ROUTE PERMIT APPLICATION AND ENVIRONMENTAL ASSESSMENT FOR A 161-KV TRANSMISSION LINE IN MARTIN COUNTY, MINNESOTA

Submitted to:

MINNESOTA PUBLIC UTILITIES COMMISSION
DOCKET NO. IP7013/TL-25-389

Submitted by:

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DECEMBER 2025

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ACRONYMS AND ABBREVIATIONS

2022 Route Permit	Route Permit issued to Big Bend Wind issued September 28, 2022, MPUC docket Number IP-7013/TL-19-621
2025 Sample Route Permit	Sample (or template) route permit provided by EIP Staff in December 2025
Apex	Apex Clean Energy Holdings, LLC
APE	area of potential effect
APLIC	Avian Power Line Interaction Committee
Applicants	Big Bend Wind, LLC and Great River Energy
Application	Route Permit Application
Application Alignment	proposed alignment the transmission line will follow for purposes of this Application
AQI	Air Quality Index
ARMER	Allied Radio Matrix for Emergency Response
Big Bend	Big Bend Wind, LLC
Big Bend Transmission Line Extension Project	new 161-kV transmission line route and associated facilities, including new substations
BGEPA	Bald and Golden Eagle Protection Act of 1940
BMP	best management practice
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CSW Permit	Construction Stormwater Permit
CWA	Clean Water Act
CWI	County Well Index
dBA	A-weighted decibel
EA	Environmental Assessment
ECS	Ecological Classification System
EERA EA	EA for the Big Bend Wind Farm, Red Rock Solar Project, and Big Bend Wind 161-kV Transmission Line Project
EMF	electromagnetic fields

ESA	Endangered Species Act
Extension Project	Big Bend Transmission Line Extension Project
FAA	Federal Aviation Administration
GPS	global positioning system
IPaC	Information for Planning and Conservation
kV	kilovolt
kV/m	kilovolts per meter
mA rms	milliAmperes root mean square
MBTA	Migratory Bird Treaty Act
MDH	Minnesota Department of Health
MDNR	Minnesota Department of Natural Resources
MHz	megahertz
mG	milligauss
MGS	Minnesota Geological Survey
MIAC	Minnesota Indian Affairs Council
Minn. Stat. §	Minnesota Statute section
Minn. R. ch.	Minnesota Rules chapter
MISO	Midcontinent Independent System Operator
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MPUC	Minnesota Public Utilities Commission
MRO	Midwest Reliability Organization
MW	megawatt
N_2O	nitrous oxide
NAC	Noise Area Classifications
NAAQS	National Ambient Air Quality Standards
NESC	National Electrical Safety Code
NERC	North American Electric Reliability Corporation
NO_2	nitrogen dioxide
NOx	oxides of nitrogen
NLCD	National Land Cover Database
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Services
NRHP	National Register of Historic Places

NWI	National Wetlands Inventory
O_3	ozone
OSA	Office of the State Archaeologist
ppb	parts per billion
$PM_{2.5}$	fine particulate matter equal to or less than 2.5 microns in diameter
PM_{10}	particulate matter equal to or less than 10 microns in diameter
Extension Project	Big Bend Extension Transmission Line Project
Project Area	the general area within an approximate 1-mile radius of the Extension Project
Proposed Route	route for which Big Bend has acquired voluntary easements
Proposed Right-of-Way	necessary right-of-way for the safe construction and operation of the transmission line
PWI	Public Waters Inventory
ROI	region of influence
SDS	State Disposal System
SF_6	sulfur hexafluoride
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SSURGO	Soil Survey Geographic Database
subd.	subdivision
subp.	subpart
SWPPP	Stormwater Pollution Prevention Plan
USACE	United States Army Corps of Engineers
U.S.C	U.S. Code
USDA	United States Department of Agriculture
EPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VMP	Vegetation Management Plan

1.0 INTRODUCTION

On September 28, 2022, Big Bend Wind, LLC (Big Bend), an indirect subsidiary of Apex Clean Energy Holdings, LLC (Apex), received a Route Permit (2022 Route Permit) from the Minnesota Public Utilities Commission (MPUC) to construct an approximately 18-mile 161-kilovolt (kV) transmission line and associated facilities to interconnect its approximately 311.1-megawatt (MW) wind project to the transmission grid.[1]

Since MPUC issuance of the route permit, Big Bend has negotiated an offtake agreement with Great River Energy that requires a new interconnection point to the transmission grid. This change in the interconnection point results in the need for approximately 4.5 miles of additional 161-kV transmission line route and associated facilities, including new substations, not previously permitted, referred to as the Big Bend Transmission Line Extension Project (Extension Project) (see **Figure 1**). The Extension Project's location, as it relates to the wind farm and transmission line route permitted by the MPUC in the 2022 Route Permit, is shown on **Figure 2**.

In this Route Permit Application (Application), Big Bend and Great River Energy (collectively, the Applicants) request permission to construct and operate the Extension Project to connect the wind project to Great River Energy's Lakefield Generating Substation, which is associated with Great River Energy's Lakefield Junction Station, a natural-gas-fired generating plant, in Martin County. The combined output of the wind project and Lakefield Junction Station can collectively use the existing Interconnection Service that Great River Energy has established. This makes the interconnection point a "net-zero increase."

Big Bend filed a Surplus Interconnection Service at the Lakefield Generating Substation with Midcontinent Independent System Operator (MISO) in June 2024. MISO is currently finalizing its surplus studies. The Applicants' understanding, based on MISO study models and methodology, is that there will not be any negative grid impacts due to the wind project, which means no upgrades to the transmission grid will be necessary. Additionally, the Surplus Interconnection Service is separate from the standard MISO Definitive Planning Phase Generator interconnection process, which will help to prevent study delays, restudy due to other queue generators, or limited operation. This allows for bringing the wind project into service expeditiously and at low-risk.

This Application is submitted under Minnesota Statute Section (Minn. Stat. §) 216I.07 under the Standard Review Process. The Extension Project's 161-kV transmission line qualifies for standard review because it is a high voltage transmission line with a capacity between 100 and 300 kilovolts. Application requirements under the Standard Review Process are identified in **Appendix A**. The statute requires that Applicants propose one route but must also describe any alternative routes that were considered but rejected and provide the reasons for rejecting them. **Chapter 4.0** describes one alternate route segment and one alternative route that Big Bend considered and rejected.

The Applicants are applying for a route permit for the Extension Project, rather than an amendment to the 2022 Route Permit, because the Extension Project involves an additional owner, Great River Energy; the Standard Review Process ensures that the potential human and environmental impacts of the approximately 4.5 miles of new right-of-way are analyzed in an

[1] Minnesota Public Utilities Commission, Docket Number IP-7013/TL-19-621.

environmental assessment; and the new landowners along the Extension Project have an opportunity to participate in the MPUC's route permit process.

Big Bend respectfully requests that the MPUC issue a route permit for the Extension Project and authorize a variable route width of 200 to 635 feet. Big Bend requests an expanded route width of up to 1,711 to 1,731 feet on Great River Energy-owned property to provide flexibility to route the transmission line to the new substations given other existing transmission lines on the parcel (see **Figure 3**). These substations are within a Substation Development Area, which is depicted on **Figure 4**. Route widths are shown on the detailed maps in **Appendix B**.

The transmission line presented in this Application represents Big Bend's effort to identify a route that follows existing roads and/or parcel lines to the extent practicable, avoids residences, and minimizes impacts on the environment and the typical farming practices of the affected landowners for which Big Bend has voluntary easements (the Proposed Route). This Application and Environmental Assessment (EA) demonstrate that construction of the Extension Project along the Proposed Route will comply with the applicable standards and criteria set out in Minn. Stat. § 216I.05, subdivision (subd.) 11. The Extension Project, as proposed, will support the State's goals to conserve resources, minimize environmental, human settlement, and land use impacts, and support the State's electric energy security.

