession of and commerce in bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*), either alive or dead, or any part, nest, or egg of these eagles. Known bald eagle nest records are maintained in the MNDNR's Minnesota Natural Heritage Information System (NHIS). A review of this data identified known nests within one mile of the Purple route near the Minnesota River, and within one mile of the Red and Green routes near the Blue Earth River.

6.8.9.1 Impacts and Mitigation – All Routes

A constraints analysis was conducted during the routing process to determine potential impacts to sensitive natural resources, including wildlife habitat (refer to Section 3 and Appendix E). Where possible, the Applicants designed routes to avoid these resources. The acreage of each land cover type crossed by the Purple, Green, Red, and Blue routes is provided in Section 6.2 (refer to Table 6.2-1). Refer to Section 6.2.5 for a discussion of impacts of the routes on these land cover types. Impacts to fauna associated with WMAs, WPAs, AMAs, State Water Trails, county parks, state parks, and other protected areas along the four route options are discussed in Section 6.5.8.

The construction, operation, and maintenance of the application alignment would be designed to minimize potential adverse impacts to wildlife resources, especially threatened and endangered plant and animal species, although no impacts to listed species are anticipated. The primary impact would be loss of habitat.

During active construction, wildlife would likely be displaced from the Project Study Area to seek shelter away from construction activities and workers. These impacts are temporary; upon cessation of construction activities, wildlife use patterns in these areas would be restored.

The greatest risk to wildlife is associated with injury or death of bird species from collisions with the transmission line. These impacts often involve waterfowl or other large birds. The Applicants will coordinate with MNDNR and USFWS to identify any wildlife migration pathways, particularly avian flyways crossed by the four route options and to identify areas where the line should be marked to minimize avian interactions. To mitigate impacts on potential bird strikes and electrocutions, the Project will be constructed according to Avian Power Line Interaction Committee (APLIC) recommended safety standards to reduce the potential for avian collisions.

6.9 RARE AND UNIQUE NATURAL RESOURCES

6.9.1 Threatened and Endangered Species

The Applicants reviewed the USFWS Information for Planning and Conservation (IPaC) website for a list of federally listed threatened and endangered species, candidate species, and designated critical habitat that may be present within the Project Study Area on September 22, 2017 (USFWS, 2017a). The Applicants also reviewed the MNDNR's NHIS for known occurrences of federal and state-listed species that may be present within one mile of each route on September 13, 2017. These reviews do not represent a comprehensive survey, but acknowledge the potential for the presence of listed or candidate species or designated critical habitat along the four proposed route options (refer to Table 6.9.1-1).

Table 6.9.1-1
Federal and State-Listed Species Potentially Present Within One Mile of the Route Options

Common Name	Scientific Name	Habitat [a]	Route	Status [b]	
				State	Federal
Mammals					
Eastern spotted skunk	*Spilogale putorius*	Open lands with adequate cover, (e.g., fencerows, shelterbelts, thickets, brush, riparian woodlands).	Purple	THR	-
Northern long-eared bat	*Myotis septentrionalis*	Summer: forested habitats in proximity to water sources. Loose bark, broken tree limbs, cavities, and cracks in a tree can all be utilized by bats as roosting sites Winter: natural caves, sand mines, and deep iron mines.	All	SC	THR
Birds					
Loggerhead shrike	*Lanius ludovicianus*	Upland prairie habitats; native and non-native grassland; sometimes in agricultural areas.	Purple	END	
Mollusks					
Elktoe	*Alasmidonta marginata*	Sand or gravel substrates in small to large rivers with moderate to fast moving currents.	Green, Red	THR	-
Fluted-shell	*Lasmigona costata*		Green, Red	THR	-
Monkeyface[c]	*Quadrula metanevra*		All	THR	-
Mucket	*Actinonaias ligamentina*		All	THR	-
Pistolgrip	*Tritogonia verrucosa*		Green, Red	END	
Spike	*Elliptio dilatata*		Green, Red	THR	-
Salamander mussel	*Simpsonaias ambigua*	Found only under flat rocks or under ledges of rock walls	Green, Red	END	-
Rock pocketbook	*Arcidens confragosus*	Fine or coarse substrate in medium to large rivers with slow moving currents	All	END	-
Wartyback	*Quadrula nodulata*		Green, Red	THR	-
Yellow sandshell	*Lampsilis teres*		All	END	-
Invertebrates					
A caddisfly[d]	*Oecetis ditissa*	Genus *Oecetis* is typically found on the bottom substrates of lakes and slow-moving rivers.	Green, Red	THR	-

Table 6.9.1-1
Federal and State-Listed Species Potentially Present Within One Mile of the Route Options

Common Name	Scientific Name	Habitat [a]	Route	Status [b]	
				State	Federal
Fish					
Paddlefish	*Polyodon spathula*	Open waters of large rivers and river lakes, oxbow lakes, and backwaters.	All	THR	-
Reptiles and Amphibians					
Blanding's turtle	*Emydoidea blandingii*	Requires calm, shallow waters with rich, aquatic vegetation for foraging and adjacent sandy uplands for nesting.	Green, Red, Blue	THR	-
Plants					
Hair-like beak rush	*Rhynchospora capillacea*	Calcareous fens.	All	THR	-
Prairie bush clover	*Lespedeza leptostachya*	Mesic to dry-mesic prairie slopes.	Purple (Martin County only)	THR	THR
Rock fir moss	*Huperzia porophila*	Moist, well-shaded wooded habitats.	Green, Red	THR	-
Stream parsnip[e]	*Berula erecta*	Swamps, seeps, shallow water, and cool streams.	All	THR	-
Sullivant's milkweed	*Asclepias sullivantii*	Mesic tallgrass prairies.	Purple, Blue	THR	-
Three-leaved coneflower	*Rudbeckia triloba var. triloba*	Mesic floodplain forests and hardwood forests.	Green, Red		
Tuberous Indian-plantain	*Arnoglossum plantagineum*	Restricted to native, moist prairies in southern Minnesota.	Purple, Blue	THR	-

[a] MNDNR, 2017e
[b] END – Endangered, THR – Threatened, SC – Special Concern
[c] This species is believed extirpated from the Minnesota River (Bright et al., 1990).
[d] Houghton, 2012
[e] Minnesota Wildflowers, 2017

Refer to Table 6.9.1-1 for a list federally listed threatened and endangered species, candidate species, and designated critical habitat that may be present along the four route options (USFWS, 2017a). This table also identifies known occurrences of state-listed species that may be present within one mile of each route option as identified by a review of the NHIS database.

6.9.1.1 Federally listed species

Northern Long-eared Bat

The northern long-eared bat (*Myotis septentrionalis*) is a medium-sized bat of the Vespertilionidae family. Approximately 3.0 to 3.7 inches in length with a wingspan of 9 to 10 inches, the species is characterized by relatively long ears with a long, pointed tragus when compared to other members of the genus *Myotis* (USFWS, 2015a). In summer, the species roosts in both live trees and snags, and can be found roosting alone or in colonies under loose bark or in crevices and hollows. A habitat generalist, roost tree selection appears to be opportunistic; the species uses a variety of tree sizes and species, typically greater or equal to three inches diameter at breast height (USFWS, 2015a; USFWS, 2016). The species is generally associated with forested habitats, including mesic hardwood, floodplain, and fire-dependent forests, particularly those near water sources (MNDNR, 2017f). However, males and non-reproductive females may also roost in cooler places such as caves and mines. The species overwinters in small crevices or cracks in hibernacula (e.g., caves and mines with constant temperatures, high humidity, and no air currents). Migration to summer habitat occurs between mid-March and mid-May (USFWS, 2016).

The primary threat to the northern long-eared bat is white-nose syndrome (WNS) (USFWS, 2015a). Other sources of mortality such as collisions with wind turbines, loss of summer habitat, and changes which alter the microhabitat of hibernacula have not been observed to produce significant population declines; however, as WNS impacts more populations, impacts from these activities may become more pronounced (USFWS, 2015a).

This species may be found throughout the Project Study Area.

Prairie Bush Clover

Prairie bush clover (*Lespedeza leptostachya*) is a federally threatened prairie plant known to occur in Martin County. The prairie bush clover is a member of the Fabaceae (Pea) family and a midwestern "endemic" – known only from the tallgrass prairie region of the upper Mississippi River Valley; it is currently only found in small regions of Minnesota, Iowa, Illinois and Wisconsin, and is thought to occur at fewer than 100 sites (MNDNR, 2007; USFWS, 2015b). Also known as slender-leaved bush-clover, the plant grows on one or more stems and are generally between 9 to 18 inches tall, although plants can grow up to 39 inches (1 meter) in height (USFWS, 1988). The leaf is clover-like and comprised of three small leaflets; the plant often has a grayish or silver luster. Pale pink or cream-colored flowers bloom from mid-July to early September, and flowers are loosely arranged on an open spike. (MNDNR, 2007; USFWS, 2015b)

In southwestern Minnesota, prairie bush clover can be found on dry-mesic prairies on north or northwest-facing slopes with well drained soils. Populations are primarily restricted to remnant prairies that have persisted despite widespread conversion to cropland; the majority of populations in the state are found on prairies that were historically or are presently used for pasture (MNDNR, 2017g). Threats to the species and remaining habitat include agricultural expansion, herbicides, residential development, and the lack of natural disturbances, especially fire. (MNDNR, 2017g; USFWS, 1988; USFWS, 2015b).

The prairie bush clover is only found along a portion of the Purple Route in Martin County.

6.9.1.2 State listed species

State-listed species with known occurrences within one mile of the four application routes are shown in Table 6.9.1-1.

<u>Eastern spotted skunk</u>

Often confused with the striped skunk, the eastern spotted skunk is characterized by a complex black and white spotted pattern. The species is found in open, upland areas with cover such as hedgerows, shrubs, wooded draws, and agricultural areas. The species may utilize buildings, corncribs, trash piles, rock piles, and haystacks for cover and den sites. It is thought that the increase in number of small farms in Minnesota in the early 1900s enabled the spotted skunk to expand its range northward. Loss of habitat in the form of farmhouses and outbuildings, restricted access to stored grain crops and the rodents attracted to them, and the reduction of access to small farm animals such as chickens have likely led to the decline of the species. Surveys in Minnesota the early 1990s found only four individuals, suggesting that the species in the state is restricted to only a few small, isolated populations (MNDNR, 2017h).

Loggerhead shrike

The loggerhead shrike is a medium sized bird identified by a black mask through the eyes, a gray back, a white patch on otherwise black wings, and white, outer tail feathers. In Minnesota, the species is a seasonal resident, nesting in shrubs, hedgerows, and small trees. Loggerhead shrikes can be found in both non-native and native grasslands, and utilize agricultural areas, hunting in short grasses in farmyards, cemeteries, and old fields. The species was once common in grassland habitats, but is now absent from much of its former range; in Minnesota, they are only consistently found in Dakota and Clay counties, with sporadic, scattered observations elsewhere. Threats to the species include tree encroachment on grasslands and a loss of shelterbelts and windrows due to increases in intensive row-cropping practices (MNDNR, 2017i).

Mollusks

Ten state-protected mussel species were identified from the review of the NHIS data. Nine of these species are found in medium to large rivers in sand or gravel substrate; most prefer moderate to fast-moving waters, while the rock pocketbook, wartyback, and yellow sandshell mussels prefer slower currents (MNDNR, 2017e). The spike mussel can also be found in sand and gravel substrates in lakes and reservoirs; in these areas, it is found near outlets with swift moving currents (MNDNR, 2017j). The salamander mussel is only found under flat rocks or ledges in habitats suitable for its glochidial host, the mudpuppy salamander (MNDNR, 2017k).

Invertebrates

Not much is known about the caddisfly *Oecetis ditissa*; a single specimen of was collected from Minneopa Creek in Minneopa State Park, and is the only known record in the state. The larvae of the genus *Oecetis* is typically found in substrates in lakes or slow-moving rivers, and it is thought that the species in Minnesota may be at the northwestern edge of its known range (Houghton, 2012).

Paddlefish

The paddlefish is identified by a long, paddle-like snout and small, paired barbels. The species is mostly scale-less and is blue-black or gray above, and white below. The paddlefish is native to the Mississippi River basin, and requires large expanses of free-flowing rivers; they are found in open water in large rivers, river lakes, oxbows, and backwaters and are associated with areas of deep water and slow currents. Paddlefish feed on zooplankton and spawn in gravel bars that are inundated in spring floods. The species is threated by damming and impoundments on large rivers; these structures have made historical spawning grounds inaccessible and have interfered with migration patterns (MNDNR, 2017l).

Blanding's turtle

The Blanding's turtle is characterized by a domed carapace and a bright yellow chin and throat. The species requires wetland complexes associated with rivers and streams with abundant aquatic vegetation for foraging; nearby upland areas with sandy soils are used for nesting. In Minnesota, the species utilizes a variety of wetland types and riverine habitats throughout the state. In southern Minnesota, female Blanding's turtles may nest in agricultural areas. Threats to the species include mortality crossing roads and degradation and loss of upland and wetland habitats (MNDNR, 2017m).

Plants

Seven species of state-protected plants were identified from the review of the NHIS data. Three species (prairie bush clover, Sullivant's milkweed, and tuberous Indian-plantain) are found in prairie habitats. These species are at risk due to habitat loss, and are now only found in remnant and isolated prairie habitats along railroad rights-of-way or in areas where steep slopes where cultivation is not feasible (MNDNR, 2017e).

Rock fir moss and three-leaved coneflower are primarily found in mesic floodplain and hardwood forests (MNDNR, 2017n; 2017o). Conversion of floodplain forests to agricultural uses has reduced suitable habitat for both species. However, rock fir moss is rare even in areas where suitable habitat is present; only a small number of populations known to currently exist in Winona, Houston, Cook, and Lake counties (MNDNR, 2017n).

In prairie regions of Minnesota, hair-like beak rush is found in isolated calcareous fens. The species prefers marginal areas of fen pools where competition is minimal. Groundwater drawdown is a major threat to calcareous fens in agricultural areas; loss of suitable fen habitat is a major threat to the hair-like beak rush (MNDNR, 2017p).

In Minnesota, stream parsnip is associated with non-forested peatlands, wet meadows, seepages, fens, and small rivers and streams. Threats to the species include habitat degradation, groundwater drawdown, and competition from invasive wetland species (Minnesota Wildflowers, 2017).