Figure 1. Extension Project Overview Map

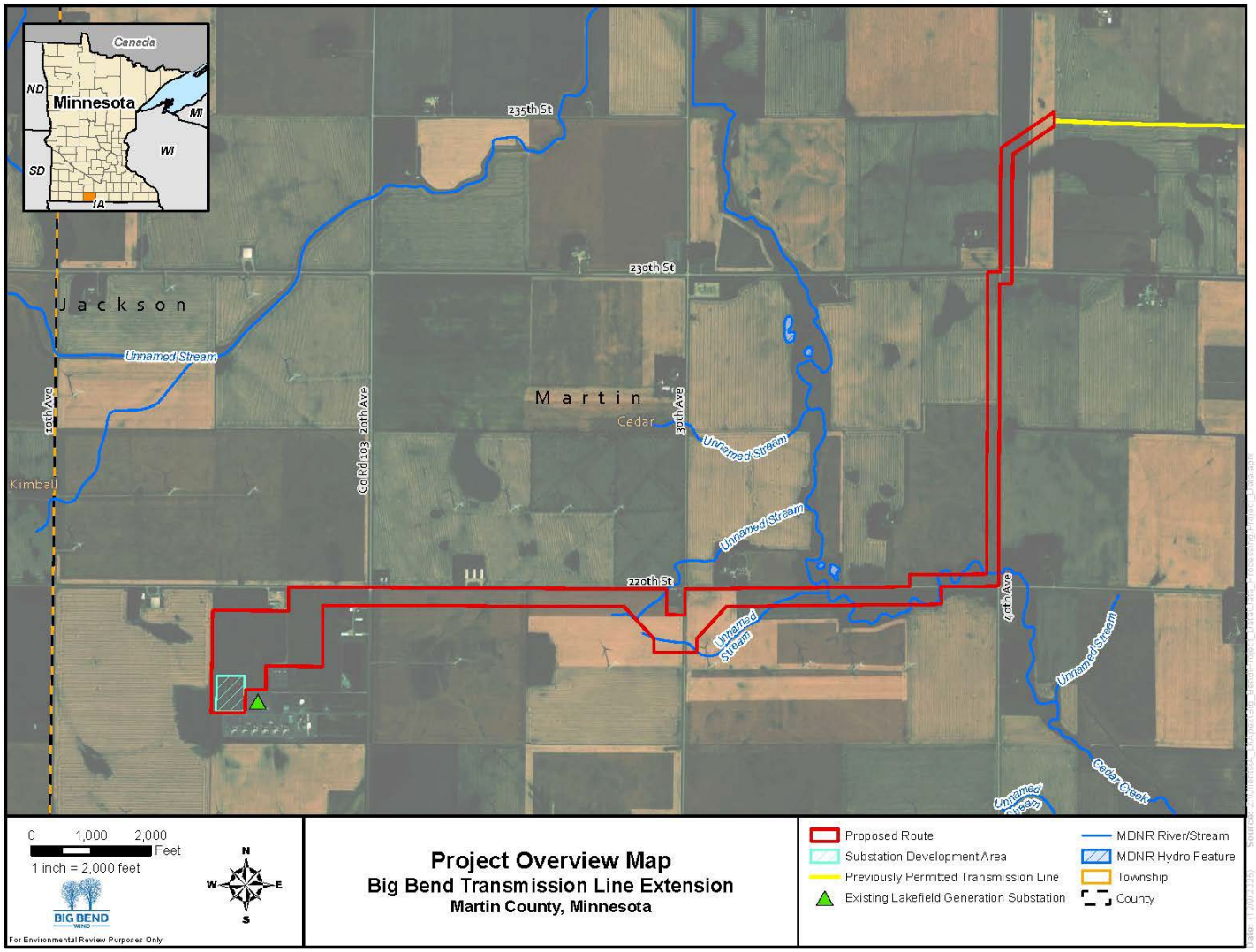


Figure 2 Wind Farm and Extension Project

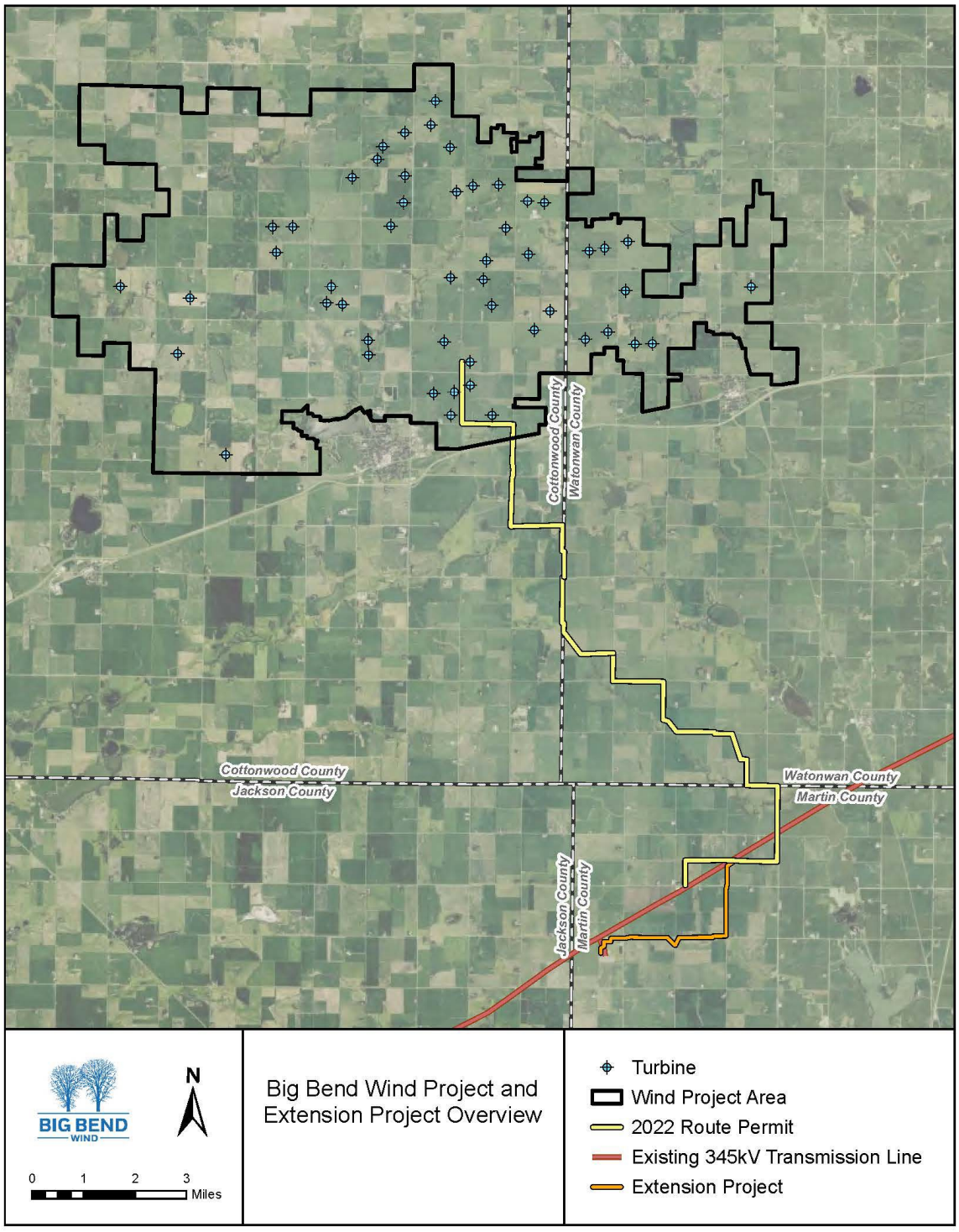


Figure 3 Great River Energy Interconnection Parcel

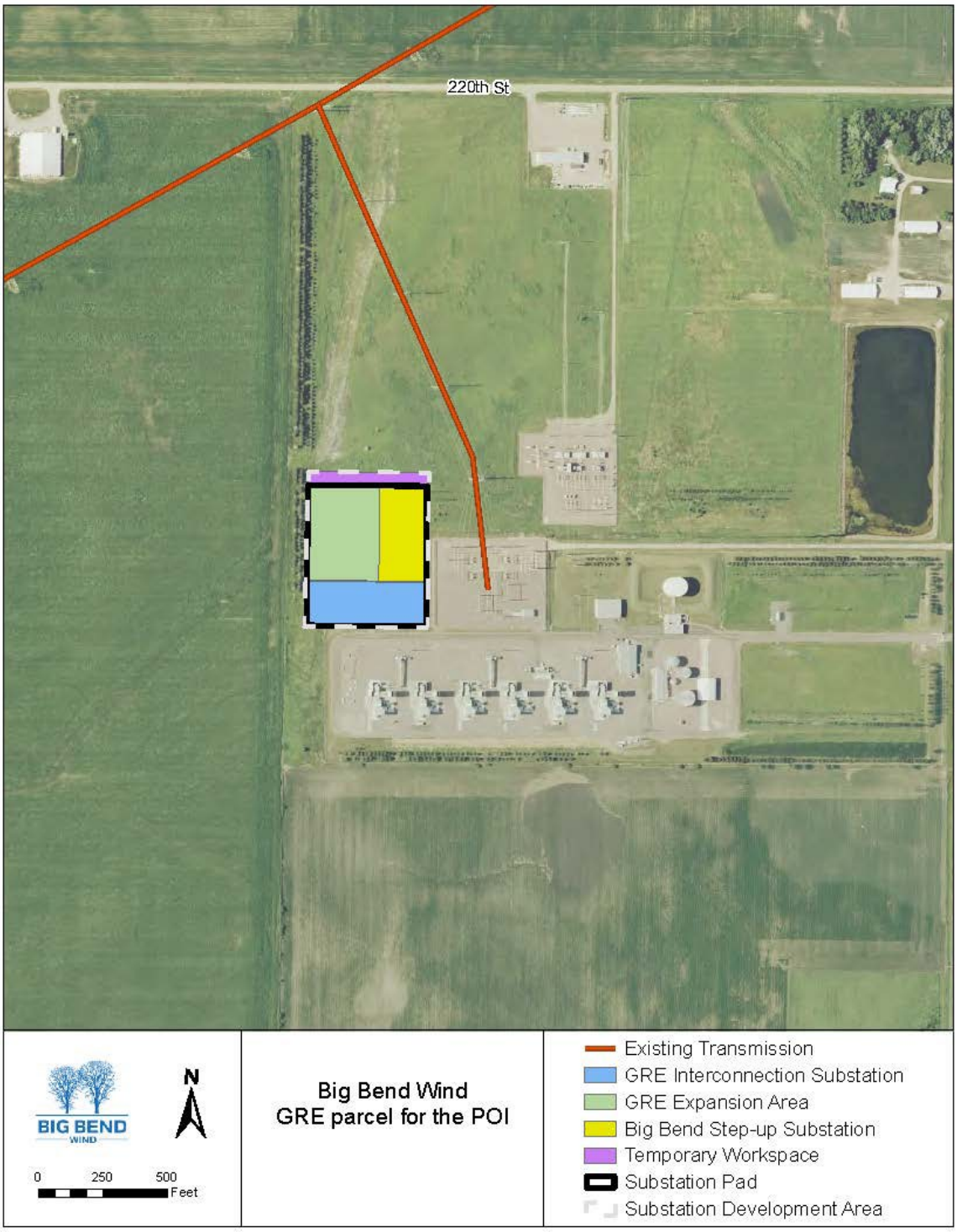
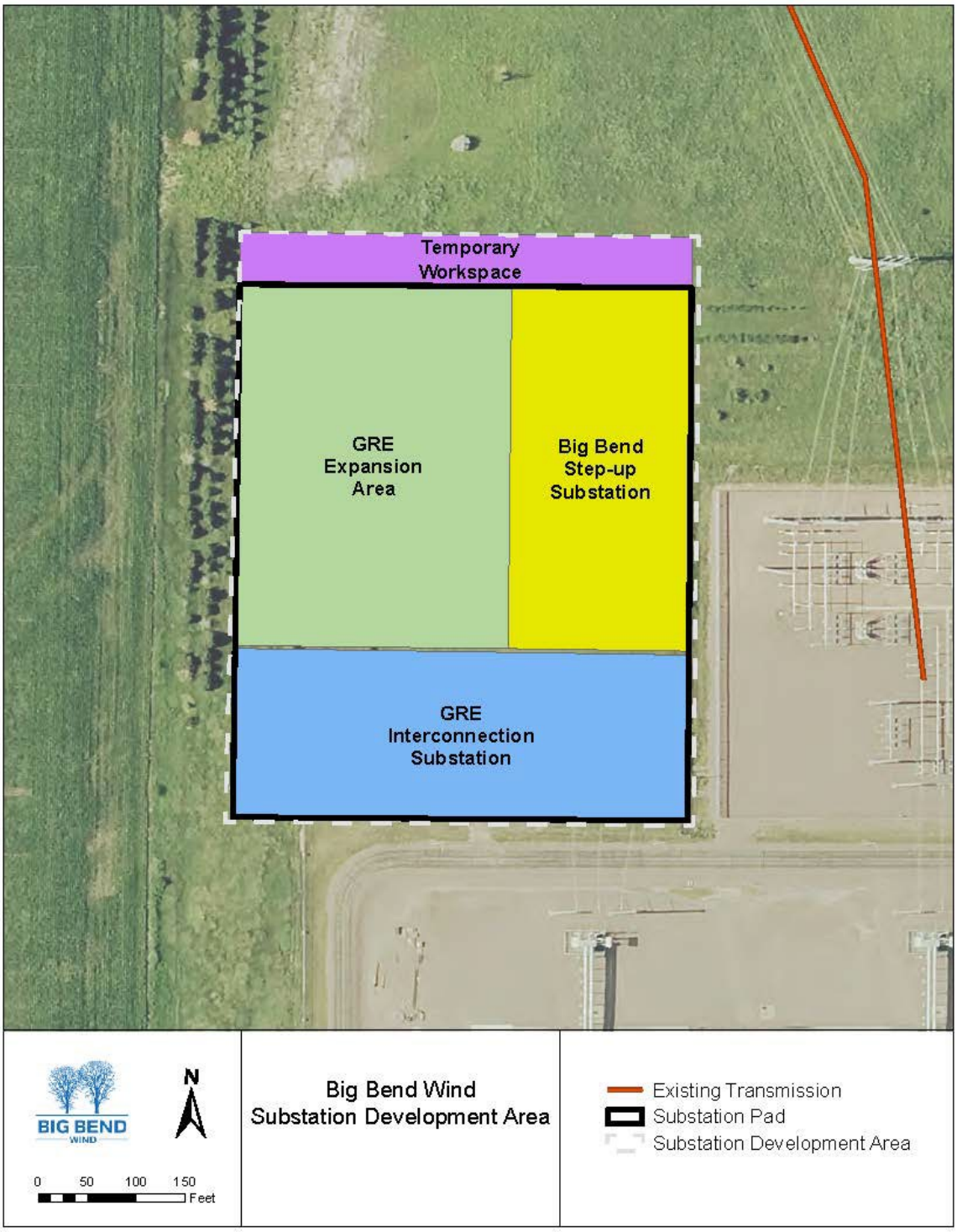


Figure 4 Substation Development Area



1.1 Big Bend Wind, LLC

Big Bend is developing an approximately 311.1 MW wind project and associated facilities in portions of Cottonwood, Watonwan, and Martin Counties. The wind project is more fully described in Big Bend's Site Permit Application and related filings in MPUC Docket Number IP-7013/WS-19-619. The MPUC issued Big Bend a site permit for the wind project in September 2022 and extended the site permit in December 2024.

Founded in 2009, Apex is a full-service renewable energy company that develops, constructs, and operates utility-scale generation and associated transmission facilities across the United States. Driven by a team of more than 400 professionals and headquartered in Charlottesville, Virginia; Apex has developed more than 45 projects totaling over 8 gigawatts of capacity. In 2024 alone, Apex constructed eight projects across the country: three solar projects, three wind projects, and two energy storage projects.

1.2 Great River Energy

Great River Energy provides electricity and related services to approximately 1.7 million people and serves two-thirds of Minnesota and parts of Wisconsin. Great River Energy's electric system is interconnected directly with neighboring suppliers and is a member of the Midwest Reliability Organization (MRO) and MISO.

Great River Energy's mission is to safely provide affordable, reliable energy in harmony with a sustainable environment. Great River Energy owns and operates more than 5,100 miles of transmission line (69-kV or higher) and owns more than 100 substations in Minnesota, North Dakota, South Dakota, and Wisconsin. Great River Energy designs and maintains a portfolio of power generation facilities and transmission resources to deliver reliable and affordable wholesale electricity to the regional electricity market.

1.3 Proposed Extension Project

The Extension Project is needed to interconnect Big Bend's approximately 311.1 MW wind project to the transmission grid. As shown on **Figure 2**, the transmission line departs from the previously permitted route at Structure 144 which is east of 40th Avenue, south of 240th Street and north of 230th Street, approximately 9.5 miles southeast of Mountain Lake. It will travel approximately 4.5 miles south/southwest to a new Big Bend-owned substation located adjacent to Great River Energy's existing Lakefield Junction Station. This new substation, referred to as the Step-up Substation, will convert the electricity from 161-kV to 345-kV. The Step-up Substation will interconnect to a new GRE-owned substation referred to as the Interconnection Substation, which then interconnects to the existing Lakefield Generating Substation.

The Interconnection Substation is needed because the wind project is a surplus generation interconnect, which must be located on the generation side at the point of interconnection. Currently the Lakefield Generating Substation has three positions on the generation side, all of which are occupied by existing natural gas turbines.

The Proposed Route is in Cedar Township in Martin County. **Figure 1** shows the Extension Project on a map. **Table 1** lists the township, range, and section crossed by the Extension Project.

Table 1
Townships, Ranges, and Sections Crossed by the Extension Project

Township Name	Township	Range	Section
Cedar	104	33	9, 10, 15-17, 19-22

Big Bend proposes to use 70- to 120-foot-tall steel or laminate wood structures with spans of approximately 600 to 800 feet. Longer spans might be used to accommodate landowner requests and/or design around features such as stream crossings and the Cedar Lutheran Cemetery. Generally, Big Bend has obtained a 100-foot-wide easement when the transmission line follows parcel lines and a 150-foot-wide easement when adjacent to road right-of-way. To avoid the Cedar Lutheran Cemetery while also minimizing transmission structure placement in the middle of agricultural fields, Big Bend has coordinated with a private landowner to acquire an approximately 200-foot easement to accommodate a longer span length between structures in the vicinity of the cemetery. Big Bend has secured 100 percent of the private easements from landowners for the Proposed Right-of-Way required for the Extension Project. The Proposed Right-of-Way is the necessary right-of-way for the safe construction and operation of the transmission line.

Big Bend will construct a new 161-/345-kV Step-up Substation that will interconnect to a new Interconnection Substation to be constructed by Great River Energy. These substations will be constructed on the same pad. The pad will be sized to accommodate an additional substation. This area, referred to as the Substation Development Area, comprises approximately 6.5 acres immediately adjacent to the existing Great River Energy-owned Lakefield Junction Station. A short, less than 100-foot 345-kV transmission line, to be owned by Great River Energy, will link the Step-up Substation and Interconnection Substation. A similar transmission line, approximately 300 feet in length, will connect the Interconnection Substation with the Lakefield Generating Substation. Breakers and switches will be installed to ensure safe and reliable operation of the transmission line. Great River Energy owns the property where the Substation Development Area is located. The Substation Development Area is completely within the Proposed Route.

1.4 Ownership, Permittee and Contact

Big Bend will own and operate the 161-kV transmission line and the new 161/345-kV step-up substation. Great River Energy will own the new 345-kV interconnection substation. Big Bend and Great River Energy will own the structures within their respective substations; however, the 345-kV conductor traveling between these substations will be owned by Great River Energy.

The permittees for the Extension Project will be:

Big Bend Wind, LLC
8665 Hudson Boulevard North, Suite 200
Lake Elmo, Minnesota 55042

Great River Energy
12300 Elm Creek Blvd.
Maple Grove, MN 55369

The contact persons regarding the Application are:

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Senior Director of Project Permitting
Apex Clean Energy Holdings, LLC
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Charlottesville, VA 22902
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brie.anderson@apexcleanenergy.com

Mark Strohfus
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Project Manager, Transmission Permitting
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Maple Grove, MN 55369
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MStrohfus@GREnergy.com

Christina Brusven
Fredrikson & Byron, P.A.
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Minneapolis, MN 55402
612-492-7000
cbrusven@fredlaw.com

1.5 Pre-application Coordination

In September 2025, Big Bend provided notification letters to 126 individuals at the Tribal Nations, agencies and organizations listed in **Table 2. Table 2** is divided into four categories: Tribal, State of Minnesota, county, and local government units and other organizations. Consistent with Minn. Stat. § 216I.05, subdivision 5, these letters provided information about the Extension Project, requested comments, and provided recipients the opportunity to request a pre-application coordination meeting. Correspondence to date with Tribal governments and organizations and agencies is included in **Appendix D** and **Appendix E**, respectively.

As required by Minn. Stat. § 216I.05, subd. 6, the Applicants provided a draft of this Application to Commission staff for their review on October 13, 2025.

1.5.1 Landowner Coordination

There are four private landowners that own ten parcels along the Proposed Route, along with the Great River Energy-owned parcel at the terminus of the Extension Project. Big Bend has coordinated with each of these private landowners to route the transmission line across the parcels in such a way that minimizes impacts to the landowner's use of their property. The result of this coordination is executed easement agreements.

Table 2
Big Bend Tribal and Agency Correspondence

Jurisdiction / Agency	Date / Action	Summary of Action
TRIBAL		
1854 Treaty Authority	9/10/2025 – Notification	Notification email, letter and overview map sent. (No response.)
Bois Forte Band of Chippewa	9/10/2025 – Notification 12/3/2025 – Message	Notification email, letter and overview map sent. (No response.) Left message with reception with contact information; indicated they would call back.
Fond du Lac Band of Lake Superior Chippewa	9/10/2025 – Notification 12/3/2025 - Voicemail	Notification email, letter and overview map sent. (No response.) Left a voicemail message with contact information.
Grand Portage Band of Lake Superior Chippewa	9/10/2025 – Notification 12/3/2025 – Voicemail	Notification email, letter and overview map sent. (No response.) Left a voicemail message with contact information.
Leech Lake Band of Ojibwe	9/10/2025 – Notification 9/10/2025 – E-mail response	Notification email, letter, and overview map sent. Leech Lake THPO responded to the notification indicating that the Extension Project will be added to the Off Reservation/Land Claim Areas Review List and comments regarding historic properties will be provided.
Lower Sioux Indian Community	8/20/2025 – Notification 9/10/2025 – Notification 10/10/2025 – Meeting Invite 10/20/2025 – Meeting Invite 12/3/2025 – Phone call	Notification email as a function of Settlement Agreement about Extension Project (No response.) Notification email, letter, and overview map sent. Meeting invitations as a function of Settlement Agreement to discuss overall Project updates, including the Extension Project (No response.) Spoke with the THPO; the THPO was able to pull-up the September 10, 2025, notification. The THPO indicated she would review the Project information and provide a response in the next couple of weeks.

Table 2
Big Bend Tribal and Agency Correspondence

Jurisdiction / Agency	Date / Action	Summary of Action
Mille Lacs Band of Ojibwe	9/10/2024 – Notification	Notification email, letter, and overview map sent.
	9/10/2025 – E-mail	Directed Big Bend to contact Jamie Edwards (Government Affairs). Jamie Edwards was also included as part of the pre-application coordination mailing list so no additional outreach was conducted.
	12/3/2025 – Voicemail	Left a voicemail message with contact information.
Minnesota Chippewa Tribe	9/10/2025 – Notification	Notification email, letter and fact sheet sent. (No response.)
	12/3/2025 – Voicemail	Left a voicemail message with contact information.
Prairie Island Indian Community	9/10/2025 – Notification	Notification email, letter and fact sheet sent. (No response.)
	12/3/2025 – Voicemail	Left a voicemail message with contact information.
Red Lake Nation	9/10/2025 – Notification	Notification email, letter and fact sheet sent. (No response.)
	12/3/2025 – Voicemail	Left a voicemail message with contact information.
Shakopee Mdewakanton Sioux Community	9/11/2025 – Notification	Notification email, letter and fact sheet sent.
	9/11/2025 – E-mail	THPO responded to notification email with no concerns regarding the Extension Project.

Table 2
Big Bend Tribal and Agency Correspondence

Jurisdiction / Agency	Date / Action	Summary of Action
Upper Sioux Community	8/20/2025 – Notification	Notification email as a function of Settlement Agreement about Extension Project (No response.)
	9/11/2025 – Notification	Notification email, letter and fact sheet sent. (No response.)
	10/10/2025 – Meeting Invite 10/20/2025 – Meeting Invite	Meeting invitations as a function of Settlement Agreement to discuss overall Project updates, including the Extension Project (No response.)
	12/3/2025 – Voicemail	Left a voicemail message with contact information.
	12/8/2025 – E-mail and voicemail	The THPO sent an email and voicemail to request additional information and to potentially participate in field surveys.
	12/9/2025 – Email	Big Bend called the THPO to provide an overall update on the Big Bend Wind Project and the Extension Project. The THPO is interested in field surveys in Spring 2026; Big Bend will continue to coordinate with the THPO once those are planned based on weather.
White Earth Nation	9/11/2025 – Notification	Notification email, letter and fact sheet sent. (No response.)
	12/3/2025 – Phone call	Provided a description of the project to the White Earth Band THPO. The THPO indicated that the Project is outside of the area that this THPO would review. The THPO is working on providing a map of the standard review area to MIAC and other agencies to inform the agencies and applicants on when the THPO should be contacted for overlapping projects.
STATE OF MINNESOTA		
Board of Soil and Water Resources	9/10/2025 – Notification	Notification email, letter and overview map sent. (No response.)
Department of Agriculture	9/10/2025 – Notification	Notification email, letter and overview map sent. (No response.)
Department of Commerce	9/10/2025 – Notification	Notification email, letter and overview map sent. (No response.)

Table 2
Big Bend Tribal and Agency Correspondence

Jurisdiction / Agency	Date / Action	Summary of Action
Department of Health	9/10/2025 – Notification	Notification email, letter and overview map sent.
	9/10/25 – E-mail	Department of Health requested a shapefile of the Extension Project Area.
	9/10/2025 – E-maill	Shapefiles sent.
	9/12/25 – E-mail	No major issues or concerns with the Extension Project; noted setback distance from wells, electrical transformer storage areas; and confirmed there are no drinking water supply management areas in the Project Area.
Department of Labor and Industry	9/10/2025 – Notification	Notification email, letter and overview map sent. (No response.)
Department of Natural Resources	9/10/2025 – Notification	Notification email, letter and overview map sent.
	9/10/25 – E-mail	Haley Byron (DNR Regional EA Ecologist) will be main contact for early coordination and will seek input from applicable DNR divisions and provide a written response for the Extension Project. If a utility crossing license is required, Karla Ihns with Lands and Minerals will be the DNR contact. Requesting shapefiles to aid review.
	9/10/2025 – Email	Shapefiles sent.
Department of Revenue	9/10/2025 – Notification	Notification email, letter and overview map sent. (No response.)
Department of Transportation	9/10/2025 – Notification	Notification email, letter and overview map sent. (No response.)
Indian Affairs Council	10/2/2025 – Notification	Notification email, letter and overview map sent. (No response.)
State Historic Preservation Office	9/23/25 – E-mail	Submittal of Phase 1a Report to SHPO.
	11/14/25 – E-mail	SHPO comments on Phase 1a Report and request for revisions.
	11/24/25 – E-mail	Re-submittal of Phase 1a Report to SHPO with requested edits.
	11/25/25 – E-mail	SHPO acknowledgement of receipt of revised Phase 1a Report.
Office of Pipeline Safety	9/10/2025 – Notification	Notification email, letter and overview map sent. (No response.)

Table 2
Big Bend Tribal and Agency Correspondence

Jurisdiction / Agency	Date / Action	Summary of Action
Pollution Control Agency	9/10/2025 – Notification 9/17/25 – E-mail	Notification email, letter and overview map sent. MPCA is evaluating internal process re: early coordination statute change; no comments at this time but will be further evaluating the Extension Project and likely commenting during public comment period after the environmental document is finalized.
COUNTY		
Martin County Planning and Zoning	9/10/2025 – Notification 10/8/2025 – Telephone 10/9/2025 – E-mail 10/10/2025 – E-mail 11/4/2025 - Meeting	Notification email, letter and overview map sent. Martin County reached out to Big Bend via telephone asking if Big Bend would like to provide a brief presentation to the County Board about the Extension Project and be available for questions. Big Bend confirmed via email that they would present at the November 4, 2025, meeting. Big Bend presented at the County Board meeting and answered questions from attendees.
Martin County Highway Department	9/10/2025 – Notification	Notification email, letter and overview map sent. (No response.)
Martin County Drainage	9/10/2025 – Notification 11/19/2025 – E-mail	Notification email, letter and overview map sent. Tyler Utesch, Drainage Systems Manager, provided as-built files for County Drainage systems to incorporate into the Extension Project design after attending the November 4, 2025, County Board meeting.

Table 2
Big Bend Tribal and Agency Correspondence

Jurisdiction / Agency	Date / Action	Summary of Action
LOCAL GOVERNMENT UNITS and OTHER ORGANIZATIONS		
Cedar Township	9/10/2025 – Notification 9/26/25 – Telephone 10/10/25 – Telephone	Notification email, letter and overview map sent. Cedar Township reached out to Big Bend via telephone (voicemail) on 9/26/25. Big Bend connected with Cedar Township on October 10, 2025. Mr. Jeff Shaw requested that transmission structures be placed outside of township road right-of-way (16 feet on either side of the centerline). Big Bend confirmed all structures will be placed outside township road right-of-way.
Martin County Soil and Water Conservation District	9/10/2025 – Notification 9/11/2025 – Email	Notification email, letter and overview map sent. Indicating where applications can be sent.
Region Nine Development Commission	9/11/2025 – Notification	Notification email, letter and overview map sent. (No response.)

2.0 REGULATORY PROCESS

Chapter 2 discusses the regulatory process Big Bend and Great River Energy must follow to receive permits for their respective portions of the Extension Project.

2.1 State of Minnesota Certificate of Need Not Required

A certificate of need from the MPUC is not required for the Extension Project. Minn. Stat. § 216B.243, subd. 2, states that "[n]o large energy facility shall be sited or constructed in Minnesota without the issuance of a Certificate of Need by the [MPUC]." Minn. Stat. §216B.2421, subd.2(3) defines a large energy facility, in part, as a "high-voltage transmission line with a capacity of 100-kV or more with more than ten miles of its length in Minnesota." When the Extension Project is constructed with the original route, the 161-kV line will exceed 10 miles in length. However, Minn. Stat. § 216B.243, subd. 8(a)(10) provide an exemption from certificate of need requirements for "transmission lines that directly interconnect large wind energy conversion systems to the transmission system." Because the Extension Project will interconnect the wind project to the larger transmission system, a certificate of need is not required.

2.2 State of Minnesota Route Permit Required

Minn. Stat.§ 216I.05, subd. 2, provides that "[a] person is prohibited from constructing a high-voltage transmission line without a Route Permit issued by the [MPUC]." A high-voltage transmission line is defined by Minn. Stat. § 216I.02, subd. 8, as "a conductor of electric energy and associated facilities that is (1) designed for and capable of operation at a nominal voltage of 100 kilovolts or more, and (2) is greater than 1,500 feet in length." Because the Extension Project consists of a 161-kV transmission line that is greater than 1,500 feet in length, a Route Permit from the MPUC is required. A separate Route Permit would cover the associated facilities Great River Energy will construct.

Big Bend and Great River Energy are co-applicants for this Application and request that the Commission grant separate route permits for each Applicant, reflecting the respective portions of the Extension Project that will be owned by each. Big Bend will own the161-kV transmission line and Step-up Substation. Great River Energy will own the Interconnection Substation and the 345-kV conductors between the Step-up Substation, Interconnection Substation and Lakefield Generating Substation. The transmission line is depicted in **Figure 1**. The substations are depicted in **Figures 3 and 4**.

2.3 Other Permits and Approvals

In addition to the route permit issued by the MPUC, other permits, licenses, approvals or consultations might be required for the Extension Project. The need for these permits depends on the final route design and potentially affected resources. A list of potentially required federal, state and local permits is provided in **Table 3**. Correspondence with regulatory agencies to date is included in **Appendix E**.

Table 3
Summary of Potentially Required Permits, Licenses, Approvals, and Consultations

Permit	Jurisdiction
Section 404 Clean Water Act Permit (Utility Regional General Permit)	United States Army Corps of Engineers—St. Paul District
Endangered Species Act / Migratory Bird Treaty Act Consultation	United States Fish and Wildlife Service (USFWS)
State Endangered Species Consultation	Minnesota Department of Natural Resources (MDNR)
Utility Crossing License	MDNR
Water Appropriation General Permit – Temporary Construction Dewatering	MDNR
National Historic Preservation Act Consultation Minnesota Field Archaeology Act Minnesota Historic Sites Act Minnesota Private Cemeteries Act	State Historic Preservation Office Tribal Historic Preservation Officers
National Pollutant Discharge Elimination System Construction Stormwater General Permit	Minnesota Pollution Control Agency (MPCA)
Section 401 Clean Water Act Water Quality Certification (via the Section 404 Clean Water Act Permit – Utility Regional General Permit)	MPCA
Oversize and/or Overweight Permit	Minnesota Department of Transportation (MnDOT)
Local Road Permit	Cedar Township
Wetland Conservation Act	Board of Soil and Water Resources Martin County Soil and Water Conservation District (SWCD)
Oversize/Overweight Moving Permit	Martin County
Utility Permit	Martin County
Crossing Permits/Agreements	Utilities

2.3.1 Federal

2.3.1.1 Section 404 Clean Water Act Permit

A Section 404 permit is required from the U.S. Army Corps of Engineers (USACE), St. Paul District, if there are discharges of dredged or fill material into waters of the United States. Based on wetland mapping using Minnesota Department of Natural Resources (MDNR) National Wetland Inventory (NWI) data, the Extension Project would have minimal impacts to wetlands. If wetlands are impacted by the final alignment, impacts are anticipated to be eligible for coverage under the Minnesota Utility Regional General Permit. The Applicants, in consultation with the USACE, St. Paul District, will seek coverage under the appropriate permit once design of the transmission line is complete. **Section 5.8.9** discusses potential impacts on water resources.

2.3.1.2 Endangered Species Act

In accordance with the Endangered Species Act, the Applicants will assess whether the activity may affect any federally listed threatened, endangered, or proposed threatened and endangered species, designated critical habitat, or proposed critical habitat. **Section 5.8.6** discusses potential impacts to federally listed threatened and endangered species.

2.3.1.3 Bald and Golden Eagle Protection Act and

Bald and golden eagles are protected under the federal Bald and Golden Eagle Protection Act (BGEPA) of 1940, (16 United States Code [U.S.C.]U.S.C. §§ 668-668d), as amended. The BGEPA prohibits anyone, without a permit issued by the Secretary of the Interior, from taking Bald or Golden Eagles, including parts (such as feathers), nests or eggs. A take involves the action to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb. The regulations define disturb as, “to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (50 Code of Federal Regulations [CFR] § 22.6). The Applicants will coordinate with the USFWS to identify if potential bald or golden eagle nest(s) occur within the route for the Extension Project. If eagle activity or a nest(s) is present, conservation measures will be implemented to avoid and minimize potential impacts (for example, application of buffer, modification of daily or seasonal timing of activities, monitoring).

2.3.1.4 Migratory Bird Treaty Act

Migratory birds are protected under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. §§ 703–7121). The MBTA prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the USFWS. Specifically, the MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any listed migratory bird (50 CFR § 10), including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR § 21). However, based upon an M-Opinion issued by the Trump Administration (April 11, 2025), only purposeful take of migratory birds is prohibited by the MBTA. **Section 5.8.10** discusses the potential impacts to migratory bird species.

2.3.1.5 Airport Obstruction Evaluation

Title 14 CFR Part 77 “establishes standards and notification requirements for objects affecting navigable airspace.”[2] Notifying the Federal Aviation Administration (FAA) of potential hazards allows the agency to prevent or minimize, “adverse impacts on the safe and efficient use of navigable airspace.”[3] Big Bend utilized the FAA’s online Obstruction Evaluation/Airport Airspace Analysis tool to determine the need to notify the FAA. **Section 5.4.8** discusses potential impacts on transportation, including airports.

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[2] Federal Aviation Administration. 2023. Notification of Proposed Construction or Alteration on Airport Part 77.Available online at: https://www.faa.gov/airports/central/engineering/part77#NewRule. Accessed August 2025.

[3] *Ibid*.

2.3.2 State

2.3.2.1 Construction Stormwater Permit

Construction projects that disturb one or more acres of land require a general National Pollutant Discharge Elimination System (NPDES) / State Disposal System (SDS) Construction Stormwater Permit (CSW Permit) from the MPCA. This permit is issued to "construction site owners and their operators to prevent stormwater pollution during and after construction."[4] **Section 5.8.9** discusses potential impacts on water resources.

2.3.2.2 Section 401 Clean Water Act Water Quality Certification

According to the MPCA, "Section 401 of the Clean Water Act is designed to ensure that the federal government does not issue a permit or license for a project that will result in a violation of the state water quality standards."[5] Should a Section 404 Clean Water Act permit be required, then a Section 401 Water Quality Certification would be required. The Extension Project is likely to qualify under the Minnesota Utility Regional General Permit and the MPCA has already issued a Section 401 Certification associated with this permit; therefore, no additional review would be required should the Extension Project meet applicable conditions. **Section 5.8.9** discusses potential impacts on water resources.

2.3.2.3 Endangered Species Act Consultation

Minn. Stat. §84.0895 prohibits the take, import, transport, or selling of any portion of an endangered species or wild animal or plant. To determine if a project will impact a state listed threatened or endangered species, the Applicants will consult with the MDNR Natural Heritage and Nongame Research Program, which collects, manages, and interprets information about nongame species. The results of initial consultation regarding the Extension Project are provided in **Section 5.8.6**.

2.3.2.4 Field Archaeology Act

The Minnesota Field Archaeology Act (Minn. Stat. §§ 138.32-138.42) establishes the Office of the State Archaeologist (OSA). The OSA requires licenses to engage in archaeology on nonfederal public land and requires state agencies to submit development plans to the OSA, Minnesota State Historic Preservation Office (SHPO), and the Minnesota Indian Affairs Council (MIAC) for review when there are known or suspected archaeological sites in the area. **Section 5.7** discusses potential impacts on archaeological and historic resources.