6.9.1.3 Impacts and Mitigation – All Routes

Federally Listed Species

Impacts on individual northern long-eared bats may occur if clearing or construction take place when the species is breeding, foraging, or raising pups in its summer habitat. Bats may be injured or killed if occupied trees are cleared during this active window (i.e., April 1 – September 30), and the species may be disturbed during clearing or construction activities due to noise or human presence.

On January 14, 2016, the USFWS published the final 4(d) rule identifying prohibitions that focus on protecting the bat's sensitive life stages (i.e., hibernation and raising young) in areas affected by WNS (USFWS, 2016). The Project Study Area falls wholly within the USFWS-designated WNS Zone (USFWS, 2017b). Per USFWS guidance, incidental take from tree removal activities is not prohibited provided:

- it is not conducted within 0.25 mile of a known northern long-eared bat hibernacula; and
- it does not entail removing a known maternity roost tree (or trees within 150 feet of a known maternity roost tree) June 1- July 31.

In Minnesota, the MNDNR maintains records of known hibernacula and roost tree locations in the NHIS; the Applicants reviewed the most recent NHIS rare features database to identify the presence of maternity roost trees or hibernacula in the vicinity of the Project. The NHIS review confirmed the absence of known hibernacula within 0.25 mile and the absence of known roost trees within 150 feet from the four route options.

As such, the lead federal agency (i.e., the USACE) may choose to rely upon the finding of the programmatic Biological Opinion developed by USFWS on January 5, 2016 to fulfill its Section 7 consultation obligations for this species. The streamlined framework requires submission of the Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form. If, after 30 days there has been no response from the USFWS, the USACE may presume the determination of may affect, but incidental take is not prohibited is informed by the best available information and consider its project responsibilities under Section 7(a)(2) with respect to the northern long-eared bat fulfilled.

To reduce impacts to individual bats, it is recommended that all tree clearing activities are conducted when the species is in hibernation and not present on the landscape (i.e., October 1 through March 31). However, it is understood that tree clearing activities cannot begin until all consultations for the species are complete.

Project-specific consultations were initiated with the USFWS Twin Cities Ecological Services Field Office on August 15, 2017. Based on a review of the four route options, USFWS staff noted that there are no known roost trees or hibernacula in the area associated with the northern long-eared bat, and as such, the Project would likely be covered under the 4(d) rule. Staff recommended conducting tree-clearing activities between October 1 and March 31, if possible, to prevent adverse impacts to protected bat species.

USFWS staff also noted that prairie bush clover typically only occurs in areas of high quality prairie; most of the Project Study Area in Martin County is associated with agricultural land cover, and suitable habitat for the species is likely not present.

State-Listed Species

No in-stream work will be required to construct the Project; however, runoff from Project workspaces may decrease water quality and impact mussel and fish species. The Applicants will implement appropriate BMPs to prevent erosion and sediment runoff and protect water quality. As such, adverse impacts to mussel and fish species are not anticipated.

Tree clearing may impact sensitive bird species of conducted during the breeding and nesting season. Where possible, the Applicants will clear trees and shrubs between October 1 and March 31, and will thereby avoid impacts to the state-listed loggerhead shrike.

State-listed plant species are endemic either to the tall-grass prairie or calcareous fens and wet meadows. Suitable habitat for these species is not likely to be present along the proposed Project Routes; much of the area has been converted to agricultural use, and in-water work will not be necessary. As such, impacts to state-listed plant species are not expected.

The Applicants met with MNDNR staff on May 23, 2017 and again on September 14, 2017 to discuss impacts to sensitive resources, including state-listed species (refer to Section 7.1.2). The Applicants will continue to work with the MNDNR to avoid adverse impacts to these species and will implement appropriate, species-specific BMPs if Project activities will take place during the species' active season.

6.9.2 Natural Resource Sites

Under the purview of the MNDNR, the Minnesota Biological Survey (MBS) "systematically collects, interprets, monitors and delivers data on plant and animal distribution as well as the ecology of native plant communities and functional landscapes." Once work in a region is complete, MBS assigns a rank of biodiversity significance to each survey site. These SOBS ranks are based on a variety of factors, including the presence and numbers of rare species populations, the quality (i.e., size and condition) of native plant communities within the site, and the site's context within the landscape (i.e., whether the site is isolated in the landscape or contiguous with or close to other areas with intact native plant communities) (MNDNR, 2017q). A rank of outstanding is assigned to those sites which contain the largest, most intact functional landscapes, and the best occurrences of the rarest plant and animal species.

The MNDNR also maintains records of locations of plant communities that are important areas of native vegetation or habitat. These NPCs are classified and defined by the MBS by considering the vegetation, hydrology, landforms, soils, and natural disturbance regimes associated with groupings of native communities. They are named for their characteristic environmental features or the characteristic plant species within them.

The Applicants reviewed the Project Study Area for various natural resource sites including SOBS, NPCs, WMAs, Scientific and Natural Areas (SNAs), state parks, and WPAs. None of the route options intersect National Park Service Wilderness Areas, National Wild and Scenic Rivers, or National Forests.

Table 6.9.2-1
Sites of Biodiversity Significance Crossed by the Route Options

Site of Biodiversity Significance	Rank	Existing Powerlines Present	Acres of Crossing (150-foot Right-of-Way)			
			Purple Route	Green Route	Red Route	Blue Route
Belgrade 26	Below Minimum	Yes	2.5	2.5	2.5	--
Belgrade S 9	Below Minimum	No	--	10.6	10.6	--
Center Creek 1	Moderate	No	2.2	--	--	--
CERESCO 1	Below Minimum	No	7.8	--	--	--
Delavan 31	Moderate	No	--	--	0.1	--
Judson 3 NE	High	Yes	7.3	--	--	--
Judson Meadows	High	No	0.3	--	--	--
Lime 29	Below Minimum	Yes	--	--	--	5.7
Lime W 36	High	Yes	14.8	14.8	14.8	--
Lincoln 2	Below Minimum	Yes	0.6	--	--	--
Lura 34	Moderate	No	--	--	--	0.4
Nicollet 34	Below Minimum	Yes	2.8	--	--	--
Pleasant Mound 24	Below Minimum	No	1.2	--	--	--
Pleasant Mound Prairie	Moderate	Yes	12.5	--	--	--
South Bend 29	Moderate	No	--	3.5	3.5	--
Verona 17	Below Minimum	Yes	1.9	--	--	--
Verona 6	Moderate	No	< 0.1	--	--	--
Verona 14	Moderate	Yes	--	3.5	3.5	3.5
Total for Each Route Option			**54.0**	**34.9**	**35.1**	**9.6**

Table 6.9.2-2
Native Plant Communities Crossed by the Route Options

Native Plant Community	Existing Powerlines Present	Acres of Crossing (150-foot Right-of-Way)			
		Purple Route	Green Route	Red Route	Blue Route
Elm-Ash-Basswood Terrace Forest	No	0.5	4.9	2.8	2.8
Mesic Prairie (Southern)	Yes (Purple Route only)	13.1	5.2	5,2	1.4
Pin Oak-Bur Oak Woodland	No	4.2	4.2	4.2	
Red Oak-Sugar Maple-Basswood (Bitternut Hickory) Forest	No	1.9	--	--	--
Southern Terrace Forest	No	0.1	--	--	--
Wet Prairie (Southern)	No	0.4	--	--	--
Southern Mesic Oak-Basswood Forest	Yes (Purple Route only)	--	1.1	3.1	3.1
Total for Each Route Option		**20.2**	**15.5**	**15.3**	**7.3**

6.9.2.1 Purple Route

The Purple Route right-of-way crosses eight SOBS, including three ranked as sites of High Biodiversity Significance, and three ranked as Moderate (refer to Tables 6.9.2-1 and 6.9.2-2). In addition, the Purple Route right-of-way crosses six NPCs.

The Purple Route crosses one USFWS WPA; this easement will be crossed within the existing Lakefield Junction - Wilmarth Line easement. The Applicants initiated consultation with the USFWS regarding USFWS-managed lands (i.e., WPAs and wetland/grassland easements) in May 2017. The Applicants will continue to work with the USFWS to reduce impacts to USFWS-managed lands.

The Purple Route also intersects with the boundary of Minneopa State Park. This parcel will also be crossed within the existing 345 kV Lakefield Junction – Wilmarth Line easement. The Purple Route does not intersect with any other state-managed lands.

6.9.2.2 Green Route

The Green Route does not cross any federally-managed lands. The Green Route right-of-way intersects with Rice Lake WMA; a total of five SOBS, including one ranked as a site of High Biodiversity Significance and two ranked as Moderate; and four NPCs (refer to Tables 6.9.2-1 and 6.9.2-2).

6.9.2.3 Red Route

The Red Route right-of-way intersects with the Smith WMA. The Applicants have designed the crossing to improve the existing right-of-way. The new crossing will be a double-circuit to incorporate both lines, and will parallel 405th Avenue; this improved route will avoid new impacts to the WMA, and will remove crossings over lakes and wetlands associated with Smith WMA. The Applicants will continue to work with the MNDNR to refine routing to reduce impacts at these locations.

The Red Route crosses the Roberts WPA in Blue Earth County. The Roberts WPA crossing is proposed to double-circuited with an existing transmission line utilizing a transmission line easement that predates the WPA. The Red Route is also adjacent to the Prescott WPA and the Lura Lake WPA in Faribault County.

A total of three SOBS intersect with the Red Route right-of-way, including one ranked as a site of Moderate Biodiversity Significance (refer to Tables 6.9.2-1 and 6.9.2-2). The 150-foot right-of-way of the Red Route also crosses four NPCs.

6.9.2.4 Blue Route

The Blue Route right-of-way does not cross any federally or state-managed lands but crosses three SOBS and three NPCs. Two of the SOBS crossed by the Blue Route right-of-way are ranked as sites of Moderate Biodiversity Significance (see Tables 6.9.2-1 and 6.9.2-2). The Applicants will continue to work with the MNDNR to refine routing to reduce impacts at these locations.

6.9.2.5 Impacts and Mitigation – All Routes

A number of SOBS and NPCs are located within the Purple, Green, Red, and Blue routes and are primarily associated with major drainageways such as the Minnesota, Blue Earth, Watonwan, and Le Sueur rivers. Several such communities are present within the four route options and primarily consist of sugar-maple basswood forest, silver maple floodplain forest, and wet and mesic southern prairie. The Applicants conducted a review of the GIS shapefiles of the SOBS and NPCs as they relate to the route options.

Sensitive natural resources were included in the comparative analysis used to develop and refine routes (refer to Section 3). Where possible, the Applicants designed routes to avoid these resources. Where these areas could not be avoided, route alternatives were chosen, and construction techniques such as spanning will be utilized to minimize impacts to these areas. For the areas where impacts are still possible, minimization and mitigation measures could include conducting surveys for rare features prior to construction, fencing of sensitive sites during construction, seasonal or time-of-year restrictions for conducting construction activities, or special site restoration following construction. Overall, no adverse impacts to rare or sensitive resources are anticipated.

In a letter dated August 29, 2017, the Applicants requested MNDNR review the Project Routes, and met with MDNR staff on September 14, 2017, to discuss potential impacts to rare features. The Applicants worked with MNDNR to incorporate and refine routing to reduce and minimize impacts to SOBS and NPCs, including native prairie (refer to Section 7.1). The Applicants will continue to work with MNDNR to identify and minimize impacts to these sensitive resources.

Xcel Energy will implement integrated vegetation management plans associated with its existing pollinator initiative, which was created to enhance pollinator habitat; these plans minimize chemical use by avoiding broadcast applications, and employ spot treatments for control of invasive species.

6.10 ALTERNATIVES, CONNECTORS, AND BYPASS ROUTE OPTIONS

In addition to the four application routes, the Applicants conducted an analysis of the environmental features along each of the identified route alternative segments and connector options as compared to the corresponding segments of the Purple, Green, and Red routes. Figure 4.5-1 in Section 4.5.1.1 provides an overview of the alternatives and connectors in relation to the four main route options.

6.10.1 ROUTE SEGMENT ALTERNATIVES

6.10.1.1 Belgrade Township and Rockford Road Alternatives (Alternative Segments A and B)

Table 6.10.1-1 provides a comparison of the environmental features located along Alternative Segments A and B and the corresponding segment of the Green and Red routes. Figure 6.10.1-1 shows the environmental features located along each alternative segment. Alternative Segments A and B are located within the same ecological province, section, and subsection as the Green and Red routes (refer to Section 6.1 for a description of the environmental setting along the routes) and environmental features along the routes such as vegetation, flora, and fauna are similar.