2.3.2.5 Private Cemeteries Act

Human burial grounds and remains older than 50 years on public or private lands or waters, including prehistoric Indian burial mounds and historic cemeteries, and remains located outside of platted or identified cemeteries are protected from unauthorized disturbance by the Private

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[4] Minnesota Pollution Control Agency. 2025a. *Construction stormwater*. Available online at: https://www.pca.state.mn.us/business-with-us/construction-stormwater. Accessed August 2025.

[5] Minnesota Pollution Control Agency. 2025b. *Clean Water Act Section 401 Water Quality Certifications*. Available online at:https://www.pca.state.mn.us/business-with-us/clean-water-act-section-401-water-quality-certifications. Accessed August 2025.

Cemeteries Act (Minn. Stat. § 307.08). **Section 5.7** discusses potential impacts on archaeological and historic resources.

2.3.2.6 License to Cross Public Waters

The MDNR Division of Lands and Minerals regulates utility crossings over, under, or across any State land or public water identified on the Public Waters and Wetlands Maps. A license to cross public waters is required under Minn. Stat. § 84.415 and Minnesota Rules Chapter (Minn. R. ch.) 6135. As further discussed in **Section 5.8.9**, the Extension Project crosses a public water watercourse; therefore, a Utility License to Cross Public Waters will be required. No MDNR-administered public lands are crossed by the Extension Project.

2.3.2.7 Water Appropriation General Permit – Construction Dewatering

Minn. Stat. § 103G.265 requires the MDNR to manage water resources to ensure an adequate supply to meet long-range seasonal requirements for domestic, agricultural, fish and wildlife, recreational, power, navigation, and quality control purposes. A water use permit from the MDNR is required for all uses withdrawing more than 10,000 gallons of water per day or 1 million gallons per year. Construction dewatering activities are sometimes required during the installation of transmission poles, as further discussed under **Section 5.8.9**.

2.3.2.8 Oversize/Overweight Loads

An Oversize/Overweight permit from Minnesota Department of Transportation (MnDOT) is required when transporting an oversize or overweight load on Minnesota roadways. **Section 5.4.8** discusses potential impacts on transportation, including roadways.

2.3.2.9 Wetland Conservation Act

The Board of Water and Soil Resources administers the state Wetland Conservation Act. The Extension Project may cause minimal impacts to wetlands, if any. If wetlands are impacted as part of this Extension Project, the Applicants anticipate being eligible for the Exemption for Utilities in accordance with Minn. Stat. § 103G.2241, subd. 6, and Minn. R. 8420.0420, subp. 6, which allows the utility exemption for installation, maintenance, repair, or replacement of lines if (a) the impacts have been avoided and minimized to the extent possible; and (b) the proposed project significantly modifies or alters less than one-half acre of wetlands. Further discussion on the potential impacts to wetlands associated with the Extension Project are provided in **Section 5.8.9**.

2.3.3 Local

Coordination with Martin County and/or Cedar Township will be required. A driveway permit might be needed to construct access roads or driveways from county or township roads. Oversize/overweight permits to move over-width or heavy loads on county or township roads could be necessary. A utility permit could be required to cross or occupy county or township road rights-of-way.

Agreements might be required where the transmission line crosses existing utility infrastructure, such as another transmission line, that is not owned by Big Bend.

2.4 Electrical Codes

The Extension Project is subject to electrical codes. All power lines and substations must comply with the National Electrical Safety Code (NESC). NESC "sets the ground rules and guidelines for practical safeguarding of utility workers and the public during the installation, operation, and maintenance of electric supply, communication lines and associated equipment."[6] The Applicants must also comply with North American Electric Reliability Corporation (NERC) standards, which define the reliability requirements for planning and operating the electrical transmission grid in North America.

[6] IEEE Standards Association. *The NESC*. Available online at: https://standards.ieee.org/products-programs/nesc/. Accessed August 2025.

3.0 PROPOSED EXTENSION PROJECT

Chapter 3 discusses the proposed Extension Project: its design, construction, restoration, operation and maintenance.

3.1 Proposed Route, Right-of-Way and Proposed Alignment

Section 3.1 describes the route width, right-of-way, and alignment requested for the Extension Project. **Appendix B** contains detailed maps depicting these features.

3.1.1 Proposed Route

The Energy Infrastructure Permitting Act, Minn. Stat. ch. 216I, directs the routing of transmission lines in a way that "minimize[s] adverse human and environmental impact while ensuring (1) continuing electric power system reliability and integrity, and (2) that electric energy needs are met and fulfilled in an orderly and timely fashion." The Energy Infrastructure Permitting Act further authorizes the MPUC 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.

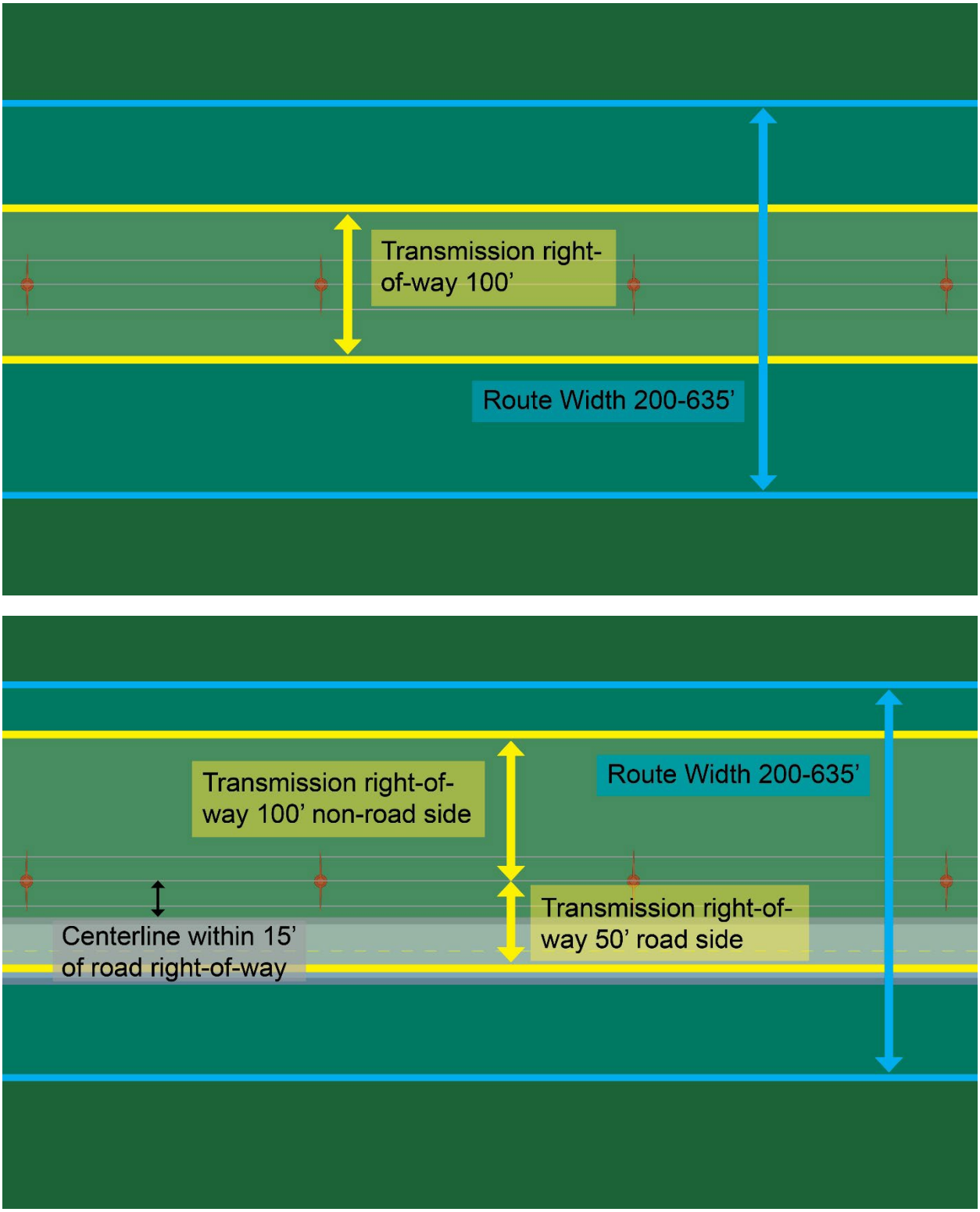
A route should be wide enough to provide flexibility for the permittee to work with landowners to address concerns and to address engineering issues that may arise after a Route Permit is issued. Once a route is established by the MPUC, the permittee then does more detailed engineering and survey work and obtains input from landowners to establish a final alignment and pole placement.

Big Bend respectfully requests that the MPUC approve the Extension Project and authorize a variable route width of 200 to 635 feet along the transmission line route. The Applicants request an expanded route width of up to 1,711 to 1,731 feet on Great River Energy-owned property to allow flexibility to route the 161-kV transmission line to the Step-up Substation given other existing transmission lines on the parcel. The requested route width (or Proposed Route) is depicted on the detailed maps provided in **Appendix B**.

3.1.2 Proposed Right-of-Way

Big Bend anticipates constructing the new single-circuit 161-kV transmission line and structures using a design and span lengths that require a variable right-of-way. When paralleling existing road rights-of-way, Big Bend will utilize a right-of-way width of 150 feet, 50 feet wide on the roadside and 100-feet wide on the non-roadside of the alignment (see **Figure 5**). Big Bend proposes to place poles on private property, approximately 5 to 15 feet outside of the existing road right-of-way. These pole placements allow the transmission line right-of-way to share existing road rights-of-way to the greatest extent feasible for existing overhangs and will reduce the overall size of the easement required from the private landowner along roads. Pole placement and offset distances may vary in areas such as intersections due to road design requirements and in areas of planned future road expansion. Where the transmission line is not parallel to existing road rights-of-way, Big Bend will generally utilize a right-of-way width of 100 feet. In cooperation with the affected private landowner, Big Bend is proposing an approximately 200-foot right-of-way to accommodate longer spans between structures near the Cedar Lutheran Cemetery while also minimizing transmission structure placement in the middle of agricultural fields.

Figure 5. Route width, right-of-way and alignment illustration



3.1.3 Application Alignment

Big Bend has developed its "Application Alignment" within the Proposed Route to minimize the overall potential impacts of the transmission line based on the routing factors identified in Minn. Stat. § 216I.05, subd. 11. The Application Alignment is shown on the detailed maps in **Appendix B**.

After the MPUC issues a Route Permit for the Extension Project, Big Bend will prepare a final alignment based on detailed survey and engineering work, site review, design, and landowner and agency input. Once the permittee establishes a final alignment and structure placement, proposed construction drawings will be provided to the MPUC in the form of a “Plan and Profile” compliance filing so the MPUC can confirm that the permittee’s plans are consistent with the Route Permit.

3.2 Transmission Line

The location of the transmission line is generally depicted in **Figure 1**. The following subsections describe the proposed 161-kV transmission line. Section 3.3 describes the proposed substations.

3.2.1 Structure Design

Big Bend proposes either wood or steel monopole structures that generally range in height from 70 feet to 120 feet tall. This is also consistent with Big Bend’s crossing of the existing 345-kV transmission line on the Great River Energy-owned parcel, as Big Bend will cross below this line. The Extension Project may use three types of structures:

- Dead end: used at 90-degree turns and within the step-up and interconnection substations;
- Angle: used in locations where the alignment turns; and
- Tangent: for in-line (straight) segments.

Structure spacing will be dependent on the right-of-way width. In areas with a 100-foot right-of-way or 150-foot right-of-way, structures will be spaced approximately 600 to 800 feet apart. For the short length of the transmission line routed parallel to the existing 345-kV transmission line and around the cemetery (200-foot right-of-way) and in coordination with the landowners to minimize structures in agricultural fields, the span lengths will be closer to 1,100 feet. Structures would be directly embedded into the ground, unless poor soil or geotechnical conditions necessitate concrete foundations. The wood poles have a diameter of approximately 30 inches. Drilled pier foundations may vary from approximately 3 to 6 feet in diameter and 20 to 30 feet or more in depth, depending on soil conditions.

The proposed 161-kV transmission line will be designed to meet or surpass all relevant local and state codes, NERC standards, and the NESC. Appropriate standards will be met for construction and installation, and applicable safety procedures will be followed during and after installation.

3.2.2 Conductors

The transmission line will have three phase wires and one shield wire. Big Bend anticipates the phase wires will be T2-795 ACSR Drake aluminum-conductor steel reinforced or a conductor with similar capacity. The shield wire will be 0.465 optical ground wire.

3.2.3 Transmission Line Clearance Requirements

NESC sets minimum conductor clearances from structures within or adjacent to the right-of-way. Clearance requirements are summarized in **Table 4**.

Table 4
National Electric Safety Code clearance requirements

161-kV Risk Case	Horizontal Clearance (feet)		Vertical Clearance (feet)
	No Wind	Wind	
From a lighting support, traffic signal support, or support structure for another line.	7.7	7.2	7.2
From any other buildings, walls, projections, structures, bridges, etc.	10.2	7.2	At least 15.2

3.2.4 Right-of-Way Acquisition

New right-of-way is required for the Extension Project. Big Bend has, through voluntary negotiations, acquired all the private land rights necessary to construct the Extension Project.

3.2.5 Construction Procedures

Construction will not begin until federal, state, and local approvals are obtained; property, and rights-of-way are acquired; soil conditions are determined; and design is completed for that construction area. The precise timing of construction will take into account various requirements that may be in place due to permit conditions, system loading issues, weather, and available workforce and materials. At this time, no electrical outages to other existing transmission or distribution lines are anticipated from construction of the Extension Project. Big Bend will notify landowners of anticipated timing of construction. As required by Section 5.3.6 of the 2025 Sample Route Permit (see **Appendix J**), construction activities will be limited to daytime working hours to the extent practicable.

Construction of the Extension Project will follow standard construction and mitigation practices, including best management practices (BMPs) that were developed from experience with past projects. These practices address right-of-way clearance, staging, erecting transmission line structures, and stringing transmission lines. Construction and mitigation practices to minimize impacts will be developed based on the proposed schedule for activities, permit requirements, maintenance guidelines, inspection procedures, terrain, and other practices. In certain cases, some activities, such as schedules, are modified to minimize impacts on sensitive environments. Any contractors involved in construction of the transmission line will adhere to these BMP requirements. Chapter 5 discusses specific BMPs and how they can mitigate impacts on specific resources.

Construction of an overhead transmission line requires several sequential activities in a coordinated manner within the workspace. Several of these activities may occur concurrently during the construction process, with more than one construction crew operating simultaneously at different locations, and with each crew passing through any given area at least once.

Construction for the transmission line will follow Big Bend's standard construction and mitigation best practices. Construction will typically occur as follows:

- surveying and staking;
- installation of erosion and sediment control BMPs prior to anticipated ground disturbance activities;
- mobilization and preparation of staging / laydown yards;
- road improvements or development to provide access to the right-of-way;
- clearing activities of the right-of-way;
- temporary material staging in the Project Area prior to construction installation;
- grading, excavation, and foundation installation;
- structure setting;
- wire stringing and clipping once there are enough structures set consecutively in a row to support a wire pull;
- removal of existing transmission circuits;
- cleanup and restoration of right-of-way; and
- demobilization and laydown yard cleanup.

Typical construction equipment used on transmission projects includes tree removal equipment, mowers, cranes, backhoes, digger-derrick line trucks, track-mounted drill rigs, dump trucks, front end loaders, bucket trucks, bulldozers, flatbed tractor-trailers, flatbed trucks, pickup trucks, concrete trucks, and various trailers. Many types of excavation equipment are set on wheel or track-driven vehicles. Poles are transported on tractor-trailers.

The first phase of the transmission line construction activities will involve survey staking of the transmission line centerline, right-of-way, foundation or structure locations, sensitive environmental resource boundaries, property or section lines, and underground and above ground utilities. Survey staking of structure locations may again occur after vegetation has been removed and just prior to structure installation.

Installation of erosion and sediment control BMPs will be implemented prior to anticipated ground disturbance and in accordance with the MPCA NPDES CSW Permit. BMPs will be inspected, maintained, repaired, and replaced in accordance with the MPCA General Permit.

Access to the transmission line right-of-way will be made directly from existing roads or farm field access roads that run parallel or perpendicular to the transmission line right-of-way. In some situations, private field roads will be used where necessary to accommodate heavy equipment used in construction, including cranes, concrete trucks, and hole drilling equipment. On landowners' parcels, existing access roads may be upgraded or new roads may be constructed to Extension Project specifications. New access roads may also be constructed where no current access is available or the existing access is inadequate to cross roadway ditches. Road improvements may include tree trimming, tree clearing, road grading, widening, and fill placement. Depending on landowner preferences and permit requirements, access roads may be left in place or returned to prior conditions following construction.

Construction mats may be used as a protective measure to minimize ground impacts and may be installed to provide access through wetlands or other unstable soil areas prior to construction. Mats may also be used to support and stabilize large equipment required for construction. Construction mat travel lanes will generally be 16 to 20 feet wide. In addition, permitted temporary bridges will be installed over waterways. Equipment bridges will be designed to meet the

requirements of the applicable agencies and local authorities. Bridges will be installed during clearing and will be removed as soon as possible during final restoration once the bridge is no longer required to complete and monitor restoration activities. Fording of waterbodies is prohibited (i.e., civil survey, potholing, or other equipment are not permitted to ford waterbodies prior to bridge placement).

To facilitate construction equipment access and ensure safe clearances between vegetation and the transmission line, all vegetation will be cleared for the full width of the right-of-way. Stumps will be grubbed down the center of the transmission line for safety clearance; on the outer portion of the right-of-way they will typically be cut two inches from ground level or as agreed to with landowners. Roots will generally be left in place to avoid more significant soil disturbances. All materials resulting from clearing operations will be stacked outside of the right-of-way for use by the property owner, if so desired. Otherwise, it will be removed and properly disposed of in accordance with agency requirements. If temporary removal or relocation of fences is necessary, installation of temporary or permanent gates will be coordinated with the landowner. Additional details regarding vegetation clearing are provided in the draft Vegetation Management Plan (VMP) (see **Appendix G**).

Temporary construction workspace beyond the right-of-way may be required at certain locations, such as road intersections, utility crossings, and along steep slopes. Temporary workspace will also be required adjacent to some structures where the direction of the line changes to allow for the pulling and stringing of the wires. In addition, there will be temporary staging of materials, such as structures and hardware, in the Project Area prior to construction. Staging areas are associated with the wind project and extra space at the Substation Development Area. The Applicants will avoid the placement of temporary construction workspace in wetlands and near waterbodies, as practicable.

The second phase of construction will involve structure installation and stringing of conductor wire. During this phase, existing underground utilities will be identified along the route through the required Gopher State One Call process.

Transmission line structures are generally designed for installation at existing grades. There are no slopes greater than 10 percent associated with the Extension Project, and as such, grading the structure area is not anticipated.

Tangent and angle structures may be placed on poured concrete foundations or direct embedded. Direct embedding involves digging a hole for each pole, filling it partially with crushed rock, and then setting the pole on top of the rock base. The area around the pole is then backfilled with crushed rock and/or soil once the pole is set. In uplands, excess soil from the excavation will be spread and leveled near the structure or removed from the site, if requested by the property owner or regulatory agency. Excess soil in wetlands and riparian areas will be removed from the site. Big Bend anticipates the majority of structures to be direct embedded.

Dead end poles will have concrete foundations. Concrete foundation installation involves excavating and placing temporary steel casing, rebar, concrete, and anchor bolts. The base of the concrete foundation typically projects about one-foot above grade. In those cases, holes are drilled in preparation for the foundation. Drilled pier foundations may vary from approximately 3 to 8 feet in diameter and 20 to 30 feet or more in depth, depending on soil conditions. Steel reinforcing bars and anchor bolts are installed in the drilled holes prior to concrete placement. After the concrete foundation is set, the pole is bolted to the foundation.

Conductor stringing operations require brief access to each structure to secure the conductor wire and shield wire once the final sag is established. Temporary guard or clearance structures are installed, as needed, over existing distribution or communication lines, streets, roads, highways, railways, waterways, or other obstructions after any necessary notifications are made or permits obtained. This ensures that conductors will not obstruct traffic or contact existing energized conductors or other cables. In addition, the conductors are protected from damage.

3.2.6 Restoration and Cleanup Procedures

Big Bend will take the steps necessary to lessen the impact of the Extension Project on the surrounding environment by restoring areas disturbed by construction in accordance with BMPs, permit conditions, and the procedures outlined in the draft VMP (see **Appendix G**).

Big Bend or its contractor will contact each property owner after construction is completed to identify and address any damage that may have occurred as a result of the construction of the Extension Project. If damage has occurred to crops, fences, drainage tiles, or the property, the Big Bend will fairly compensate the landowner for the damage sustained in accordance with the terms and conditions agreed upon in the transmission easement agreement between Big Bend and the landowner.

3.2.7 Maintenance Procedures

The principal operating and maintenance cost for transmission facilities is the cost of inspections, which will be performed monthly by either truck or by air. Inspections will be conducted to ensure that the transmission line is fully functional and that no vegetation clearance remains consistent with NESC standards. Annual operating and maintenance costs for 161-kV transmission lines in Minnesota and the surrounding states are expected to be approximately $1,500 per mile per year. 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.

Access to the right-of-way of a completed transmission line is required to perform periodic inspections, conduct maintenance, and repair damage. Regular maintenance and inspections will be performed during the life of the transmission line to ensure its continued integrity. If problems are found during inspection, repairs will be performed, and property restoration will occur, or the landowner will be provided with reasonable compensation for any damage to the property.

The right-of-way will be managed to remove vegetation that interferes with the operation and maintenance of the transmission line. Shrubs that will not interfere with the safe operation or accessing and traversing the transmission line right-of-way will be allowed to reestablish within the right-of-way. Big Bend will use an integrated vegetation management approach that incorporates a wire / border zone practice for clearing and maintenance.

As a general practice, the area below the outer conductors plus 10 to 15 feet (that is, the “wire zone” or “clear zone”) will be cleared of all shrubs and trees to ensure maintenance trucks can access the line and no vegetation interferes with the safe operation of the transmission line. Low-growing brush, or tree species will be allowable at the outer limits of the easement area (that is, the border zone). Taller tree species that endanger the safe and reliable operation of the transmission facility will be removed. To the extent practical, existing low-growing vegetation that

will not pose a threat to the transmission facility or impede construction or maintenance may remain in the border zone, as agreed to during easement negotiations.

The NESC states that “vegetation that may damage ungrounded supply conductors should be pruned or removed.” Trees beyond the easement area that are in danger of falling into the energized transmission line, could grow into the wire zone or are otherwise deemed to be a hazard to the safe operation of the line. These “danger trees” may be removed or trimmed to eliminate the hazard if allowed by the terms in the easement. Danger trees generally are those that are dead, diseased, weak, or leaning towards the energized conductors. Tree trimming may be possible to minimize tree removal based on negotiations with individual landowners. Landowners will be notified of tree trimming or removal activities as outlined in the VMP.

3.3 Substations

The locations of the step-up and interconnection substations are generally depicted in **Figure 1** and shown on the detailed maps found in **Appendix B**. The following subsections describe the proposed Step-up Substation and Interconnection Substation to be developed within the Substation Development Area.

3.3.1 Design

Within the Proposed Route is an approximately 6.5-acre Substation Development Area. This area will include a 5.8-acre substation pad. The remainder is temporary workspace. The substation pad will be fenced. Within this substation pad, Big Bend will have a 161-/345-kV Step-up Substation (approximately 185 feet by 370 feet; 1.6 acres) and Great River Energy will have an Interconnection Substation (approximately 465 feet by 170 feet; 1.8 acres). The remaining 2.4 acres will be set aside for future expansion for Great River Energy(approximately 280 feet by 370 feet; 2.4 acres). Each individual substation will be fenced and be properly grounded. The future expansion area will be graded and graveled, but no other work will be completed in this area. A conceptual diagram of Substation Development Area is provided on **Figure 4.** A stormwater retention pond may be constructed adjacent to the Substation Development Area depending on final design.

3.3.2 Land Acquisition

Great River Energy owns the property where the new Substation Development Area is located.

3.3.3 Construction Procedures

Both substations will undergo a similar construction process. Construction begins with utility locates and survey and staking. Typically, soil borings are drilled to confirm soil characteristics. Appropriate fill will be placed as necessary to provide a stable surface. Fencing will be installed to secure the larger substation pad, along with the individual substations. Holes will be drilled and concrete poured for pier footings. Forms will be laid and concrete will be poured for slab foundations. Cable trays will be installed where communication and relay cables will be placed as needed for connection between the control building and equipment. Bus work and equipment will be erected on the foundations. Control system modifications, if included at the substation, will be wired to an onsite electrical equipment enclosure. Finally, the substation will be topped off with rock to grade.

3.3.4 Restoration and Cleanup Procedures

Temporary construction workspaces that were disturbed during construction of the substations, and that are located outside of the substation footprint will be restored to their original condition to the maximum extent practicable as described in the draft VMP (see **Appendix G**). Post-construction reclamation activities will include removing and disposing of debris, removing all temporary facilities (including staging and laydown areas), employing appropriate erosion control measures, reseeding areas disturbed by construction activities with vegetation similar to that which was removed with a seed mixture certified as free of noxious or invasive weeds, and restoring the areas to their original condition to the extent possible.

Great River Energy may ultimately decide to convert the disturbed area to a different land use as opposed to restoring these areas as open space.

3.3.5 Maintenance Procedures

Regular maintenance and inspections will continue to be performed during the life of substations to ensure their continued integrity. These tasks include cleanliness checks, security checks, and routine equipment checks for functionality. The estimated annual cost of maintaining and operating the step-up substation and the interconnect substation is approximately $10,000 to $20,000 for each substation.

3.4 Safety Equipment and Plans

The proposed 161-kV transmission line will be designed to meet or surpass all relevant local and state codes, NERC standards, and the NESC. Appropriate standards will be met for construction and installation, and applicable safety procedures will be followed during and after installation.

The substations will be equipped with protective equipment such as breakers, relays, and instruments to monitor the transmission line's operating conditions. This equipment is designed to protect human health as well as the transmission system by de-energizing the transmission line should a line fault occur. Substations are also designed with significant grounding grids in part to eliminate the potential for spark discharges.

For electrical and fire safety, substations and the adjacent areas will be graveled to maintain the area free of vegetation. Fencing will prevent unauthorized entry by individuals and wildlife.

3.5 Outages

Outages are sometimes necessary to construct transmission lines and substations. Necessary outages on the transmission system are coordinated by MISO. MISO follows established procedures to meet safety and NESC requirements. All outage requests are studied. Once approved, detailed switching orders are developed. At this time, no electrical outages to other existing transmission lines are anticipated because of constructing the Extension Project.

3.6 Service Life and Reliability

Transmission lines are designed to operate for decades. Typically, they require only moderate maintenance, particularly in the first few years of operation. The estimated service life of the

proposed Extension Project is approximately 40 years. However, high voltage transmission lines are seldom completely retired.

Transmission infrastructure is reliable because it includes very few mechanical elements. It is built to withstand weather extremes, except for severe weather such as tornadoes. Transmission lines are automatically taken out of service by the operation of protective relaying equipment when a fault is sensed on the system. Such interruptions are usually momentary. Scheduled maintenance outages are also infrequent. As a result, the average annual availability of transmission infrastructure is very high, in excess of 99 percent.

3.7 Design Options to Accommodate Future Expansion

The proposed 161-kV transmission line is designed to meet current and projected needs. While the Extension Project will interconnect approximately 311.1 MW of renewable energy, the proposed transmission line would be designed, constructed, and operated to be capable of supporting and transmitting up to 374 MW of electricity. The capacity provided by the Extension Project allows for potential future additional generation in southern Minnesota to be interconnected to the electric grid.

Substations, when constructed, will be built on a single pad surrounded by an exterior fence. Within this exterior fence, there will be an undeveloped area large enough to accommodate an additional, similar sized step-up substation, which would be permitted in the future, as necessary. Like the Extension Project's Step-up Substation, this additional step-up substation would interconnect to the Interconnection Substation.

Big Bend is not aware of additional large energy infrastructure facilities needed in the Project Area.

3.8 Estimated Costs

The Extension Project is expected to cost approximately $50.5 million dollars. Costs will likely vary depending on several factors, including material and labor costs. The Applicants currently estimate that costs could vary +/- 20 percent. Costs are summarized in **Table 5**.

Table 5
Estimated Costs

Extension Project Phase	Big Bend Transmission Line and Step-up Substation	Great River Energy Interconnection Substation
Planning, Land Acquisition, and Permitting	$2.25 million	$50,000
Design	$850,000	$350,000
Procurement	$15.85 million	$11.85 million
Construction	$11.275 million	$7 million
Closeout	$625,000	$350,000
Subtotal	$30.85 million	$19.6 million
PROJECT TOTAL	**$50,450,000**	

Big Bend will be responsible for all costs associated with constructing and operating the transmission line and step-up substation. Great River Energy will be responsible for all costs associated with constructing and operating the interconnection substation.

Costs associated with operation and maintenance of the transmission line are expected to be approximately $1,500 per mile annually. Actual costs will depend on the age of the transmission line, storm damage, etc. Costs associated with operating and maintaining the substations are expected to be approximately $10,000 to $20,000 per substation per year.

3.9 Estimated Schedule

An anticipated permitting and construction schedule for the Extension Project is provided in **Table 6**. This schedule is based on information known as of the date of filing and might change as further information develops or if there are delays in obtaining the necessary approvals that are required prior to construction.

Table 6
Anticipated Schedule

Activity	Estimated Date
Minnesota Route Permit Issued	Q2 2026
Other Permits Issued	Q3 2026
Start Construction	Q3 2026
In-Service [a]	Q1 2028

[a] Extension Project In-Service is dependent on full construction of the Big Bend Wind Project; the Extension Project will not take the full duration from start of construction to in-service to build. Big Bend and Great River Energy anticipate construction of the transmission line will last approximately 4 months and both substations up to 9 months.

3.10 Work Force Required

The Applicants anticipate that 40 to 50 daily workers (20 to 25 for the transmission line and 20 to 25 for the substations) will be employed for the Extension Project over the estimated nine-month construction period. No new permanent jobs will result from the Extension Project. Maintenance and operation will be conducted by existing Big Bend staff associated with the Wind Project and Great River Energy staff stationed at the St. James and New Prague outposts.