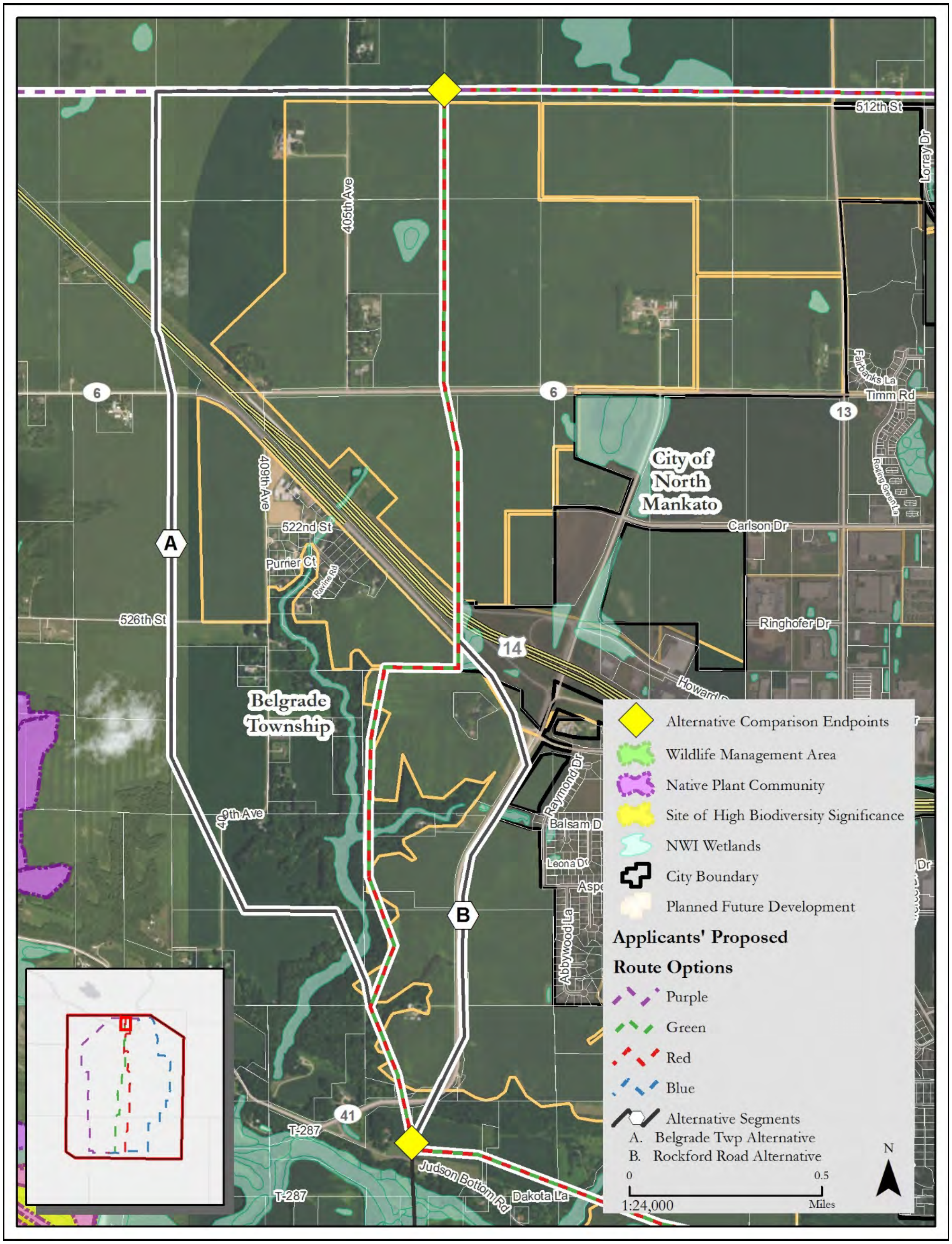
Table 6.10.1-1
Environmental Features Comparison –Alternative Segment A - Belgrade Township Alternative and Alternative Segment B - Rockford Road Alternative and Corresponding Segments of the Green and Red Routes

Environmental Features	Unit	Alternative Segment A	Alternative Segment B	Green and Red Routes
Route Length	Miles	3.8	2.9	3.0
150-foot Right-of-Way	Acres	69.0	52.1	54.1
Agricultural Land in 150-foot Right-of-Way	Acres	52.7	30.0	35.6
Wetlands in 150-foot Right-of-Way	Acres	1.8	1.0	1.6
Non-forested	Acres	1.1	0.6	0.4
Forested	Acres	0.7	0.4	1.2
Grasslands in 150-foot Right-of-Way	Acres	4.9	5.6	5.9
Forest Lands in 150-foot Right-of-Way	Acres	4.9	0.1	9.1
Developed Areas in 150-foot Right-of-Way	Acres	4.8	14.9	2.0
Open Water in 150-foot Right-of-Way	Acres	0.5	0.0	0.0
Co-located with Existing Transmission Rights-of-Way	Miles (Percent)	0.7 (18.4%)	0.0 (0.0%)	0.0 (0.0%)
Co-located with Railroad or Road Rights-of-Way	Miles (Percent)	0.0 (0.0%)	0.0 (0.0%)	0.0 (0.0%)

Table 6.10.1-1
Environmental Features Comparison –Alternative Segment A - Belgrade Township Alternative and Alternative Segment B - Rockford Road Alternative and Corresponding Segments of the Green and Red Routes

Environmental Features	Unit	Alternative Segment A	Alternative Segment B	Green and Red Routes
Co-located with Property Lines	Miles (Percent)	1.5 (39.4%)	1.8 (62.1%)	1.2 (40.0%)
Residences within 0-75 feet	Number	0	0	0
Residences within 76-150 feet	Number	0	0	0
Residences within 151-300 feet	Number	0	1	0
Residences within 301-500 feet	Number	3	3	3
Total Residences	Number	3	4	3
SOBS ranked Moderate or Outstanding in 150-foot Right-of-Way	Acres	0.0	0.0	0.0
Native Plant Communities in 150-foot Right-of-Way	Acres	0.0	0.0	0.0
Prime Farmland Soils	Acres	62.9	50.3	43.7
Intermittent Waterbody Crossings	Number	1	0	0
Ephemeral Waterbody Crossings	Number	0	0	0
Perennial Waterbody Crossings	Number	0	0	0

Figure 6.10.1-1 Environmental Features Along Alternative Segments A and B



Alternative Segment A is longer than the corresponding segments of the Green and Red routes and its right-of-way would affect more acres overall, including more acres of prime farmland soils. However, the alternative would affect fewer acres of forested uplands and forested wetlands than the corresponding segments of the Green and Red routes.

The length of Alternative Segment B is comparable to the length of the corresponding segments of the Green and Red routes, but the alternative would cross more acres of prime farmland soils. However, the alternative would cross fewer acres of land used for agricultural purposes and fewer acres of forested upland areas and forested wetlands. The alternative would also be co-located with Rockford Road for a greater percentage of its route.

Construction of Alternative Segments A and B would have similar impacts to flora and fauna as those discussed in Sections 6.8.8 and 6.8.9. The potential impacts of Alternative Segments A and B on federal and state-listed threatened and endangered species and natural resource sites that may be present in the Project Study Area would be similar to those discussed for the Green and Red routes in Sections 6.9.1 and 6.9.2, respectively.

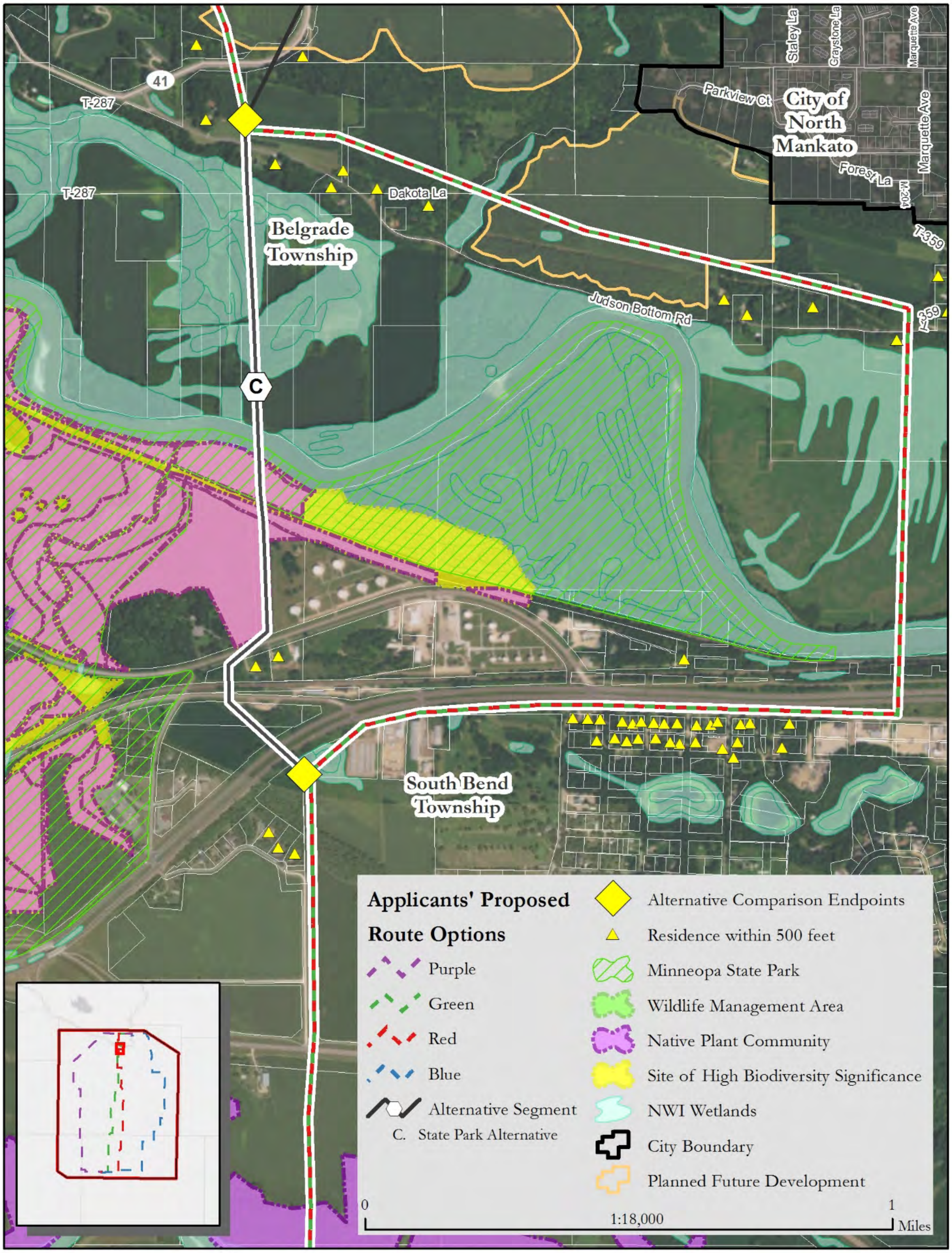
6.10.1.2 State Park Alternative Route (Alternative Segment C)

Table 6.10.1-2 provides a comparison of the environmental features located along Alternative Segment C and the corresponding segment of the Green and Red routes. Figure 6.10.1-2 shows the environmental features located along Alternative Segment C. Alternative Segment C is located within the same ecological province, section, and subsection as the Green and Red routes (refer to Section 6.1 for a description of the environmental setting along the routes) and environmental features along the routes are generally similar.

Table 6.10.1-2
Environmental Features Comparison – Alternative Segment C - State Park Alternative and Corresponding Segments of the Green and Red Routes

Environmental Features	Unit	Alternative Segment C	Green and Red Routes
Route Length	Miles	1.4	3.3
150-foot Right-of-Way	Acres	24.4	59.1
Agricultural Land in 150-foot Right-of-Way	Acres	2.1	12.2
Wetlands in 150-foot Right-of-Way	Acres	9.2	7.5
Non-forested	Acres	0.8	5.7
Forested	Acres	8.4	1.8
Grasslands in 150-foot Right-of-Way	Acres	4.1	11.8
Forest Lands in 150-foot Right-of-Way	Acres	3.6	7.9
Developed Areas in 150-foot Right-of-Way	Acres	4.2	18.7
Open Water in 150-foot Right-of-Way	Acres	1.2	1.0
Co-located with Existing Transmission Rights-of-Way	Miles (Percent)	0.0 (0%)	0.8 (24.2%)
Co-located with Railroad or Road Rights-of-Way	Miles (Percent)	0.0 (0%)	0.0 (0%)
Co-located with Property Lines	Miles (Percent)	0.1 (7.1%)	0.6 (18.2%)
Minneopa State Park Crossing	Miles	0.1	0.0
Minneopa Trail Crossing	Yes/No	Yes	Yes
Residences within 0-75 feet	Number	0	0
Residences within 75-150 feet	Number	0	8
Residences within 150-300 feet	Number	3	10
Residences within 300-500 feet	Number	1	22
Total Residences	Number	4	40
SOBS ranked Moderate or Outstanding in 150-foot Right-of-Way	Acres	0.0	0.0
NPCs in 150-foot Right-of-Way	Acres	5.5	0.0
Prime Farmland Soils	Acres	8.9	38.5
Intermittent Waterbody Crossings	Number	0	1
Ephemeral Waterbody Crossings	Number	0	0
Perennial Waterbody Crossings	Number	1	1

Figure 6.10.1-2 Environmental Features Along Alternative Segment C



Minnesota Rules 7850.4300 provides "No high voltage transmission line may be routed through state or national parks or state scientific and natural areas unless the transmission line would not materially damage or impair the purpose for which the area was designated and no feasible and prudent alternative exists. Economic considerations alone do not justify use of these areas for a high voltage transmission line."

Alternative Segment C crosses state-owned land along a narrow strip of the Park (approximately 550 feet long). Applicants have discussed this crossing with MNDNR staff and have provided analysis related to direct park impacts, visual impacts to the park and the potential need for long term vegetation management.

Figure 6.10.1-3 shows various structure height options and LiDAR measured tree heights. As shown on the preliminary design (Figure 6.10.1-3), if the Project were constructed on the Alternative Segment C, no structures would be placed within the park. On the south, a structure would be placed on top of the bluff adjacent to Magellan Pipeline's existing tank storage facility, the Chicago and North Western railroad, and other industrial properties. On the north, a structure would be placed on privately-owned agricultural land across the Minnesota River from park land.

Applicants propose to construct the line using poles with heights ranging from approximately 75 feet to 170 feet tall. With these heights, the line could be constructed over the existing canopy without removing or trimming any trees. Applicants note that the trees in this area are near maximum height. Figures 6.10.1-3 and 6.10.1-4 show various structure height options and LiDAR measured tree heights.

In addition, Applicants do not anticipate the need to access park property or to place any equipment in park property during construction. However, during operation of the Project, selective tree removal or cutting may be required to ensure vegetation clearances are met for safe operation of the line. These practices would include using chainsaws to cut down, girdle, or trim trees.