4.0 ALTERNATIVES CONSIDERED BUT REJECTED

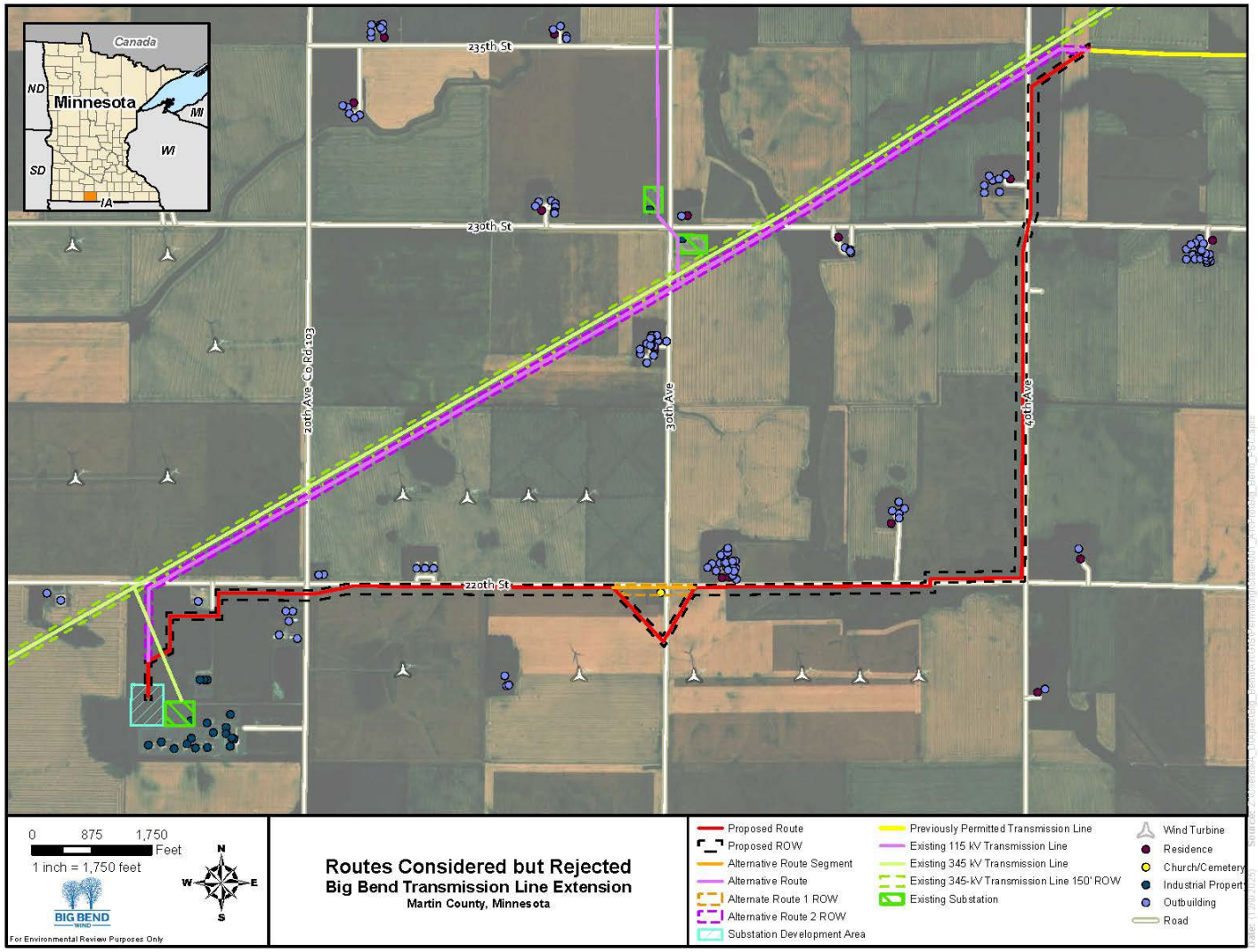
Minn. Stat. § 216I.0.05, subd. 3(14) requires a "discussion regarding any other sites or routes that were considered and rejected by the applicant." Big Bend considered but rejected a single alternative route segment. **Figure 6** identifies transmission line routes considered but rejected by Big Bend.

4.1 Alternatives Considered but Rejected

Big Bend considered an Alternative Route Segment that continued along 220th Street to maximize right-of-way sharing. In addition to maximizing co-location with existing road rights-of-way, it would also minimize potential impacts on agricultural operations. Big Bend rejected Alternative Route 1 because it would cross the Cedar Lutheran Cemetery and be in close proximity to the Cedar Lutheran Church. Given the location of the cemetery adjacent to the road, locating the transmission line along the road would most likely result in conductors overhanging burial sites. After consulting with the Minnesota Office of State Archeologist and reviewing records for the cemetery, Big Bend concluded that such a route was impracticable. Working with the adjacent landowner, Big Bend was able to develop an Application Alignment that avoids the church and cemetery while keeping structure locations along field edges. Therefore, this alternative was rejected.

Big Bend also considered an Alternative Route that parallels an existing 345-kV transmission line from the eastern end point southwest to Great River Energy's Lakefield Junction Station to maximize co-location with existing utility rights-of-way. This Alternative Route 2 was dismissed for the following reasons: 1) it would require a 125-foot offset from the existing transmission line alignment requiring the Application Alignment to be further into agricultural fields at a staggered angle not conducive to agricultural equipment; 2) the new 161-kV transmission structures would be located at different span lengths than the existing 345-kV transmission structures, increasing the impact on farming operations; 3) it would require additional travel along the right-of-way due to its location in agricultural fields and away from road right-of-way; 4) Big Bend was unable to acquire voluntary easements from private landowners given the increased impacts on agricultural operations, and 5) routing the Extension Project on the south side of the 345-kV transmission line would put the Extension Project too close to existing residences (within 200 feet of farmsteads and not across a road) and too close to existing and operating wind turbines (within 500 feet). Therefore, this alternative was rejected.

Figure 6. Alternative Considered but Rejected



5.0 ENVIRONMENTAL ASSESSMENT

Chapter 5 discusses the potential human and environmental impacts from construction and operation of the Extension Project, as well as potential mitigation measures. Sections 5.1 and 5.2 are taken from *Environmental Assessment: Big Bend Wind Project; Red Rock Solar Project and Big Bend Wind 161 kV Transmission Line Project*[7] prepared in January of 2022 by the Minnesota Department of Commerce Energy Environmental Review and Analysis unit with limited modification.

Big Bend was issued a route permit "to construct and operate an approximately 18-mile 161-kV transmission line and associated facilities"[8] on September 28, 2022 (see **Appendix C**). Big Bend will implement the conditions required under the 2022 Route Permit, as further updated by the standard conditions found in the 2025 Sample Route Permit provided by EIP staff (see **Appendix J)**, when constructing and operating the Extension Project and references those conditions throughout this Application to maintain consistency with regard to the mitigation measures applied to the entire length of the 161-kV transmission line.

Unless specifically identified otherwise, the discussion herein refers to potential impacts that could occur from the construction and operation of the Extension Project, including both the transmission line and the Substation Development Area .

5.1 Definitions

A potential impact is the anticipated change to an existing condition caused either directly or indirectly by the construction and operation of a proposed project. Potential impacts can be positive or negative and short- or long-term. Impacts vary in duration and size, by resource, and across locations. In certain circumstances, potential impacts can accumulate incrementally meaning that impacts from the project would be in addition to on-the-ground impacts already occurring.

Direct impacts are caused by the proposed action and occur at the same time and place. An indirect impact is caused by the proposed action but is further removed in distance or occurs later in time. This EA considers direct and indirect impacts that are reasonably foreseeable, which means a reasonable person would anticipate or predict the impact. Cumulative potential effects are the result of the incremental impacts of the proposed action in addition to other projects in the environmentally relevant area.

To provide appropriate context, the following terms and concepts are used to describe and analyze potential impacts:

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[7] Minnesota Department of Commerce. 2022. Big Bend Wind and Red Rock Solar Environmental Assessment. Available online at: https://puc.eip.mn.gov/node/7341. Accessed August 2025.

[8] Minnesota Public Utilities Commission. 2022.*Route Permit for a High Voltage Transmission Line and Associated Facilities issued to Big Bend Wind, LLC.* Available online at: https://puc.eip.mn.gov/sites/default/files/2024-01/pdfs/187e3223-0e6c-4719-8dc6-e6c52bf2099a.pdf. Accessed August 2025.

- **Duration** Impacts vary in length. Short-term impacts are generally associated with construction. Long-term impacts are associated with the operation of the project. Permanent impacts extend beyond project decommissioning and reclamation.

- **Size** Impacts vary in size. To the extent possible, potential impacts are described quantitatively, for example, the number of impacted acres or the percentage of affected individuals in a population.

- **Uniqueness** Resources are different. Common resources occur frequently, while uncommon resources are not ordinarily encountered.

- **Location** Impacts are location dependent. For example, common resources in one location might be uncommon in a different location.

The context of an impact, in combination with its anticipated on-the-ground effect, is used to determine an impact intensity level, which can range from highly beneficial to highly harmful. Impact intensity levels are described using a qualitative scale, which is explained below. These terms are not intended as value judgments, but rather a means to ensure common understanding among readers and to compare potential impacts between alternatives.

- **Negligible** impacts do not alter an existing resource condition or function and are generally not noticeable to an average observer. These short-term impacts affect common resources.

- **Minimal** impacts do not considerably alter an existing resource condition or function. Minimal impacts might, for some resources and at some locations, be noticeable to an average observer. These impacts generally affect common resources over the short- or long-term.

- **Moderate** impacts alter an existing resource condition or function and are generally noticeable to the average observer. Impacts might be spread out over a large area making them difficult to observe but can be estimated by modeling. Moderate impacts might be long-term or permanent to common resources, but generally short- to long-term to uncommon resources.

- **Significant** impacts alter an existing resource condition or function to the extent that the resource is impaired or cannot function. Significant impacts are likely noticeable or predictable to the average observer. Impacts might be spread out over a large area making them difficult to observe but can be estimated by modeling. Significant impacts can be of any duration and affect common or uncommon resources.

Also discussed are opportunities to mitigate potential impacts by avoiding, minimizing, or correcting the on-the-ground effect. Collectively, these actions are referred to as mitigation.

- To **avoid** an impact means to eliminate it altogether, for example, by not undertaking part or all the project, or relocating the project.

- To **minimize** an impact means to limit its intensity, for example, by reducing project size or moving a portion of the project.

- To **correct** an impact means fixing it by repairing, rehabilitating, or restoring the affected resource, or compensating for it by replacing it or providing a substitute resource elsewhere. Correcting an impact can be used when an impact cannot be avoided or further minimized.

Some impacts can be avoided or minimized; some might be unavoidable but can be minimized; others might be unavoidable and unable to be minimized but can be corrected. The level at which an impact can be mitigated might change the impact intensity level.

5.2 Regions of Influence

Potential impacts on human and environmental resources are analyzed within specific geographic areas called regions of influence (ROI). The ROI is the geographic area where the project might exert some influence and is used as the basis for assessing potential impacts. ROIs vary by resource. As necessary, this EA discusses potential impacts and mitigation measures beyond the identified ROI to provide appropriate context. Also, direct impacts within the ROI might cause indirect impacts outside the ROI.

This EA uses the following ROIs:

- **Proposed Right-of-Way**:
    - 100-foot-wide right-of-way where not co-located with existing rights-of-way; generally, 50 feet on each side of Application Alignment
    - 150-foot-wide right-of-way where co-located with road rights-of-way; generally, 50 feet on the road side of the transmission line Application Alignment and 100 feet on the non-road side of the Application Alignment
    - 200-foot-wide right-of-way along an approximately 2,100-foot segment of the Application Alignment around Cedar Lutheran Cemetery
    - Substation Development Area
- **Local Vicinity**: 1,000 feet on either side of the Application Alignment
- **Project Area**: one mile on either side of the Application Alignment
- **Census Tract**: census tracts crossed by the Application Alignment and substation locations
- **County**: Martin County

ROIs are based on a distance from the Application Alignment developed by the applicant and extend on both sides of the centerline. **Table 7** summarizes the ROIs used in this EA by resource element.

Table 7
Regions of Influence

Resource Type	Element	Region of Influence
Human Settlement	Displacement, Transportation (excluding Airports)	Proposed Right-of-Way
	Aesthetics, Electrical Interference, Noise, Property Values, Recreation	Local Vicinity
	Transportation (Airports)	Project Area
	Environmental Justice	Census Tract
	Cultural Values, Public Services, Land Use and Zoning; Socioeconomics	County
Public Health and Safety	Electric and Magnetic Fields (including Stray Voltage), Implantable Medical Devices, Public and Worker Safety	Proposed Right-of-Way
	Emergency Services	County
Land-based Economies	Agriculture, Forestry, Mining	Proposed Right-of-way
	Tourism	Local Vicinity
Archaeological Resources		Proposed Right-of-Way
Historic Resources		Local Vicinity
Natural Environment	Geology, Public and Designated Lands, Soils, Vegetation, Water Resources, Wetlands, Wildlife (except birds), Wildlife Habitat, Rare and Unique Resources	Proposed Right-of-Way
	Wildlife (birds)	Local Vicinity
	Air Quality, Climate Change and Resilience, Greenhouse Gas	County

5.3 Environmental Setting

The MDNR 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.[9] Through the ECS, the State of Minnesota is split into Ecological Provinces, Sections, and Subsections. The Extension Project is located within the North Central Glaciated Plains Section of the Prairie Parkland Province (251B). The Extension Project is in the southeastern part of the Minnesota River Prairie ecological subsection.

The Minnesota River Prairie subsection coincides with large till plains flanking the Minnesota River. The subsection consists of a gently rolling ground moraine about 60 miles wide. The depth to bedrock in this subsection is typically 100 to 400 feet through glacial till. Soils are loamy and well-drained with thick dark surface horizons. Annual precipitation in the Minnesota River Prairie subsection ranges up to 30 inches with an average growing season that lasts approximately 147 to 152 days. Prior to European contact, vegetation in this subsection was predominantly tallgrass

[9] Minnesota Department of Natural Resources. 2025a. *Ecological Classification System*. Available online at: https://www.dnr.state.mn.us/ecs/index.html. Accessed September 2025.

prairie, with many islands of wet prairies and forest restricted to the Minnesota River and other streams. Currently, land use in this subsection is primarily agricultural activity; there are few remnants of pre-European contact vegetation left.[10]

In general, agricultural communities in southwestern Minnesota are characterized by relatively flat and wide-open vistas with scattered farmsteads and associated shelterbelts dotted throughout the landscape. Most of the area crossed by the Application Alignment is between 1,250 and 1,290 feet above mean sea level, with elevation gradually increasing from east to west. A north to south line of lakes is located to the east of the Project Area, this includes Fish Lake, Buffalo Lake, North Lake, and Cedar Lake.

Generally, the townships within one mile of the Application Alignment are sparsely populated rural areas with farmsteads located along roads, and away from major population centers. The municipality nearest to the Extension Project is Trimont, about 4.5 miles southeast along State Highway 4. Infrastructure is part of the landscape, including grain silos, wind turbines, transmission lines and the Great River Energy's Lakefield Junction Station—a natural gas electrical generating plant.

Figure 1 depicts the existing environment along the Application Alignment. Detailed maps of the Extension Project are provided in **Appendix B**.

5.4 Human Settlement

Human settlement in the Local Vicinity includes residences and farmsteads scattered along rural county roads. Built features include highways and county roads, grain silos, transmission lines and wind turbines. Wind turbines are the tallest and most visible features on the landscape. The Extension Project is routed through the Trimont Area Wind Farm, which consists of 67 turbines that are 125.6 meters (412 feet) tall. While the Trimont Area Wind Farm is the dominant visual element on the landscape, the existing Great River Energy Lakefield Junction Station (see **Figure 7**) and existing 345-kV transmission lines are also prominent visual features.

Table 8
Building Distances from Application Alignment

Building Type	0-50 feet	50-100 feet	100-150 feet	150-200 feet	Total
Home	0	0	1	0	1
Other	0	0	2	6	8
Business	0	0	0	0	0
Total	**0**	**0**	**3**	**6**	**9**

Source: USDA Farm Services Agency. n.d. National Agriculture Imagery Program. Available online at: https://naip-usdaonline.hub.arcgis.com/

Construction and operation of the Extension Project have the potential to impact human settlement. Potential impacts and measures to mitigate these impacts are discussed below.

[10] Minnesota Department of Natural Resources. 2025b. *Minnesota River Prairie Subsection*. Available online at: https://www.dnr.state.mn.us/ecs/251Ba/index.html. Accessed September 2025.

5.4.1 Aesthetics

Aesthetic impacts are subjective, as such, how an individual perceives changes to the landscape from a proposed infrastructure project can vary greatly. Aesthetic impacts are based on the number of views and their duration, along with the sensitivity of the viewer. Generally, residents and recreationalists are more likely to perceive visual disturbances as negative compared to individuals passing through an area. A harmonious viewshed is generally considered more aesthetically pleasing; however, built features can provide visual points of interest for some viewers.

As shown in **Section 5.8.4**, topography along the Proposed Route is generally flat and the vegetation cover is uniformly low, except for windbreak areas near homes and farmsteads, making the topography vulnerable to visual disruptions. Viewsheds in this area are broad with small, scattered areas defined by trees or topography, but interrupted by existing infrastructure.

Human settlement in the Local Vicinity includes residences and farmsteads scattered along rural county roads. One residence is located within 150 feet of the Application Alignment. See **Table 8** for a complete listing of structures within 200 feet of the Application Alignment. The viewshed is shaped by the built environment. Horizontal elements, such as highways and county roads, are consistent with the long and open viewsheds in the area. Vertical elements such as grain silos, transmission lines and wind turbines are visible from considerable distances and are the tallest and often the most visible features on the landscape. The Extension Project is routed through the Trimont Area Wind Farm. The wind farm is the dominant visual element on the landscape; however, the existing Great River Energy Lakefield Junction Station (see **Figure 7**) and existing 345-kV transmission lines are also prominent visual features.

Figure 7. Lakefield Junction Station

Source: Great River Energy

5.4.1.1 Potential Impacts and Mitigation

The ROI for aesthetics is the Local Vicinity. The Extension Project's transmission line structures and conductors would create new aesthetic impacts. Substations, while new, would create

incremental impacts at the existing Lakefield Junction Station. Transmission line and substation impacts are expected to be negligible to minimal. Impacts will be long-term, of a small size and not affect a unique resource. Impacts are unavoidable but can be mitigated in part.

Potential Impacts

The Extension Project will alter the current viewshed through construction of the transmission line. Seventy- to 120-foot poles as well as conductors and an optical ground wire will be added to the landscape. Views of the transmission line will generally be screened at residences due to the existence of existing windbreaks and outbuildings, for example, sheds and barns. Nevertheless, the transmission line will be visible along township roads, in fields, and other locations within the Local Vicinity. Because there is other existing infrastructure within one mile of the Extension Project, including wind turbines and other transmission lines which are taller than the proposed Extension Project, potential impacts associated with the new transmission line are expected to be incremental and minimal.

Construction of the substations within an existing industrial area will cause incremental and minimal impacts to an already industrialized area due to the presence of the existing substation facility and the existing natural gas turbines.

Mitigation

Big Bend has minimized aesthetic impacts by choosing an Application Alignment that follows road right-of-way except where it deviates to avoid the Cedar Lutheran Cemetery. Other measures include avoiding structure placement directly in front of residences and using construction methods that minimize damage to vegetation near the transmission line to the greatest extent possible. The substations will be lit with down-shielded lighting. Constructing substations within an existing industrial area also mitigates potential impacts.

The 2025 Sample Route Permit contains conditions related to aesthetics in Section 5.3.7. These conditions include considering landowner input when placing structures and preserving the natural landscape to the extent possible by not unnecessarily destroying the natural surroundings. Additionally, transmission structures shall be placed to minimize the loss of agricultural land, forests and wetlands, and to avoid homes and farmsteads, among other conditions. Many other provisions in the 2025 Sample Route Permit also indirectly mitigate aesthetic impacts. For example, Section 5.3.10 Vegetation Management requires Big Bend to minimize the number of trees removed and to preserve windbreaks to the maximum extent practicable. General conditions can also mitigate aesthetic impacts, such as Section 5.3.18 Restoration and 5.3.19 Cleanup.

5.4.2 Cultural Values

Cultural values can be described as shared community beliefs or attitudes, among a given area or population, which provide a framework for community unity. Cultural values are also dependent on a resident’s sense of place, which is tied to the landscape where they reside.

At the time of European contact, Siouan groups (Dakota) were the predominant Native American groups represented in the southern portion of Minnesota and within Martin County. European contact with the Dakota began with French fur-trading expeditions, and interactions between Native American groups and Europeans became more frequent between 1750 and 1800. The French had the largest non-native presence in the region until the British began controlling the fur

trade following the French and Indian War in 1760. The British maintained control of the fur trade until the United States purchased the Louisiana Territory in 1803. During the Contact Period, Native American populations declined due largely to warfare and disease. European expansion also affected Native American settlement patterns as groups in the eastern portion of the United States were pushed west by the increasing European population. This frequently led to conflict between the different Native American groups.

Much of southern Minnesota, along with present-day Martin County, was ceded to the United States government by the Dakota in 1851 (approved in 1853) as part of the Traverse des Sioux and Mendota treaties. Following these treaties, the first Euro-American settlers began to enter the area. Many early settlers of Martin County were of English heritage.[11]

The Extension Project is in Cedar Township, a rural portion of Martin County. According to the United States Census Bureau[12] Martin County Profile, 90% of the population identifies as White alone. Other races include Black or African American along (less than 1 percent), American Indian and Alaska Native alone (less than 1 percent), Asian alone (less than 1 percent), Native Hawaiian and Other Pacific Islander alone (less than 1 percent), or some other race alone (less than 1 percent). Seven percent of the population identifies as Hispanic or Latino. Of the 9,259 people that reported a single ancestry, the three most commonly reported were German (4,095), Norwegian (716) and European (454).[13] The communities within Martin County primarily have cultural values tied to agricultural production, light industry, and recreational activities such as hunting and fishing. Farm-related businesses play an important role in the regional economy, and the area has a diversified agricultural mix of crops and livestock production.[14]

The Jeffers Petroglyphs Historic Site, a culturally important site for many Tribes, is over 20 miles northwest of Lakefield Junction Station. The Extension Project will not be visible from the petroglyphs.

Community events near the Extension Project both in and out of Martin County are centered more around seasonal events, national holidays, and municipal events than to those based on ethnic heritage.[15] A more detailed discussion of these events is presented in **Section 5.6.4**.

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[11] Phase Ia Literature Review (Citations omitted) (see Appendix E).

[12] United States Census. *P9 Hispanic or Latino, and Not Hispanic or Latino by Race, Decennial Census Demographic and Housing Characteristics (2020)*. Available online at: https://data.census.gov/. Accessed December 2025.

[13] United States Census. *BO4004 People Reporting Single Ancestry, American Community Survey 5-Year Estimates (2023)*. Available online at: https://data.census.gov/. Accessed December 2025.

[14] United State Department of Agriculture. 2022. *County Profile: Martin County, Minnesota*. Available online at: https://www.nass.usda.gov/Publications/AgCensus/2022/Online_Resources/County_Profiles/Minnesota/cp27091.pdf. Accessed September 2025.

[15] Big Bend Wind, LLC. November 2020. *Application for Route Permit for a 161 kV Transmission Line*. Available online at: https://efiling.web.commerce.state.mn.us/documents/%7B106CAF75-0000-CC3B-B3EF-5CDE99C9E7AF%7D/download (Section 5.3.3 Tourism). Accessed August 2025.

5.4.2.1 Potential Impacts and Mitigation

The ROI for cultural values is the County. Potential impacts on cultural values are not anticipated. The Extension Project will not interfere with the work and leisure pursuits of residents. Mitigation is not proposed.

Potential Impacts

The presence of the Extension Project will have negligible impacts on land use activities within the Local Vicinity. Agricultural practices will be allowed to continue within the right-of-way after construction of the Extension Project is complete. Substations are located on Great River Energy-owned property that is not used for agricultural production. The existing work and leisure pursuits in the Project Area are not expected to change because of construction of the Extension Project. For example, the Extension Project will not impact access to public hunting or fishing areas; therefore, impacts on recreational fishing or hunting are not anticipated.

The value an individual places on the landscape where they reside is subjective, meaning the character of the land around them depends upon personal perceptions and unique philosophical or psychological responses. Construction of the Extension Project might change some individuals' perception of the area's character and potentially erode their sense of place. However, the general character and aesthetic in the Project Area are not expected to change given the existing utility infrastructure in the Project Area including transmission lines, the Trimont Wind Farm and Lakefield Junction Station.

Mitigation

Big Bend will work with landowners to minimize disruptions to agricultural operations during construction of the transmission line to the extent possible. Because impacts on cultural values are not anticipated, no mitigative measures specific to cultural values are proposed. As discussed in Section 4.1, Big Bend rejected an alternative route segment because it would cross the Cedar Lutheran Cemetery and be in close proximity to the Cedar Lutheran Church. After consulting with the Minnesota Office of State Archeologist and reviewing records for the cemetery, Big Bend concluded that such a route was impracticable. There are no conditions in the 2025 Sample Route Permit that address cultural values. Big Bend is not aware of other MPUC route permits that directly mitigate impacts on cultural values or sense of place.

5.4.3 Displacement

Displacement is defined as compelling a person or persons to leave their home or otherwise remove a business or building. NESC standards require certain clearances between transmission line facilities and the ground, and between transmission line facilities and buildings for safe operation of the transmission line. To comply with NESC standards and allow sufficient space for transmission line maintenance, transmission lines are generally routed to avoid residences or other buildings within the right-of-way. Residences or other buildings located within a project right-of-way that cannot be avoided are generally removed or displaced. Displacements are relatively rare and are more likely to occur in heavily populated areas where avoiding all residences and businesses is not always feasible.

5.4.3.1 Potential Impacts and Mitigation

The ROI for displacement is the Proposed Right-of-Way. Displacement will not occur.

Potential Impacts

The Application Alignment crosses a rural area that is primarily used for agricultural and energy production. There are no residences or buildings located within the Proposed Right-of-Way. Residences are identified in **Table 8** and displayed on the detailed maps in **Appendix B**. The Applicants will site substations on property already owned by Great River Energy.

Mitigation

To limit proximity to residences and other buildings, Big Bend designed a route and alignment that is co-located with existing roadways. If a residence is present, Big Bend avoided it by routing the Application Alignment across the road from the residence. Because no homes or buildings are within the Proposed Right-of-Way, no additional mitigation is proposed. Section 5.5.1 of the 2025 Sample Route Permit requires Big Bend to design the Extension Project to meet or exceed all relevant local and state codes, and the NESC and NERC requirements including standards relating to clearance to buildings.

5.4.4 Electrical Interference

Corona, which is the manifestation of energy loss along the transmission line, as well as spark discharge, from transmission line conductors can generate electromagnetic “noise” at the same frequencies that some radio, television, cellular, and GPS signals are transmitted. Electromagnetic noise can interfere with the reception of these signals, depending on the frequency and overall strength of the signal.[16] Line of sight communication signals could also be blocked by a structure also referred to as shadowing.

Radio

There are numerous AM and FM radio broadcasting stations such as KNSW (91.7 FM), KKCK (94.7 FM), KUSQ (95.1 FM), KBEW (98.1 FM), KUXX (105.7 FM), KWOA (730 AM), KNUJ (860 AM), KKOJ (1190 AM), and KMHL (1400 AM) that operate or can be heard near the Extension Project. AM radio operates at frequencies between 530 kilohertz to 1.6 megahertz (MHz), while FM radio operates at frequencies between 88.1 and 107.9 MHz. There are no communication towers, including AM radio towers, within the Project Area.

Television

There are more than 30 digital channels broadcast in and around the Extension Project; these channels would be received from cities including Redwood Falls, Mankato, Jackson, and Worthington, Minnesota.

[16] V. Muthukrishnan. 2024. *Electromagnetic Interference (EMI): What it is & How to Reduce it*. Available online at: https://www.electrical4u.com/electromagnetic-interference/. Accessed October 2025.

Cellular Phone

Several cellular phone service providers operate in the vicinity of the Extension Project, including large carriers like Verizon, AT&T, Sprint, T-Mobile, Virgin Mobile, Boost Mobile, Cricket, Straight Talk, and Republic Wireless.

Global Positioning System

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.

5.4.4.1 Potential Impacts and Mitigation

The ROI for electrical interference is the Local Vicinity. Impacts on radio, television, cellular phones, or GPS units are not expected from construction or operation of the Extension Project. Should they occur, impacts will be of a small size, short term, not affect a unique resource and can be mitigated.

Potential Impacts

AM radio frequencies are most commonly affected by corona-generated noise. AM radio frequency interference typically occurs immediately under a transmission line and dissipates rapidly within the right-of-way to either side.

Television broadcast frequencies are typically high enough that they are not affected by corona-generated noise. In particular, digital and satellite television transmissions are not affected by corona-generated noise because they are dependent on packets of binary information or transmitted in the Ku band of radio frequencies (12,000-18,000 MHz), respectively. Digital and satellite transmissions are more likely to be affected by multi-path reflections (shadowing) generated by line-of-sight interference from a transmission line structure should the location of the structure come between the transmission and the receiver. Interference to digital and satellite signals because of the Extension Project is not anticipated.

Cellular phone signals use an ultra-high frequency, generally around 900 MHz, which is significantly higher than the range of electromagnetic noise generated by transmission line conductors. GPS signals also operate at a higher frequency, within the range of 1,225 to 1,575 MHz Because both cellular phone signals and GPS operate at frequencies outside the range of electromagnetic noise generated by transmission line conductors, the risk of interference is negligible.

Mitigation

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. Interference from a spark discharge source along the transmission line can be found and corrected.

The use of shielded coaxial cable for cable television transmittals generally makes them insusceptible to interference from electromagnetic noise. If interference to digital and satellite

signals were to occur from shadowing, such interference can be mitigated by use of an outdoor antenna to improve digital signals or by moving the affected satellite antenna to a slightly different location.

Section 5.4.3 of the 2025 Sample Route Permit addresses electrical interference. “If interference with radio or television, satellite, wireless internet, GPS-based agriculture navigation systems or other communication devices is caused by the presence or operation of the Transmission Facility, the Permittee shall take whatever action is necessary to restore or provide reception equivalent to reception levels in the immediate area just prior to the construction of the Transmission Facility.”

5.4.5 Environmental Justice

Environmental Justice means the “fair treatment and meaningful involvement of all people regardless of race, color, culture, national origin, income, and educational levels with respect to the development, implementation, and enforcement of protective environmental laws, regulations, and policies.”[17] Minn. Stat. § 216B.1691, subd. 1(e), defines “environmental justice” as “an area in Minnesota that, based on the most recent data published by the United States Census Bureau, meets one or more of the following criteria:

(1) 40 percent or more of the area's total population is nonwhite;

(2) 35 percent or more of households in the area have an income that is at or below 200 percent of the federal poverty level;

(3) 40 percent or more of the area's residents over the age of five have limited English proficiency; or

(4) the area is located within Indian country, as defined in United State Code, title 18, section 1151.”

Although the statute quoted above applies to the establishment of Minnesota’s renewable energy objectives, the Applicants apply this statutory definition because it is the only statutory definition of environmental justice applicable to any MPUC proceedings.