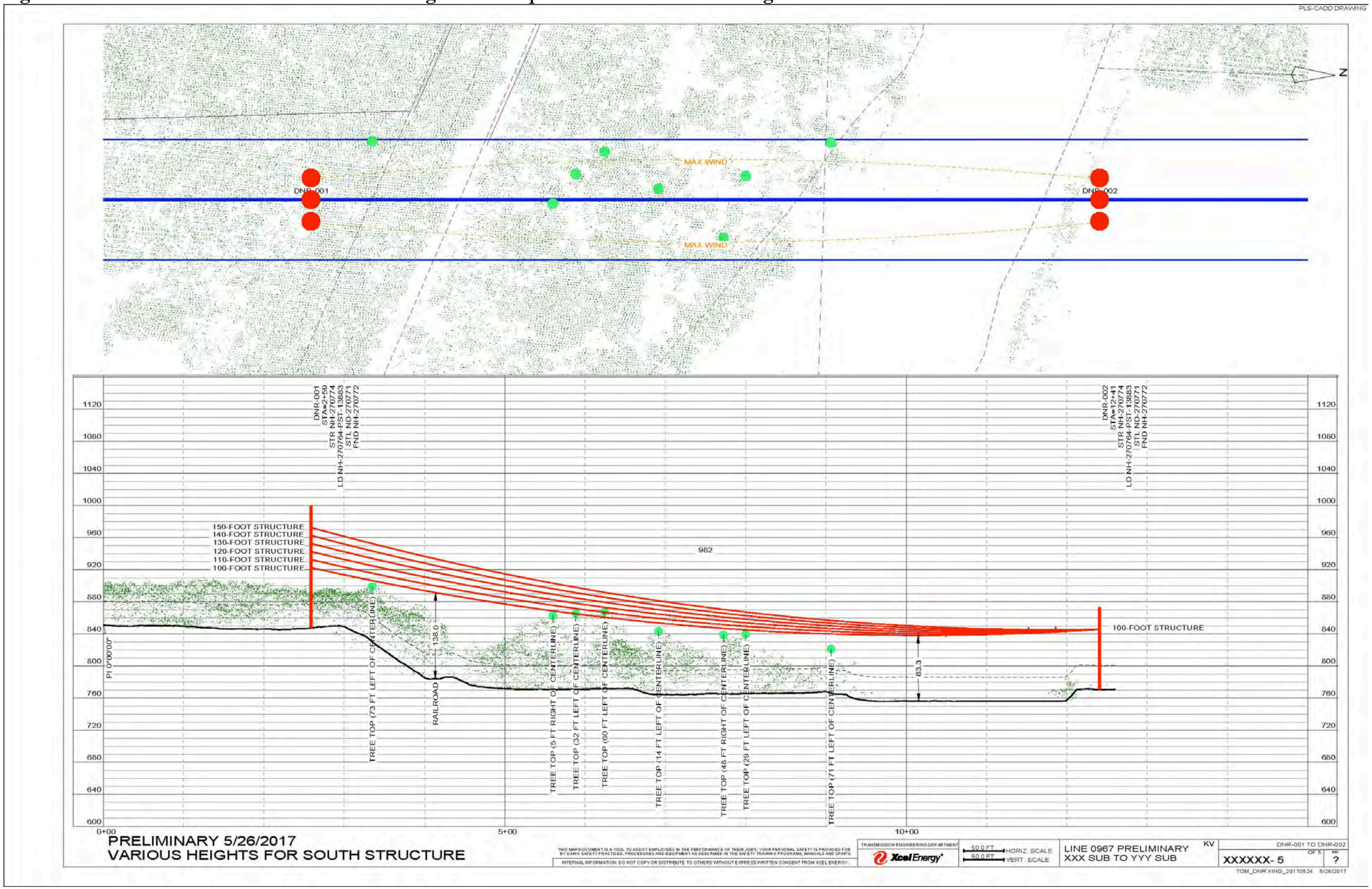
Applicants conducted an assessment of visual impacts from Alternative Segment C on land within Minneopa State Park. The assessment was completed using data layers created using light detection and ranging (LiDAR) data furnished by the Minnesota DNR. Applicants created a Triangulated Irregular network (TIN) surface elevation model of the state park and surrounding areas using the LiDAR data. This surface modeling created ground surface layers as well as vegetation and buildings. Visual receptor locations were selected at 16 key spots in the state park, of varying elevations and locations, where park visitors may be able to see the proposed structures. These spots are along hiking trails, scenic overlooks, parking lots, buildings, and camp sites.

A line-of-sight model was created using a geoprocessing tool to assess whether or not the proposed structures along Alternative Segment C are visible from any of the observation points. The line-of-sight model analyzed whether the top of any of the proposed structures in Alternative Segment C could be seen from any of the 16 receptor locations. Structure locations, elevations, and heights were created using PLSCADD, a transmission line design software. Along with the structure design information, the TIN model of topography, vegetation and receptor locations was used to create a workspace in ArcScene (a GIS modeling software). Using a height of 6 feet 6 inches above ground elevation for each receptor location, a line-of-site analysis was conducted. The result was that the top of only one structure is visible from only one of the 16 observation points. Every other line-of-sight combination of observation point and structure was obscured either by topography, vegetation, or both. Figure 6.10.1-4 shows these results.

Recreation in the portion of the park crossed by Alternative Segment C is limited to passive recreation; no hiking, skiing, biking, or other trails, campgrounds, camper cabins, RV sites, picnic shelters, or historic sites are located in this portion of the park (MNDNR, 2016). As such, recreation in this portion of the park would be limited to water activities on the Minnesota River or non-trail hiking. Because direct impacts to the Minneopa State Park would be avoided by spanning over this crossing, no impacts to public use of the Minneopa State Park are anticipated.

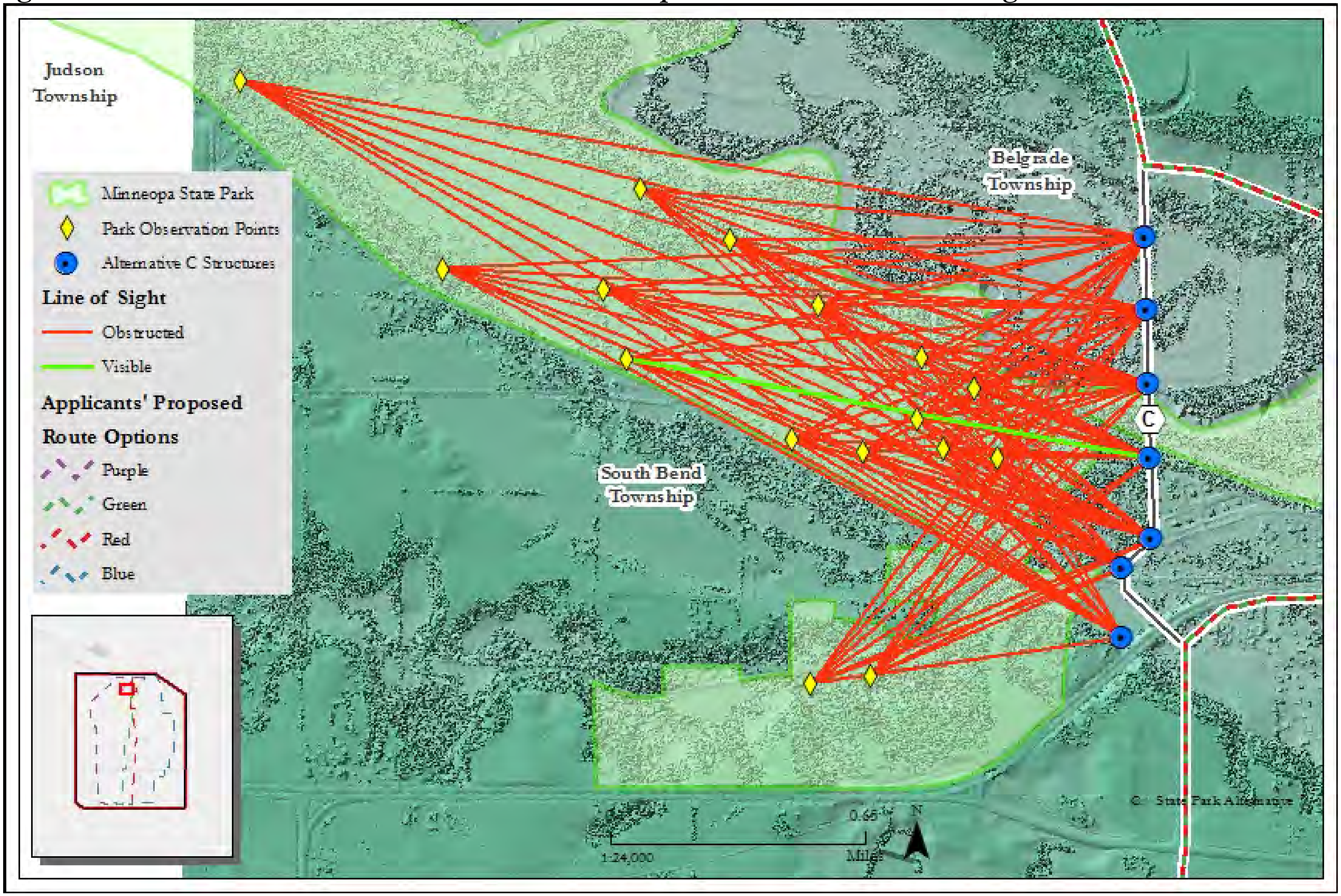
This Page Intentionally Left Blank

Figure 6.10.1-3 Plan and Profile Drawing of Minneopa State Park Alternative Segment C



This Page Intentionally Left Blank

Figure 6.10.1-4 **Visual Assessment of Minneopa State Park Alternative Segment C**



Alternative Segment C and the Green and Red routes cross the Minneopa Trail, a paved hiking and biking trail that runs parallel to Highway 68 in this area; no direct impacts to the trail or on public use of the trail are anticipated. Alternative Segment C is immediately adjacent to the Williams Nature Center on the south side of the Minnesota River crossing, while the Green and Red routes avoid the nature center. The Williams Nature Center consists of a 65-acre park with two overlooks, self-guided interpretive stations along nature trails, an outdoor classroom, and a heated interpretive center log cabin. The area where Alternative Segment C is adjacent to the Williams Nature Center would be spanned and no direct impacts to the nature center would occur; therefore, no impacts to public use of the nature center are anticipated.

Alternative Segment C is shorter than the Green and Red routes. It would cross fewer acres of future residential development land, forestland, and agricultural land. The alternative route and the corresponding segments of the Green and Red routes traverse predominantly rural areas located about 1.5 miles west of the Mankato city limits. Land use where the structures would be placed is agricultural on the north side of the Park and a mix of light industrial development and residential areas intersected by state and county highways on the south side of the park. Impacts to the existing land uses near the structures would be temporary with the exception of the structure foundations which would result in a small permanent impact.

Construction of Alternative Segment C would have similar impacts to flora and fauna as those discussed in Sections 6.8.8 and 6.8.9. The potential impacts of Alternative Segment C on federal and state-listed threatened and endangered species and natural resource sites that may be present in the Project Study Area would be similar to those discussed for the Green and Red routes in Sections 6.9.1 and 6.9.2, respectively.

The Applicants continue to coordinate with MNDNR on the feasibility of Alternative Segment C. Any additional mitigation measures for the alternative route's crossing of Minneopa State Park would be determined in conjunction with the MNDNR. The Applicants will continue to work with the MNDNR to refine routing to reduce impacts to flora along this alternative.

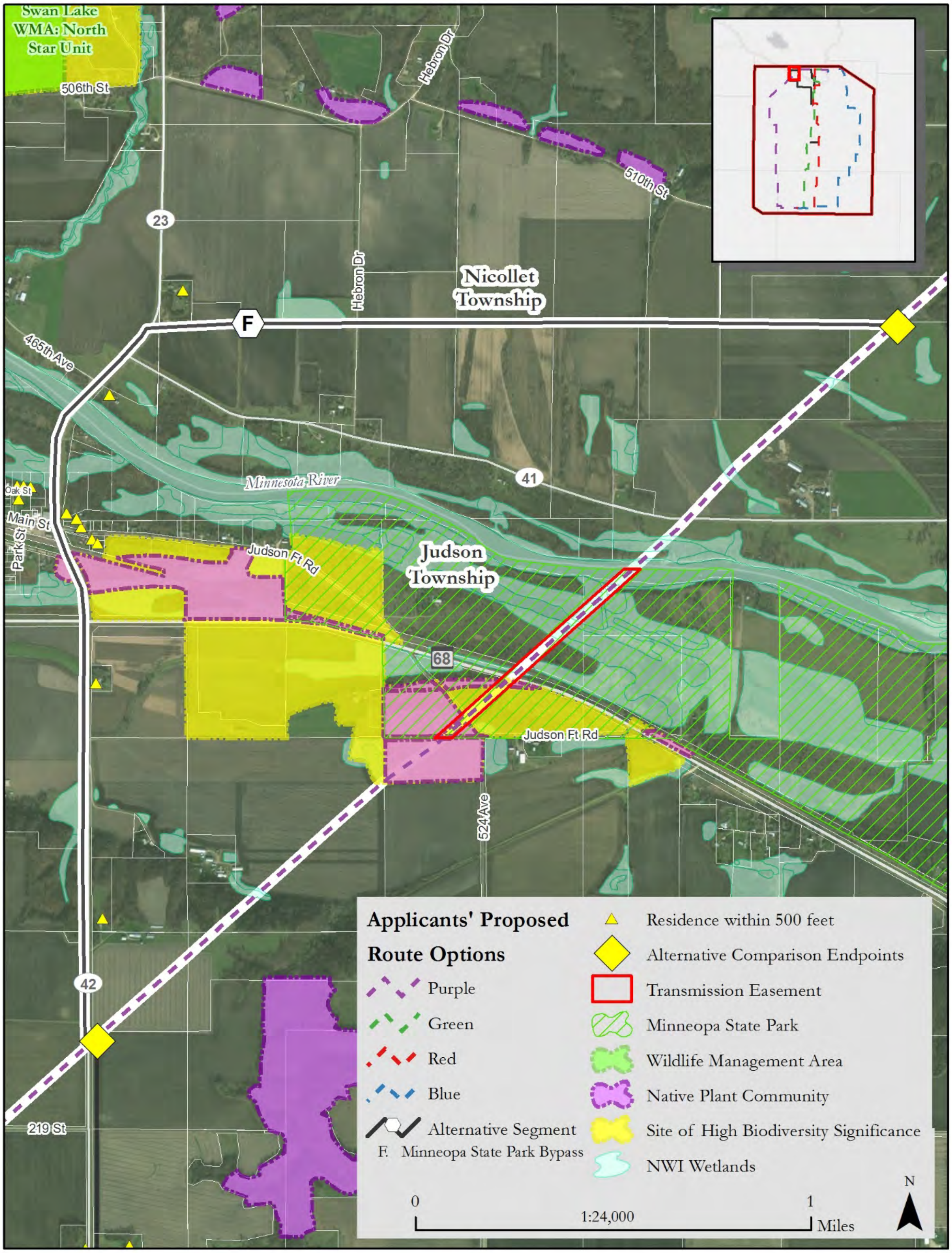
6.10.1.3 Purple Route Minneopa State Park Bypass Alternative (Alternative Segment F)

Table 6.10.1-3 describes the environmental features located along Alternative Segment F and the corresponding segment of the Purple Route. Figure 6.10.1-5 shows the environmental features located along Alternative Segment F. Alternative Segment F is located within the same ecological province, section, and subsection as the Purple Route (refer to Section 6.1 for a description of the environmental setting along the routes) and, as such, environmental features along the bypass segment are similar.

Table 6.10.1-3
Environmental Features Crossed by Alternative Segment F - Minneopa State Park Bypass Alternative

Environmental Features	Unit	Alternative Segment F	Purple Route
Route Length	Miles	3.8	2.7
150-foot Right-of-Way	Acres	69.3	49.9
Agricultural Land in 150-foot Right-of-Way	Acres	32.7	17.6
Wetlands in 150-foot Right-of-Way	Acres	3.8	11.4
Non-forested	Acres	3.4	9.1
Forested	Acres	0.4	2.3
Grasslands in 150-foot Right-of-Way	Acres	6.4	15.1
Forest Lands in 150-foot Right-of-Way	Acres	1.9	1.6
Developed Areas in 150-foot Right-of-Way	Acres	23.5	2.0
Open Water in 150-foot Right-of-Way [a]	Acres	1.1	2.0
Co-located with Existing Transmission Rights-of-Way	Miles (Percent)	0.0 (0%)	2.7 (100%)
Co-located with Railroad or Road Rights-of-Way	Miles (Percent)	0.0 (0%)	0.0 (0%)
Co-located with Property Lines	Miles (Percent)	2.9 (76.3%)	0.0 (0%)
Residences within 0-75 feet	Number	0	0
Residences within 75-150 feet	Number	0	0
Residences within 150-300 feet	Number	5	0
Residences within 300-500 feet	Number	8	0
Total Residences	Number	13	0
SOBS ranked Moderate or Outstanding in 150-foot Right-of-Way	Acres	0.0	0.0
NPCs in 150-foot Right-of-Way	Acres	0.8	3.9
Prime Farmland Soils	Acres	17.7	20.0
Intermittent Waterbody Crossings	Number	5	4
Ephemeral Waterbody Crossings	Number	0	0
Perennial Waterbody Crossings	Number	1	1

Figure 6.10.1-5 Environmental Features Along Alternative Segment F



Alternative Segment F is longer than the corresponding segment of the Purple Route and its right-of-way would affect more acres overall, including more acres of agricultural land. The area near Main Street in Judson lacks adequate space such that two commercial buildings would be located within the right-of-way. The alternative would be within 150 to 500 feet of 13 residences and would not be co-located with existing transmission rights-of-way, while the corresponding segment of the Purple Route would not be within 500 feet of residences and would be entirely co-located with existing transmission rights-of-way. However, the alternative would cross fewer acres of wetlands and forested wetlands than the corresponding segment of the Purple Route.

Construction of Alternative Segment F would have similar impacts to flora and fauna as those discussed in Sections 6.8.8 and 6.8.9 for the Application routes. The potential impacts of Alternative Segment F on federal and state-listed threatened and endangered species and natural resource sites that may be present in the Project Study Area would be similar to those discussed for the Purple Route in Sections 6.9.1 and 6.9.2, respectively.

However, there are two state-listed endangered species with known occurrences within one mile of Alternative Segment F which do not occur along any other route in the Project Study Area: the winged mapleleaf mussel (*Quadrula fragosa)* and the eared false foxglove (*Agalinis auriculata)*. No in-stream work will be required to construct the Project; however, runoff from Project workspaces may decrease water quality and impact mussel and fish species. The Applicants will implement appropriate BMPs to prevent erosion and sediment runoff and protect water quality. As such, adverse impacts to mussel species are not anticipated. Alternative Segment F occurs in an agricultural area and over half its length would be co-located with County Road 42. As such, impacts to sensitive plant species such as the eared false foxglove are not anticipated.

6.10.2 Connector Segments

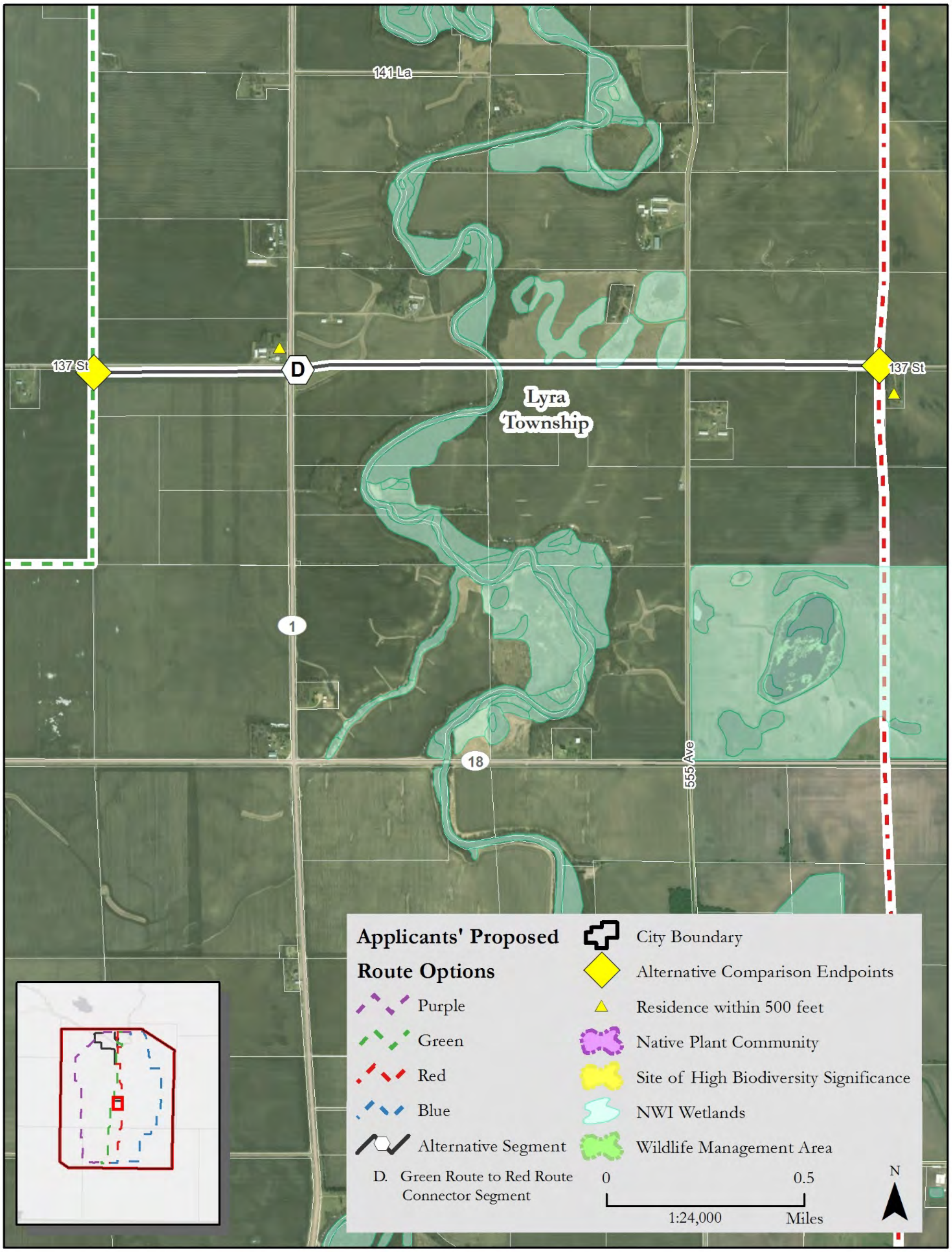
6.10.2.1Green Route to Red Route Connector Segment (Alternative Segment D)

Table 6.10.2-1 describes and Figure 6.10.2-1 shows the environmental features located along Alternative Segment D. Alternative Segment D is located within the same ecological province, section, and subsection as the Green and Red routes (refer to Section 6.1 for a description of the environmental setting along the routes) and, as such, environmental features along the connector segment are similar.

Table 6.10.2-1
Environmental Features Crossed by the Alternative Segment D - Green Route to Red Route Connector Segment

Environmental Features	Unit	Alternative Segment D
Route Length	Miles	2.0
150-foot Right-of-Way	Acres	36.2
Agricultural Land in 150-foot Right-of-Way	Acres	16.1
Wetlands in 150-foot Right-of-Way	Acres	2.3
Non-forested	Acres	2.3
Forested	Acres	0.0
Grasslands in 150-foot Right-of-Way	Acres	5.4
Forest Lands in 150-foot Right-of-Way	Acres	0.3
Developed Areas in 150-foot Right-of-Way	Acres	11.8
Open Water in 150-foot Right-of-Way	Acres	0.3
Co-located with Existing Transmission Rights-of-Way	Miles (Percent)	0.0 (0%)
Co-located with Railroad or Road Rights-of-Way	Miles (Percent)	0.0 (0%)
Co-located with Property Lines	Miles (Percent)	2.0 (100%)
Residences within 0-75 feet	Number	0
Residences within 75-150 feet	Number	0
Residences within 150-300 feet	Number	0
Residences within 300-500 feet	Number	2
Total Residences	Number	2
SOBS ranked Moderate or Outstanding in 150-foot Right-of-Way	Number	0.0
NPCs in 150-foot Right-of-Way	Number	0.0
Prime Farmland Soils	Acres	34.5
Intermittent Waterbody Crossings	Number	1
Ephemeral Waterbody Crossings	Number	0
Perennial Waterbody Crossings	Number	0

Figure 6.10.2-1 Environmental Features Along Alternative Segment D



Alternative Segment D predominantly crosses agricultural and developed land and is co-located with property lines for the entirety of its length. Two residences are located within 300 to 500 feet of the connector segment and it crosses one intermittent waterbody. The Applicants would use the same construction and mitigation measures to construct the connector segment as are described for the Green and Red routes in Sections 6.2 and 6.5.3, respectively.

Construction of Alternative Segment D would have similar impacts to flora and fauna as those discussed in Sections 6.8.8 and 6.8.9 for the application routes. The potential impacts of Alternative Segment D on federal and state-listed threatened and endangered species and natural resource sites that may be present in the Project Study Area would be similar to those discussed for the Green and Red routes in Sections 6.9.1 and 6.9.2, respectively.

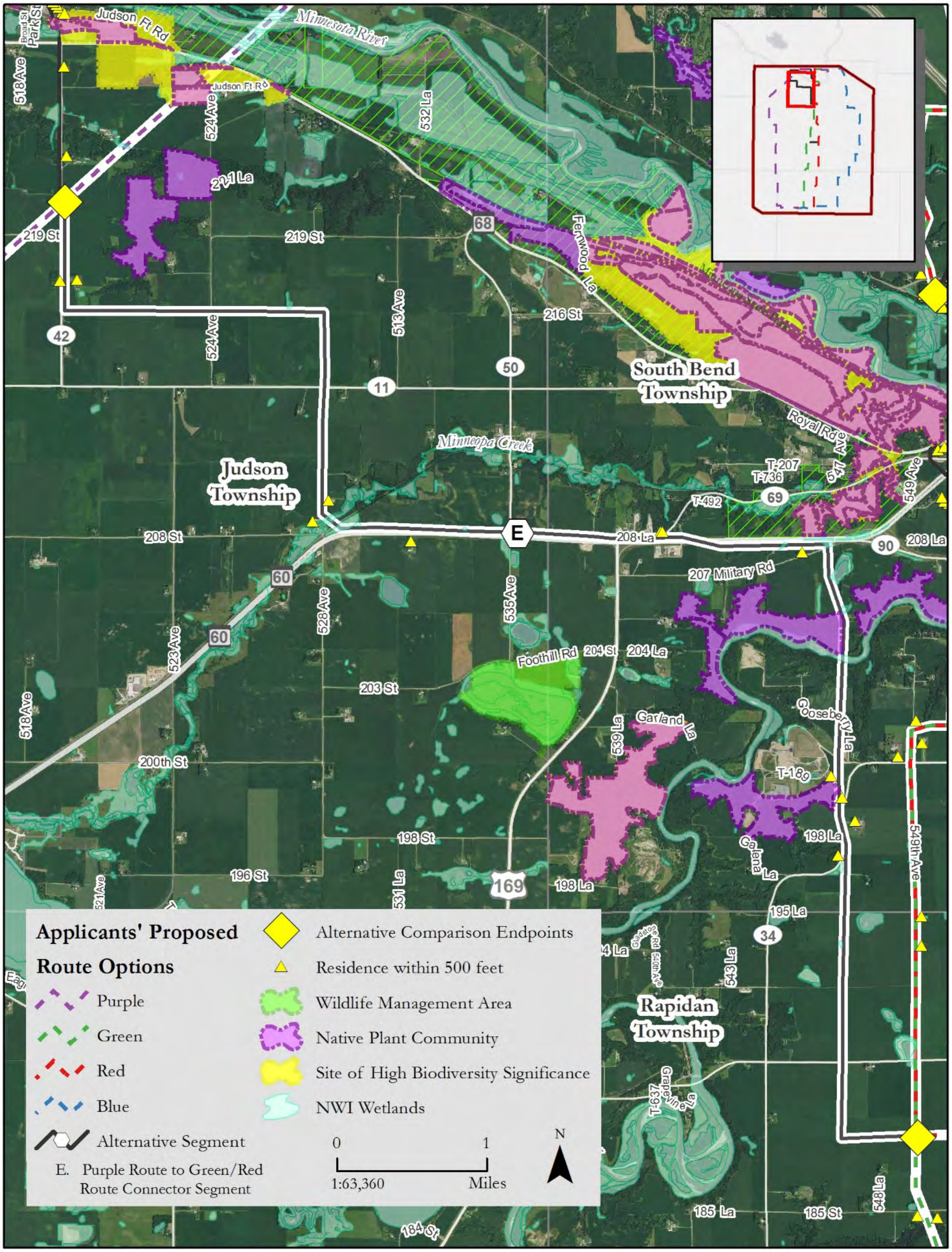
6.10.2.2 Purple Route to Green/Red Route Connector Segment (Alternative Segment E)

Table 6.10.2-2 describes and Figure 6.10.2-2 shows the environmental features located along Alternative Segment E. Alternative Segment E is located within the same ecological province, section, and subsection as the Purple, Green, and Red routes (refer to Section 6.1 for a description of the environmental setting along the routes) and, as such, environmental features along the connector segment are similar.