The Extension Project is in Census Tract 7901 Block Group 1. This census tract includes the northern quarter of Martin County. **Table 9** identifies total population, minority populations by race and ethnicity, low-income populations, and populations with a language other than English spoken at home for census tracts crossed by the Application Alignment as well as Martin County and Minnesota.

[17] U.S. Environmental Protection Agency (August 2, 2019) *EJ 2020 Glossary*. Available online at: https://19january2021snapshot.epa.gov/environmentaljustice/ej-2020-glossary_.html. Accessed September 2025.

Table 9
Environmental Justice Data

Area	Population	Percent Total Minority [a]	Individuals with Income Below 200 Percent of Poverty Level	Language Other Than English Spoken at Home
Minnesota	5,706,494	23.3%	22.0%	26.0%
Martin County	19,606	11.3%	31.1%	5.7%
Census Tract 7901	2,930	4.0%	31.6%	4.6%

[a] "Minority" refers to people who reported their ethnicity and race as something other than non-Hispanic White.

Source: 2023 American Community Survey 5-Year Estimates (Tables: DP02 Selected Social Characteristics in the United States; DP05 Demographic and Housing Estimates; S1701 Poverty Status in the Past 12 Months); 2020 Decennial Census (Table P1 Total Population). Retrieved from: https://data.census.gov/.

As shown by the MPCA Map of Environmental Justice Areas web viewer[18] and as presented in **Table 9**, the Application Alignment does not cross a census tract that is considered an environmental justice community.

5.4.5.1 Existing Human Health and Environmental Indicators

The Applicants reviewed the MPCA What's in My Neighborhood database.[19] This database shows potentially contaminated sites and an inventory of businesses that have applied for environmental permits and registrations from the agency. Just because a site is listed in the database does not necessarily imply a threat to the environment. Thirteen sites are within the Local Vicinity, including: 4 feedlots, 2 construction stormwater sites, 1 industrial wastewater site. Lakefield Junction Station is associated with multiple sites, including aboveground tanks, air quality, hazardous waste, minimal quantity generator, and industrial stormwater and wastewater.

According to the MPCA MNRISKS model and shown on the MPCA Map of Environmental Justice Areas web viewer, Census Tract 7901 Block Group 1 has an air score of 0.10. This means the air scores in the census tract are in the lowest 20 percent of air scores in Minnesota and the air quality is better than 80 percent of the state. Additionally, air scores are below health benchmarks. A health benchmark is "an amount of air pollution that is unlikely to result in health effects in sensitive populations after a lifetime of exposure."[20] According to the MPCA, contributing emission sources in the census tract include agriculture and farm equipment (66 percent of emissions),

[18] Minnesota Pollution Control Agency. 2025c. *Environmental Justice*. Available online at: https://www.pca.state.mn.us/about-mpca/environmental-justice. Accessed September 2025.

[19] Minnesota Pollution Control Agency. n.d.a. *What's in My Neighborhood*. Available online at: https://www.pca.state.mn.us/about-mpca/whats-in-my-neighborhood. Accessed September 2025.

[20] Minnesota Pollution Control Agency. 2025d. *Understanding Environmental Justice in Minnesota*. Available online at: https://experience.arcgis.com/experience/bff19459422443d0816b632be0c25228/page/Page?views=Air-pollution-score#data_s=id%3AdataSource_17-190fface219-layer-6%3A3559. Accessed September 2025.

permitted facilities (22 percent of emissions) and recreational vehicles and boating (2 percent of emissions).[21]

5.4.5.2 Potential Impacts and Mitigation

The ROI for Environmental Justice is the census tract crossed by the Extension Project.

Potential Impacts

There are no statutorily defined environmental justice communities crossed by the Extension Project.

Mitigation

No mitigation is proposed.

5.4.6 Land Use and Zoning

Land use provides insight into existing human settlement patterns. Zoning can provide an understanding of future development. The Application Alignment crosses through predominantly rural areas with sparsely scattered rural residences, farmsteads, commercial livestock operations, agricultural support facilities and existing electrical infrastructure.

Existing Environment

Land Use

Big Bend reviewed the 2024 National Land Cover Database (NLCD)[22] to identify existing land cover types crossed by the Proposed Route, as shown on **Figure 8** and in **Table 10**. The primary land cover type crossed by the Extension Project is cultivated cropland. Lands categorized as "pasture/hay" are located on Great River Energy-owned property.

[21] Minnesota Pollution Control Agency. 2025d. *Understanding Environmental Justice in Minnesota*. Available online at: https://experience.arcgis.com/experience/bff19459422443d0816b632be0c25228/page/Page?views=Air-pollution-score#data_s=id%3AdataSource_17-190fface219-layer-6%3A3559. Accessed September 2025.

[22] U.S. Geological Survey. 2024. *Annual NLCD Collection 1 Science Products: U.S. Geological Survey data release*. Available online at: https://doi.org/10.5066/P94UXNTS. Accessed September 2025.

Figure 8. Land Cover

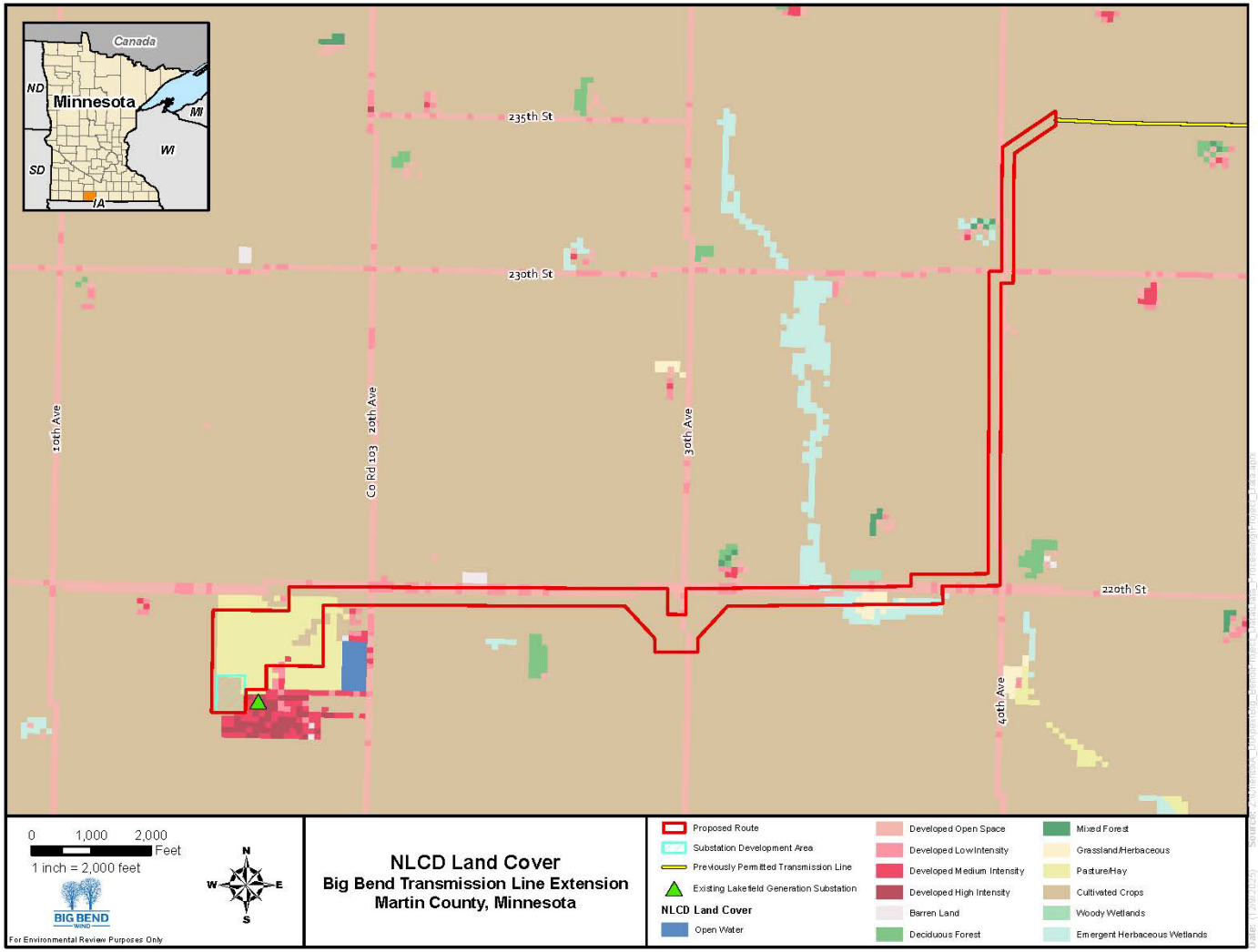


Table 10 Land Cover				
	Proposed Route		Proposed Right-of-Way	
NLCD Land Cover Category	Acres	Percent	Acres	Percent
Cultivated Crops	103.23	54%	41.86	54%
Developed Low Intensity	5.60	3%	4.17	5%
Developed Medium Intensity	0.28	>1%	0	0%
Developed Open Space	29.07	15%	23.79	31%
Emergent Herbaceous Wetlands	4.25	2%	0.71	1%
Grassland/Herbaceous	2.78	1%	0.73	1%
Pasture/Hay	44.81	24%	6.14	8%
TOTAL	**190.02**	**100%**	**77.35**	**100%**
Source: NLCD, 2024				

Zoning

Big Bend reviewed the Martin County Zoning Ordinance (2008)[23] and associated Zoning District Map (2017).[24] The Extension Project lies within the Agriculture District though portions of the transmission line would be within the Shoreland District along Cedar Creek, specifically Shoreland Special Protection—SL-1 as shown on **Figure 9**. The Agricultural District is set aside to "allow extensive areas of Martin County to be retained in agricultural use, control scattered non-farm development; preserve woodlands and other areas of aesthetic and scenic value, which, because of their physical features, are desirable as water retention areas, habitat for plant and animal life, green space or other environmental uses beneficial to the county." The SL-1 District protects natural environment lakes from development. "It is also used for urban expansion areas that should only have sparse development until annexation and city services are available."

The Martin County Buffer Ordinance is intended to "(1) Protect state water resources from erosion and runoff pollution; (2) Stabilize soils, shores and banks; and (3) Protect or provide riparian corridors."[25] Like the Shoreland District, the Buffer Ordinance applies along Cedar Creek.

The Martin County Land Use Plan was adopted March 4, 2003.[26] This plan was developed because of concerns with potential conflicts between urban and rural development and changes

[23] Martin County. 2008. *Martin County Zoning Ordinance*. Available online at: https://cms9files.revize.com/martincounty25/Government/Planning%20&%20Zoning/Land%20Use/Ordinances/Approved%20Zoning%20Ordinance%202024.pdf?t=202506180943180&t=202506180943180. Accessed August 2025.

[24] Martin County. 2017a. *Martin County, Minnesota Zoning District Map*. Available online at: https://cms9files.revize.com/martincounty25/Government/Planning%20&%20Zoning/Land%20Use/Maps/Zoning%20Map.pdf?t=202506180943580&t=202506180943580. Accessed August 2025.

[25] Martin County. 2017b. *Martin County Buffer Ordinance*. Available online at: https://cms9files.revize.com/martincounty25/Government/Planning%20&%20Zoning/Land%20Use/Ordinances/Buffer%20Ordinance.pdf?t=202506180943270&t=202506180943270. Accessed August 2025.

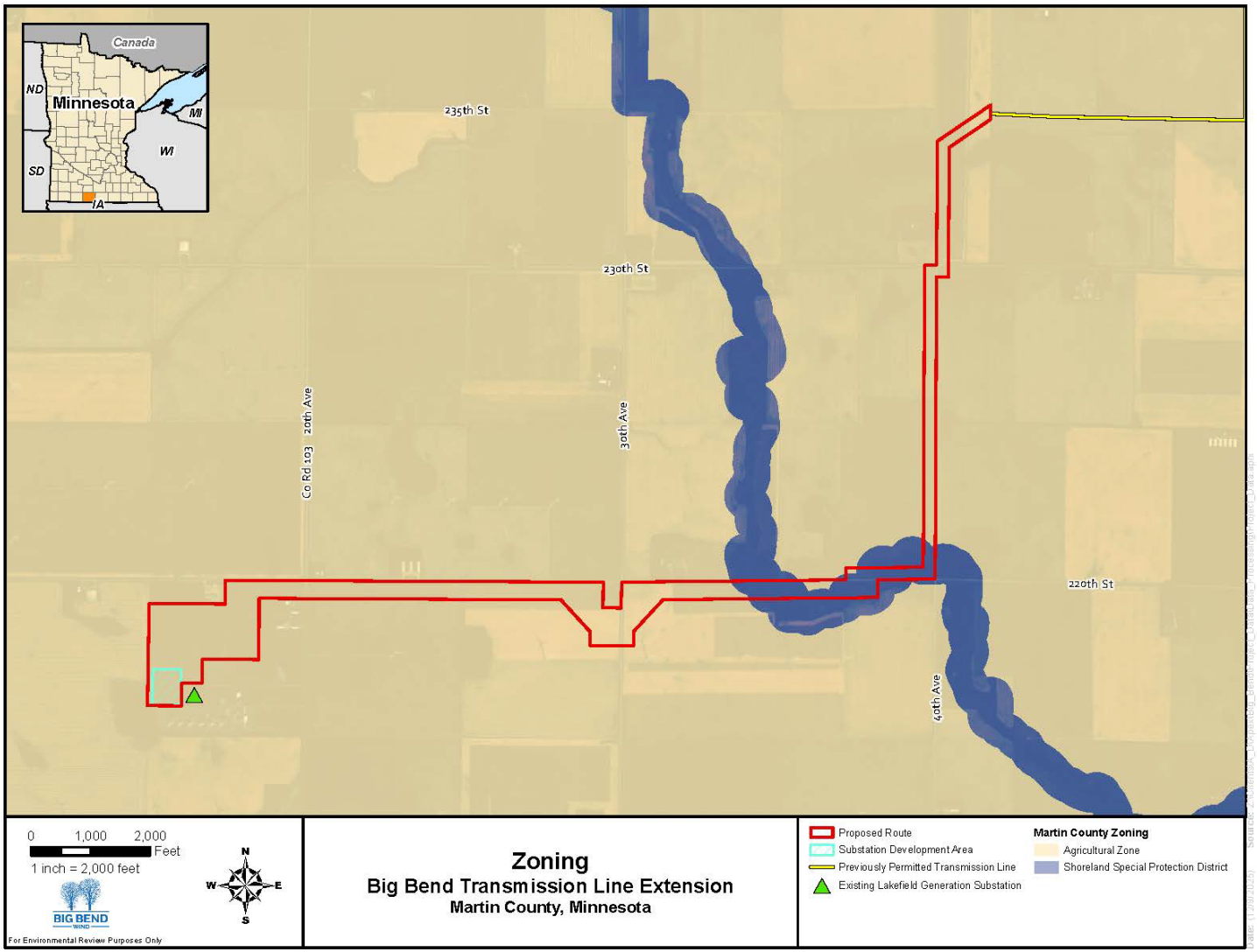
[26] Martin County. 2003. *Martin County Land Use Plan*. Available online at: https://cms9files.revize.com/martincounty25/Government/Planning%20&%20Zoning/Land%20Use/Plans/Land%20Use%20Plan.pdf?t=202506180943410&t=202506180943410 . Accessed August 2025.

in agricultural technology causing similar conflicts between neighbors, among other concerns. The plan established several goals including a natural resources goal, which aims to maintain and improve these resources, and an urban and rural coordination goal, which aims to ensure development is "not harmful to urban [sic] interests nor impede future growth corridors of its urban neighbors."