Table 6.10.2-2
Environmental Features Crossed by the Alternative Segment E – Purple Route to Green/Red Route Connector Segment

Environmental Features	Unit	Alternative Segment E
Route Length	Miles	11.7
150-foot Right-of-Way	Acres	213.1
Agricultural Land in 150-foot Right-of-Way	Acres	132.1
Wetlands in 150-foot Right-of-Way	Acres	5.0
Non-forested	Acres	3.7
Forested	Acres	1.3
Grasslands in 150-foot Right-of-Way	Acres	15.8
Forest Lands in 150-foot Right-of-Way	Acres	13.3
Developed Areas in 150-foot Right-of-Way	Acres	45.8
Open Water in 150-foot Right-of-Way	Acres	1.1
Co-located with Existing Transmission Rights-of-Way	Miles (Percent)	0.0 (0%)
Co-located with Railroad or Road Rights-of-Way	Miles (Percent)	0.0 (0%)
Co-located with Property Lines	Miles (Percent)	9.4 (80.3%)
Residences within 0-75 feet	Number	0
Residences within 75-150 feet	Number	1
Residences within 150-300 feet	Number	8
Residences within 300-500 feet	Number	4
Total Residences	Number	13
SOBS ranked Moderate or Outstanding in 150-foot Right-of-Way	Number	6.3
NPCs in 150-foot Right-of-Way	Number	1.0
Prime Farmland Soils	Acres	180.7
Intermittent Waterbody Crossings	Number	2
Ephemeral Waterbody Crossings	Number	0
Perennial Waterbody Crossings	Number	2

Figure 6.10.2-2 Environmental Features Along Alternative Segment E



Alternative Segment E predominantly crosses agricultural and developed land and is co-located with property lines for 80.5 percent of its length. Thirteen residences are located within 500 feet of the connector segment, but only one residence is located within 75 to 150 feet of the segment. The Applicants would use the same construction and mitigation measures to construct the connector segment through agricultural land and near residences as are described for the Purple, Green, and Red routes in Sections 6.2 and 6.5.3, respectively.

The connector segment crosses two intermittent and two perennial waterbodies. It also crosses 10.8 acres of SOBS ranked as having moderate or outstanding significance and 5.3 acres of NPC are located within the 150-foot right-of-way for the connector segment.

Construction of Alternative Segment E would have similar impacts to flora and fauna as those discussed in Sections 6.8.8 and 6.8.9 for the application routes. The potential impacts of Alternative Segment E on federal and state-listed threatened and endangered species and natural resource sites that may be present in the Project Study Area would be similar to those discussed for the Purple, Green, and Red routes in Sections 6.9.1 and 6.9.2, respectively.

7.0 FEDERAL AND STATE AGENCY, LOCAL GOVERNMENT, AND PUBLIC INVOLVEMENT

This section describes outreach efforts conducted by the Applicants and discusses pre-application involvement by federal, state, and local agencies as well as the public information outreach campaign. Throughout the process, the Applicants provided opportunities for stakeholders and potentially-affected landowners to participate in the routing process. This engagement provided the Applicants with valuable insight into landowner and public agency preferences regarding development of Project facilities, including the development of Route Alternatives analyzed for the Project.

7.1 AGENCY INVOLVEMENT IN PRE-APPLICATION

As part of pre-application efforts, the Applicants initiated its outreach campaign to public agencies through in person meetings and project notification letters. Many agencies, stakeholders, landowners, interested parties, and NGOs were contacted to gather feedback on the Project (refer to Table 7.1-1). This included meetings with the USFWS, MNDNR, BWSR, the City of Mankato, the City of North Mankato, Belgrade Township, and various county commissioners. Subsequently, the Applicants sent a Project introduction letter and map to other federal, tribal, state, county, and local agencies and stakeholders with jurisdiction in the Project Study Area. The letter introduced the Project and requested agency input into public and natural resources that may be potentially affected by the proposed Project. In the letter, the Applicants provided preliminary project details and a potential timeline for major project milestones. The Applicants also requested input from the federal and state agencies with respect to the resources under their jurisdiction as well as the identification of federal and state permits and/or approvals that may be potentially required for the Project.

A total of 28 agency letters were sent out on August 29 and September 8, 2017 requesting feedback on potential resources, concerns with route development, and offering GIS shapefiles upon request (Appendix G). A Project Study Area map depicting the Initial Route Network was provided with the letters. Copies of these letters and responses received as of October 25, 2017 are included in Appendix G. A summary of meetings with federal and state agencies is included below. The Applicants will continue to meet with city and county officials as the Project moves forward and the Applicants will seek any necessary local permits. Table 7.1-1 identifies agencies that were contacted through meetings or a notification letter and the date that the consultation was conducted.

Table 7.1-1
Huntley to Wilmarth Agency Correspondence

Agency	Date Contacted
U.S. Army Corps of Engineer, St. Paul District – Regulatory Branch	October 12, 2017
U.S. Fish and Wildlife Service – Twin Cities Ecological Services Field Office	August 15, 2017
U.S. Fish and Wildlife Service	August 8 and 15, 2017
United States Department of Agriculture – Natural Resources Conservation Service	September 28, 2017
Minnesota Department of Agriculture – Agricultural Development and Financial Assistance Division	December 19, 2017
State Historic Preservation Office – Minnesota Historical Society	August 29, 2017
Minnesota Department of Natural Resources – Natural Heritage Information System	September 14, 2017
Minnesota Department of Natural Resources – Division of Land and Minerals	May 23, 2017, September 14, 2017
Minnesota Department of Transportation – District 7	May 18, 2017
Minnesota Pollution Control Agency – Environmental Review Unit	August 29, 2017
Minnesota Board of Water and Soil Resources	May 31, 2017

The Applicants conducted two public open houses. The first open house was held on June 20th, 2017 at the Maple River High School in Mapleton, Minnesota. The second open house was on June 21st, 2017 at the Courtyard by Marriott in Mankato, Minnesota. Both open houses had two sessions, one in the afternoon and one in the evening. Open house invitations were sent to 25,000 landowners with the parcels in the Project Study Area on June 6, 2017. Open house notices were also placed in the local newspapers. Landowner information for the mailing list was acquired directly from Blue Earth and Faribault Counties, and from external data management company with which Xcel Energy holds a license. Landowners were also sent comment forms that they could mail in to the Applicants. Refer to Section 3.2.5 and Appendix E for more detailed information.

7.1.1 Federal Agencies

7.1.1.1 U.S. Army Corps of Engineers

The Project will require authorization from the USACE for wetland impacts under Section 404 of the Clean Water Act. If the Project crosses the Minnesota River, authorization under Section 10 of Rivers and Harbors Act would also be required. The Applicants discussed the Project with USACE staff who will manage the permitting process. These discussions included the following:

- Potential wetland impacts will be assessed for each route option. Wetland impact will be used as a criterion in comparing routes.

- Impacts to wetlands should be avoided if practicable.
- Impacts to endangered species and cultural resources will also be analyzed and avoided where possible.

7.1.1.2 U.S. Fish and Wildlife Service

Two meetings were held with USFWS staff in August 2017 to discuss land rights and endangered species. On August 8, 2017 a phone meeting was held to discuss whether existing easements on WPAs could be considered for new routes (combining the new line with an existing one). Another meeting was held on August 15, 2017 to discuss potential impacts to federally listed endangered species. A brief summary of USFWS coordination is below:

- New lines within existing easements on WPAs (Roberts and Nelson WPAs) would be acceptable, if the easement allows and as long as new lines comply with terms of the existing easement. New lines would not likely be approved across federal land where additional land rights would be needed.
- USFWS staff provided guidance on habitat quality and route selection in southwestern Blue Earth County.
- Federally listed threatened and endangered species in the Project Study Area are limited to the northern long-eared bat (NLEB) (found throughout the Project Study Area), the prairie bush clover (found only in Martin County), and the rusty patched bumble bee.
    - There are no known roost trees or hibernacula in the area associated with the NLEB, and as such, the Project would likely be covered under the 4(d) rule (refer to Section 6.9.1).
    - The prairie bush clover only occurs in areas of high quality prairie. Because most of the Project Study Area in Martin County is associated with agricultural land cover, suitable habitat for the species is likely not present.
    - The rusty patched bumble bee may be present along a portion of the Red Route. However, in reviewing the overlap of the high potential zone and the Red Route, it appears that suitable habitat for this species may not be present along the Red Route.
    - Bird impacts should be mitigated through installation of bird diverters.

7.1.1.3 U.S. Department of Agriculture, Natural Resources Conservation

The Applicants sent a Project introduction letter to the NRCS office and requested comments on the Project. NRCS responded, in a letter dated September 20, 2017, that form FPPA AD-1006 should be completed to determine whether the Farmland Protection Policy Act applies to the Project. However, an email follow-up from the NRCS State Soil Liaison on September 28, 2017, stated that the NRCS acknowledges that the Project is excluded from the Farmland Protection Policy Act because no federal funding will be used for the Project. NRCS also provided mapping for NRCS administered easements.

7.1.2 State Agencies

7.1.2.1 Minnesota Historical Society – SHPO

The Applicants received a response to the Project introduction letter on October 3, 2017. The Applicants will conduct a Phase 1a Literature Review and in turn, a Phase 1 archeological survey if necessary, after a final route has been selected by the Commission.

7.1.2.2 Minnesota Department of Natural Resources

The Applicants met with MNDNR staff on February 17, 2017, May 23, 2017, September 14, 2017, and December 19th, 2017 to discuss impacts to sensitive resources, including state-listed species, SOBS, NPCs, and the Minneopa State Park crossing route alternative.

Discussion at the first meeting focused on the Commission process and MNDNR's participation in the permitting process. An overview of the Project Study Area was examined with preliminary discussions of Minneopa State Park boundary and potential Minnesota River crossing locations.

The May 23, 2017 meeting included staff from Minneopa State Park and the discussion focused on potential crossings of the park. The potential western park crossing would follow an existing 345 kV line on existing 150-foot-wide transmission easement. The eastern park crossing would cross a 500-foot section of state park along the Minnesota River near a pipeline terminal. There are no existing land rights at this location, but the crossing would be short and narrow enough that no poles would be placed in the park. MNDNR requested additional description of park impacts. The Applicants followed up with a preliminary design that showed that no poles would be placed in parkland and that structures could be designed to keep energized lines above existing tree height to minimize tree clearing in the park.

The third meeting was held after MNDNR had reviewed potential route options. The discussion focused on areas where MNDNR had concerns or suggestions on changes. MNDNR also discussed potential impacts on endangered species and suggested an analysis of visual impacts to Minneopa State Park.

MNDNR staff requested further review of several crossings at other areas along the routes to reduce impacts to sensitive riparian areas; the Applicants refined several crossings based on this review. The Applicants will continue to work closely with the MNDNR to avoid and minimize impacts to state-protected resources.

The fourth meeting reviewed route modification suggestions made by MNDNR at the third meeting and Applicants' preliminary work on a visual assessment for impacts to Minneopa State Park from Alternate Segment C.

7.1.2.3 Minnesota Department of Transportation

Project representatives met with the MNDOT on May 18, 2017. The meeting included a discussion of providing project background and potential routes. Discussion focused on routes along state highways including U.S. Highway 169, U.S. Highway 22, and U.S. Highway 14.

7.1.2.4 Minnesota Board of Water and Soil Resources

A meeting was held with the BWSR on May 31, 2017. The meeting included a discussion of providing project background and potential routes. Discussion focused on routes that intersected with BWSR easements. BWSR staff indicated that they would evaluate the project for compatibility with the conservation plan developed by the Soil and Water Conservation District for their easements.

7.1.2.5 Minnesota Department of Agriculture

Project representatives met with the MNDOA on December 19, 2017. The meeting included a discussion of providing Project background and proposed route options. Department of Agriculture staff indicated that it recommends preparation of Agriculture Mitigation Plans for large (345 kV) transmission projects. Applicants and MNDOA will work cooperatively to develop an Agriculture Mitigation Plan.

7.1.3 Local Government Units

7.1.3.1 Mankato

Project representatives met with City of Mankato staff on January 31, 2017. The meeting included a project overview, a description of the permitting process and timeline. The city provided information on future development and requested to be kept informed of the process.

Project representatives provided a project overview presentation to the Mankato City Council on June 12, 2017.

A second City of Mankato staff meeting was held on August 22, 2017 to discuss specific concerns on potential routes east of the city. The city provided comments regarding the routes impact on future land use and indicated that they would prepare and submit written comments.

The City of Mankato submitted written comments to the Project docket in a memorandum dated October 13, 2017. These comments included information on routes including a proposed solar facility planned on the Blue Route.

7.1.3.2 North Mankato

Project representatives met with City of North Mankato staff on January 31, 2017. The meeting included a project overview, a description of the permitting process and timeline. The city provided information on future city boundaries.

Project representatives provided a project overview presentation to the North Mankato City Council on June 5, 2017.

A second meeting with City of North Mankato was held on July 19, 2017. This meeting included several residents. Feedback received included an objection to the route segment along Rockford Road. This segment was opposed by residents of the neighborhood east of Rockford Road and by the owner of large tracts of land along Rockford Road. Another landowner indicated that he is planning a housing development on a parcel east of Rockford Road and therefore opposed this section of the Green and Red routes. The city provided preliminary mapping of these potential developments and expressed an objection to any route segments that cross possible future development areas.

The City of North Mankato submitted comments to the Project docket on August 7, 2017 (Docket No. E002, ET6675/CN-17-184).

A third meeting was held on August 21, 2017 to discuss additional segments that are being considered west of North Mankato in Belgrade Township. The Applicants indicated they were planning a notice mailing that the additional routes were being considered. North Mankato staff referred to its memo indicating that it objected to all of the routes on its western fringe.

7.1.3.3 Nicollet County

Project representatives met with Nicollet County staff on February 15, 2017. Staff provided some general guidance that existing corridors are preferred and suggested avoiding river bottom roads and a county park at Minnemishinona Falls.

A second meeting was held with county staff on September 28, 2017 to discuss potential new route segments in Belgrade Township and to discuss the permitting process.

Nicollet County submitted written comments in a letter to the Project dated October 10, 2017. The letter includes a county board resolution and identifies what Nicollet County identified as objectionable impacts from route segments in the area west of Mankato and indicates that these impacts can be avoided by following the Purple Route.

7.1.3.4 Blue Earth County

A meeting was held at Blue Earth County on February 15, 2017 to provide an overview of the Project. County staff inquired about effects of the Project and provides some guidance on routing along roads and bike trails.

7.1.3.5 Faribault County

On March 23, 2017, Project representatives met with Faribault County staff to provide a project overview. Staff indicated that they were aware of wind development occurring south of the Project Study Area and inquired about economic benefits of the Project.

7.1.3.6 Martin County

On March 23, 2017, Project representatives met with Faribault County staff to provide a Project overview. Staff noted that only a small segment of one route is in Martin County.

7.1.3.7 Butternut Valley Township

Project representatives attended a township meeting on June 19, 2017. Township supervisors indicated that if the route were approved through the township, another line built parallel to the existing line would not be acceptable. A route built as a double-circuit may be preferable especially if it were built on a single pole structure.

7.1.3.8 Belgrade Township

The Belgrade Township Board passed a resolution on September 12, 2017 requesting Applicants re-evaluate recently proposed route segments in Belgrade Township and supporting routes along existing infrastructure routes.

Project representatives attended a Belgrade Township meeting on October 10, 2017. The meeting was attended by approximately 50 residents many of whom opposed the new segments introduced in Belgrade Township. Specific objections were proximity to homes and a disapproval of introducing new routes to avoid future development in the City of North Mankato.

Township residents submitted a petition, signed by 32 people, dated October 10, 2017, requesting withdrawal of routes through Belgrade Township (refer to Appendix G).

7.2 PUBLIC INFORMATION OUTREACH

7.2.1 Mailings and Newsletters

There were 25,000 public outreach mailers sent out to the parcels in the Project Study Area. Landowners that have multiple parcels received multiple mailings; therefore, the number of mailers sent out is an overrepresentation of the number of landowners that may be impacted.

Local media covered the open houses. Newspaper articles and news stations provided information about the open houses.

7.2.2 Open House Meetings

As discussed in Section 3.2.5, the Applicants hosted two open houses for the Project. Open house invitations were also sent to each land parcel within the Project Study Area. The open house invitation provided information such as a general project description, a map of the Project Study Area and Initial Route Network, the Project's website address, and contact information to submit questions and comments.

The first round of open houses was held on June 20, 2017 at the Maple River High School in Mapleton, Minnesota. The second was on June 21, 2017 at the Courtyard by Marriott in Mankato, Minnesota. Both open houses had two sessions, an afternoon and an evening. The goal of the open house meetings was to gather input from the public on several different transmission line routing options. The route options displayed were preliminary and Project staff communicated that none of the routes were preferred over another at this point in the process.

The open houses had several stations to better display and communicate the Project to the attendees. Attendees could identify their property on large poster-sized route maps and Project staff provided a description of the route option, if requested. Several booths were also set up and staffed by the Applicants to give the attendees more detailed information and to answer any questions (refer to Section 3.2.5 and Appendix E).

7.2.3 Summary of Common Themes

During the open house meetings, formal and informal comments were collected and summarized. There were 176 comments submitted about the Project and common themes included:

- Concern about crossing through farmland and potential impacts agricultural practices;
- Follow section lines, rather than cutting through farmland and dividing the land;
- Concern about using double poles because they are difficult to farm around;
- Avoid environmentally sensitive areas and preserve natural beauty;
- Concern impacts associated with the Blue Earth River crossing;
- Several registered airstrips in the area could be negatively impacted;
- Concern for transmission line safety, especially in residential areas;
- Follow existing transmission lines, highways, or railroads to keep the need for new right of way at a minimum;
- Concern over decreased property values and hindrance to development;
- Preference for single, aesthetically pleasing poles; and
- Request to keep away from developing neighborhoods to preserve pristine views.

7.3 ROUTE SEGMENTS INCORPORATED THROUGH PUBLIC AND AGENCY INVOLVEMENT

The Applicants worked with the public and agencies to inform the routing process. The following is a summary of route segments incorporated through consultation with stakeholders.

- The Applicants shifted a section of the Purple Route after meeting with the USFWS due to concerns related to the natural resources (e.g., riparian areas, wetlands) present along the western segment alignment in addition to the two WPAs and a WMA in the area (refer to Appendix E). Similarly, the USFWS indicated a preference for the southern section of the Red and Blue routes to follow an existing road (160th Street) instead of following an existing transmission line for crossing the Prescott WPA.
- The City of North Mankato and a group of landowners/residents objected to the route segment west of North Mankato. In response to these objections, Applicants added two segments farther to the west and sent a mailing to newly affected landowners. After listening to feedback from Belgrade Township residents, Applicants compared the three route segments in this area and selected the middle of the three segments to include as the primary route (the Green and Red routes). Applicants include the other two options in this area as alternative segments because a clear consensus was not achieved since three options have different types of impacts (i.e., future land use vs. a more rural setting and natural resources).
- Residents of Belgrade Township requested a different alignment in November 2017. Applicants studied the requested alignment and found it to have merit. Applicants refined the alternative, sent a mailing to affected landowners and incorporated the change into Route Alternative - Segment A.
- A resident suggested a route segment near Easton/Delavan, near what was selected as the Blue Route. Applicants included the suggested route in the comparative analysis (refer to Appendix E). Data showed that the suggested route had more homes near it than the initial route. Applicants chose to include the initial route in this area and not modify as suggested by the landowner.
- A resident near St. Clair noted that a grass air strip was present perpendicular to the Blue Route. Applicants added two segments that avoided impact to the airstrip. Surrounding landowners were notified of the addition of the two new segments. Further analysis led to Applicants incorporating one of the two new segments into the Blue Route.

- The MNDNR reviewed the initial route network using GIS shapefiles provided by the Applicants and identified areas (primarily along the Purple Route) where a shift in alignment could improve a feature crossing. In response to the request, the Applicants updated the route at the Watonwan River, and Elm and Willow Creeks crossings along the Purple Route.
- The City of Mankato submitted written comments in a memorandum dated October 13, 2017. These comments included information regarding a proposed solar facility along the Blue Route. The Applicants shifted the Blue Route to the east less than 900 feet to avoid the proposed solar facility development.

8.0 REQUIRED PERMITS, APPROVALS, AND CONSULTATIONS

The Project will require numerous regulatory permits, reviews, and approvals. Table 8.0-1 provides a summary of the major permits, approvals, and consultations that may be required for the Project. During the preparation of this Application, key agency consultations were initiated in May 2017 to introduce the Project, inform them about the Commission's Certificate of Need and Route Permit processes, and to gather initial feedback and request their participation. All permits, licenses, approvals, or consultations required for the Project will be obtained prior to construction beginning in the applicable areas.

Table 8.0-1
Summary of Potential Permits, Approvals, and Consultations

Administering Agency	Permit, Approval, or Consultation
Federal	
U.S. Army Corps of Engineers (USACE), St. Paul District	Section 404, Clean Water Act (CWA) – Dredge and Fill
USACE, St. Paul District	Section 10 Rivers and Harbors Act
U.S. Fish and Wildlife Service (USFWS),	Special Use Permit for work in waterfowl production areas
Federal Aviation Administration (FAA)	Part 7460 review
Native American Tribes	National Historic Preservation Act (NHPA), coordination upon request in support of USACE Section 106 consultation to determine impacts on Traditional Cultural Properties[22]
State	
MPCA	National Pollutant Discharge Elimination System (NPDES) Stormwater Permit
MPCA	Section 401 CWA Water Quality Certification
Minnesota Department of Natural Resources (MNDNR)	License to Cross Public Waters or State Lands Public Water Works Permit
Board of Water and Soil Resources	Conservation easements, Wetland Conservation Act
MNDNR	State Protected Species Consultations
Minnesota State Historic Preservation Office (SHPO)	Section 106 Consultation, NHPA
Minnesota Department of Transportation (MNDOT)	Utility Permit on Trunk Highway Right-of-Way (Long Form No. 2525)
MNDOT	Driveway Access
MNDOT	Oversize/overweight permits

[22] Consultation is performed by the USACE.

Table 8.0-1
Summary of Potential Permits, Approvals, and Consultations

Administering Agency	Permit, Approval, or Consultation
Minnesota Department of Agriculture (MNDOA)	Agriculture Mitigation Plan
Local	
County, Township, City, BWSR	Minnesota Wetland Conservation Act (WCA) approvals
Soil and Water Conversation Districts	Coordination meetings
County, Township, City	Lands Permits
County, Township, City	Overwidth/Overweight Loads Permits
County, Township, City	Road Crossing Permits
County, Township, City	Driveway/Access Permits

8.1 FEDERAL APPROVALS

8.1.1 USACE, Section 404, Clean Water Act, Permit

A Section 404 permit is required from the USACE under the CWA for discharges of dredged or fill material into waters of the United States. The Applicants will apply for these permits once a Route Permit is issued for the Project.

The Project would not require replacement wetlands under Minnesota law because it would be covered under the Federal Approvals exemption for utilities. In accordance with Minnesota Statute § 103G.2241, subd.3 and 6 and Minnesota Rules 8420.0420, subp.4, a replacement plan is not required for wetland impacts resulting from the construction, maintenance, or repair of utility lines, when such a project is authorized by the USACE under Section 404 of the CWA. The Applicants will submit a Notice of Exemption to all LGUs after a Route Permit is issued, concurrent with the submittal of the USACE application.

8.1.2 USACE, Section 10, Rivers and Harbors Act, Permit

The USACE regulates impacts to navigable waters of the United States under Section 10 of the River and Harbors Act. The Applicants will apply for a permit to cross the Minnesota River once a Route Permit is issued for the Project.

8.1.3 FAA, Part 7460 Review

FAA notice and approval are required for structures 200 feet above ground level or those that may exceed an imaginary surface extending outward and upward at certain slopes defined in the Code of Federal Regulations Chapter 77.9. Form 7460-1 shall be submitted to the FAA for notice of construction. Each individual structure meeting these requirements will be registered for notice, which would include information such as the latitude and longitude, structure height, and the elevation at the structure location. The FAA then conducts an aeronautical study for potential airspace impacts and issues a determination of hazard or no hazard. If a structure location is changed prior to construction, it is necessary to resubmit Form 7460-1 for that structure. When the construction is complete, as-built information will be submitted using Form 7460-2.

8.1.4 USFWS, Special Use Permit

A Special Use Permit is required from the USFWS if the route selected intersects with USFWS-owned land or easements. The Applicants initiated consultation with USFWS staff at the Minnesota Valley Wildlife Refuge and Windom Wetland Management District on August 8, 2017 to discuss the potential crossings within existing transmission line easements at the Nelson and Roberts WPAs along the Purple and Red routes, respectively.

8.1.5 USFWS, Incidental or Non-Purposeful Take Permit

The Endangered Species Act of 1973, as amended, (ESA) directs the USFWS to identify and protect endangered and threatened species and their critical habitat. Section 9 of the ESA prohibits take of federally-listed species; take is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct" The term "harm" includes significant habitat alteration which kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. There are three federally-listed species in the Project Study Area: the NLEB (found throughout the Project Study Area), the prairie bush clover (found only in Martin County), and the rusty patched bumble bee.

Projects involving federal lands, funding or authorizations require consultation between the lead federal agency (i.e., the USACE) and the USFWS, pursuant to Section 7 of the ESA. If it is determined a project will have adverse impacts on a listed species, a Biological Opinion and Incidental Take Statement will be issued by the USFWS.

Project-specific consultations were initiated with the USFWS Twin Cities Ecological Services Field Office on August 15, 2017. Based on these consultations, the Applicants do not anticipate adverse impacts on federally-listed species therefore, an Incidental Take Permit will be not necessary.

8.1.6 Spill Prevention, Control and Countermeasure Plan

A Spill Prevention, Control and Countermeasure (SPCC) plan is required to contain and prevent discharge of oil or other petroleum products into waters of the United States. Should minimum volume requirements be met for construction (e.g., fuel storage) and substation operation for the Project, the Applicants will develop the necessary SPCC plans.

8.2 MINNESOTA STATE APPROVALS

The Applicants will apply for state permits and authorizations after a Route Permit is issued for the Project.

8.2.1 MPCA, NPDES Permit

The MPCA requires an NPDES Permit for stormwater discharges associated with construction activities disturbing one acre of land or greater. Prior to construction, the Applicants will obtain a construction stormwater permit and develop and implement a SWPPP that identifies BMPs and construction measures to contain soils and to minimize discharge of sediment during stormwater events.

8.2.2 MPCA, Section 401, Clean Water Act

The MPCA requires Section 401 water quality certification to obtain a federal permit for any activity potentially resulting in discharge to waters of the United States. This certification ensures the Project will comply with state water quality standards according to the CWA.

8.2.3 MNDNR, License to Cross Public Waters or State Lands

A MNDNR Utility License is required for the passage of any utility over, under, or across any public land or public waters. The MNDNR Division of Lands and Minerals is responsible for granting approval in the form of a crossing license. In addition to a long-term license fee, there is a one-time crossing fee for each waterbody crossed. Agency review time of the application varies depending on the crossing technique and involves review and approval from several state departments and associated divisions.

8.2.4 MNDNR, Threatened and Endangered Species Consultation

Pursuant to Minnesota's Endangered Species Statute, the MNDNR is required to adopt rules designating species meeting the statutory definitions of endangered, threatened, or species of special concern and regulate treatment of these species.

After receiving a Route Permit, Applicants will consult with the MNDNR regarding any Project-specific construction considerations related to Minnesota's Endangered Species Statute.

8.2.5 MNDOT, Utility Permit

The Applicants will apply for a Utility Accommodation on Trunk Highway Right of Way (Form 2525) for work along U.S. Highway 169 and other roadways as necessary. This permit is required for the construction of utility facilities crossing or paralleling existing trunk highway rights-of-way.

8.2.6 MNDOT, Driveway Access Permit

The Applicants will apply for an Access/Driveway Permit (Form 1721) for using driveways and access points to trunk highways crossed or paralleled by the Project during construction.

8.2.7 MNDOT, Oversize/Overweight Permits

The Applicants will apply for oversize and/or overweight permits for all vehicles using state trunk highways during construction and operation of the Project. These permits are required for vehicle loads of excess height, length, and/or weight, although overlength utility poles may be exempt. Certain overwidth and/or overlength loads require escorts, which the Applicants will arrange as necessary.

8.2.8 MNDOA, Agriculture Mitigation Plan

The Applicants will develop an Agriculture Mitigation Plan for the Project. Applicants will consult with the MNDOA to develop a plan that details the measures to be implemented during construction of the Project to avoid, mitigate, or compensate for impacts on agricultural lands that may occur during construction. This plan will describe measures and BMPs used in agricultural land to minimize any negative impacts on cultivated fields and drain tile systems. Landowners would be compensated for any loss of or damage to crops, or for lands that would be cannot be planted because of Project construction activities.

8.3 MINNESOTA LOCAL APPROVALS

Once the Commission issues a Route Permit, local zoning, building and land use regulations and rules are preempted.[23] Typical other approvals associated with transmission line and associated facility construction are further detailed below.

8.3.1 Lands Permits, Including Road Crossing/Right-of-Way Permits

These permits may be required to occupy county, township, and city right-of-way and lands such as park lands, watershed districts, or other properties owned by these entities.

8.3.2 Over-width/Overweight Loads Permits

These permits may be required to move over-width or heavy loads on county, township, or city roads and will be obtained once a Route Permit has been issued by the Commission.

8.3.3 Driveway/Access Permits

These permits may be required to construct access roads or driveways that access county, township or city roadways and will be obtained once a Route Permit has been issued by the Commission.

8.4 OTHER APPROVALS

There are lands throughout the Project Study Area that are part of various conservation programs including RIM and CREP. The Applicants will work with landowners, local government entities administering such programs, and/or the sponsoring federal agencies on a site-specific basis to coordinate the approvals necessary for placing the transmission facilities on these lands.

---

[23] Minn. Stat. § 216E.10, subd. 1.

9.0 REFERENCES

Anfinson, S.F. 1997. Southwestern Minnesota Archaeology: 12,000 Years in the Prairie Lake Region.

Blue Earth County. 2012. Blue Earth Planning and Zoning Ordinance Chapter 24. Accessed August 2017 online at https://library.municode.com/mn/blue_earth_county/ordinances/code_of_ordinances?nodeId=570913.

Blue Earth County. 2017. Zoning Maps for Judson, Butternut Valley, Lincoln, Ceresco, and Pleasant Mound Townships. Accessed August 2017 online at: http://www.blueearthcountymn.gov/346/Zoning-Maps.

Bright, R. C., C. Gatenby, D. Olson, and E. Plummer. 1990. A survey of the mussels of the Minnesota River, 1989. Report to the Minnesota Department of Natural Resources, St. Paul, MN. 106 pp.

Chirpich, W. 2017. Personal Communication. Martin County Planning & Zoning districts.

City of Mankato. 2011. Land Use Plan Maplan Map. Accessed October 2017 online at: https://www.mankatomn.gov/home/showdocument?id=1028.

City of Mankato Zoning. 2017. City of Mankato Zoning Map. Accessed September 2017 online at: https://www.mankatomn.gov/home/showdocument?id=1030.

City of North Mankato. 2016. Planned Growth. Accessed September 2017 online at https://www.northmankato.com/sites/default/files/documents/PlannedGrowth.pdf.

Electric Power Research Institute (EPRI). 1982. Transmission Line Reference Book, 2nd Edition. Palo Alto, CA.

Faribault County. 2007. Faribault County Zoning Ordinance. Accessed August 2017 online at http://www.faribaultcountyswcd.com/FileLib/Zoning%20Ordinance.pdf

Faribault County. 2008. Faribault County, Minnesota Zoning Districts. Accessed August 2017 online http://www.faribaultcountyswcd.com/FileLib/Zoning_Districts.pdf.

Federal Highway Administration (FHWA). 2017. Office of Planning, Environment, and Realty, Noise, Construction Noise. Accessed September 2017 online at: https://www.fhwa.dot.gov/environment/noise/construction_noise/.

Houghton, D. 2012. Biological diversity of the Minnesota caddisflies (Insecta, Trichoptera). Accessed December 2017 online at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3345922/citedby/.

Martin County. 2008. Martin County Zoning Ordinance. Accessed August 2017 online at http://www.co.martin.mn.us/images/Ordinances/Martin_County_Zoning_Ordinance.pdf.

Minnesota Board of Water and Soil Resources (MN BWSR). 2017. The Minnesota CREP – A Plan to Improve Water Quality and Enhance Habitat. Accessed September 2017 online at: http://www.bwsr.state.mn.us/crep/.

Minnesota Department of Health (MDH). 2017a. Minnesota Well Index. Accessed September 2017 online at: http://www.health.state.mn.us/divs/eh/cwi/.

MDH. 2017b. Reports and Geospatial Data, Source Water Protection, Wellhead Protection Areas. Accessed October 2017 online at: http://www.health.state.mn.us/divs/eh/water/swp/maps/index.htm.

Minnesota Department of Natural Resources (MNDNR). 2001. Minnesota Ground Water Provinces. MnDNR Division of Waters.

MNDNR. 2007. Prairie Bush Clover: A Threatened Midwestern Prairie Plant. Minnesota Natural Heritage and Nongame Research Program. Accessed September 2017 online at: http://files.dnr.state.mn.us/natural_resources/ets/prairie_bush_clover.pdf

MNDNR. 2016. Minneopa State Park. Accessed August 2017 online at http://files.dnr.state.mn.us/maps/state_parks/spk00235.pdf.

MNDNR. 2017a. Ecological Classification System, Ecological Land Classification Hierarchy. Accessed September 2017 online at: http://www.dnr.state.mn.us/ecs/index.html

MNDNR. 2017b. Ecological Classification System, Big Woods Subsection. Accessed September 2017 online at: http://www.dnr.state.mn.us/ecs/222Mb/index.html.

MNDNR. 2017c. Ecological Classification System, Minnesota River Prairie Subsection. Accessed September 2017 online at: http://www.dnr.state.mn.us/ecs/251Ba/index.html

MNDNR. 2017d. Minnesota State Water Trails. Accessed October 2017 online at: http://www.dnr.state.mn.us/watertrails/index.html

MNDNR. 2017e. Minnesota Department of Natural Resources Rare Species Guide. Accessed October 2017 online at: http://dnr.state.mn.us/rsg/index.html

MNDNR. 2017f. Species Profile: *Myotis septentrionalis* - Northern long-eared bat. Accessed October 2017 online at: http://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AMACC01150

MNDNR. 2017g. Species Profile: *Lespedeza leptostachya* - Prairie Bush Clover. Accessed October 2017 online at: http://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PDFAB27090

MNDNR. 2017h. Species Profile: *Spilogale putorius* – Eastern spotted skunk. Accessed December 2017 online at: http://dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AMAJF05010.

MNDNR. 2017i. Species Profile: *Lanius ludovicianus* – Loggerhead shrike. Accessed December 2017 online at: http://dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=ABPBR01030

MNDNR. 2017j. Species Profile: *Elliptio dilatata* – Spike Mussel. Accessed December 2017 online at: http://dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IMBIV14100

MNDNR. 2017k. Species Profile: *Simpsonaias ambigua* – Salamander Mussel. Accessed December 2017 online at: http://dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IMBIV41010

MNDNR. 2017l. Species Profile: *Polyodon spathula* – Paddlefish. Accessed December 2017 online at:

http://dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AFCAB01010.

MNDNR. 2017m. Species Profile: *Emydoidea blandingii* – Blanding's Turtle. Accessed December 2017 online at: http://dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=ARAAD04010.

MNDNR. 2017n. Species Profile: *Huperzia porophila* – Rock Fir Moss. Accessed December 2017 online at: http://dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PPLYC02080.

MNDNR. 2017o. Species Profile: *Rudbeckia triloba var.* triloba – Three-leaved Coneflower. Accessed December 2017 online at: http://dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PDAST850H3.

MNDNR. 2017p. Species Profile: *Rhynchospora capillacea* – Hair-like Beak Rush. Accessed December 2017 online at: http://dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PMCYP0N070.

MNDNR. 2017q. Minnesota Biological Survey Site Biodiversity Significance Ranks. Accessed October 2017 online at: http://www.dnr.state.mn.us/eco/mcbs/biodiversity_guidelines.html

Minnesota Department of Transportation (MNDOT). 2003. Aggregate Sources: Gravel Pit and Rock Quarry Aggregate Source Information – County Pit Maps. Accessed October 2017 online at http://www.dot.state.mn.us/materials/aggcopitmaps.html.

MNDOT. 2015. Aggregate Source Information System (ASIS). Accessed October 2017 online at http://www.dot.state.mn.us/materials/aggsource.html.

MNDOT. 2016. Traffic Forecasting & Analysis, Data Products. Accessed December 2017 online at: http://www.dot.state.mn.us/traffic/data/data-products.html.

MNDOT. 2017. Plans, Studies, and Future Construction. Accessed October 2017 online at: http://www.dot.state.mn.us/roadwork/future.html.

Minnesota Pollution Control Agency (MPCA). 2007. Minnesota Statewide Mercury Total Maximum Daily Load. Accessed October 2017 online at: https://www.pca.state.mn.us/sites/default/files/wq-iw4-01b.pdf.

MPCA. 2008. A Guide to Noise Control in Minnesota – Acoustical Properties, Measurement, Analysis, and Regulation. Accessed October 2018 online at https://www.pca.state.mn.us/sites/default/files/p-gen6-01.pdf.

MPCA. 2017. Minnesota Pollution Control Agency Annual AQI Summary Report. Accessed October 2017 online at: https://www.pca.state.mn.us/air/annual-aqi-summary-reports

Minnesota Department of Public Safety. 2016. ARMER Sites. Accessed August 2017 online at https://dps.mn.gov/divisions/ecn/programs/armer/Documents/Armer%20Site%20Map/ARMER%20Site%20Map%202016-06-01.pdf

Minnesota State Interagency Working Group on EMF Issues (MN Working Group). 2002. A White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options. Accessed September 2017 online at: http://www.capx2020.com/Images/EMFWhitePaper2002.pdf

Minnesota Wildflowers. 2017. *Berula erecta* (Cut-leaf Water Parsnip). Species profile. Accessed December 2017 online at: *https://www.minnesotawildflowers.info/flower/cut-leaf-water-parsnip*.

National Audubon Society (NAS). 2013. Important Bird Area Criteria Overview. Accessed October 2017 online at: http://web4.audubon.org/bird/iba/criteria.html.

NAS. 2015. Important Bird Areas Program. Accessed October 2017 online at: http://web4.audubon.org/bird/iba/

NAS. 2017. Important Bird Areas. Accessed October 2017 online at: http://www.audubon.org/important-bird-areas/upper-minnesota-river-valley-iba

National Cancer Institute. 2017. Electromagnetic Fields and Cancer. Accessed August 2017 online at: https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/electromagnetic-fields-fact-sheet (updated May 2017).

Nicollet County. 2016. Nicollet County Zoning Ordinance. Accessed August 2017 online at http://www.co.nicollet.mn.us/DocumentCenter/Home/View/371.

Rampi, L.P., Knight J.F., and Bauer, M. 2016. Minnesota Land Cover Classification and Impervious Surface Area by Landsat and Lidar. 2013 Update. Accessed September 2017 online via the Data Repository for the University of Minnesota at: https://conservancy.umn.edu/handle/11299/181555

Robertson, M. 2012. Minnesota State Demographic Center: Minnesota Population Projections by County, 2015-2040. Accessed April 2017online at: http://www.demography.state.mn.us/projections2015-2040.htm .

U.S. Army Corps of Engineers (USACE). 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0). Accessed September 2017 online at: http://www.usace.army.mil/Portals/2/docs/civilworks/regulatory/reg_supp/erdc-el-tr-10-16.pdf

U.S. Census Bureau. 2010. American Fact Finder – Census 2010 Total Population. Accessed August 2017 online at https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml

U.S. Census Bureau. 2016. American Fact Finder – 2011 – 2015 American Community Survey. Accessed August 2017 online at https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml

U.S. Department of Agriculture (USDA). 2012. 2012 Census of Agriculture Publications. Accessed August 2017 online at https://www.agcensus.usda.gov/Publications/2012/

USDA. 2017a. Conservation Reserve Program. Accessed October 2017 online at: https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/index. Accessed September 2017.

USDA. 2017b. Natural Resources Conservation Service, Soil Survey Staff; Web Soil Survey. Accessed December 2017 online at: https://websoilsurvey.sc.egov.usda.gov/.

U.S. Environmental Protection Agency (EPA). 2016. Overview of the Drinking Water Sole Source Aquifer Program. Accessed September 2017 online at: https://www.epa.gov/dwssa/overview-drinking-water-sole-source-aquifer-program#What_Is_SSA.

EPA. 2017. Map of Sole Source Aquifer Locations, Geospatial Dataset. Accessed September 2017 online at: https://www.epa.gov/dwssa/map-sole-source-aquifer-locations.

USFWS. 1988. Lespedeza leptostachya Recovery Plan. U.S. Fish and Wildlife Service, Twin Cities, Minnesota. 41pp. Accessed October 2017 online at: https://ecos.fws.gov/docs/recovery_plan/881006.pdf.

USFWS. 2015a. Northern Long-eared Bat Fact Sheet. Accessed October 2017 online at: https://www.fws.gov/midwest/endangered/mammals/nleb/nlebFactSheet.html

USFWS. 2015b. Prairie Bush Clover Fact Sheet. Accessed October 2017 online at: https://www.fws.gov/midwest/endangered/plants/prairieb.html

USFWS. 2016. Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-eared Bat and Activities Excepted from Take Prohibitions. Accessed October 2017 online at: https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/BOnlebFinal4d.pdf

USFWS. 2017a. Information for Planning and Conservation (IPaC) Website. Accessed October 2017 online at: https://ecos.fws.gov/ipac/

USFWS. 2017b. White-Nose Syndrome Zone Map. Accessed October 2017 online at: https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf.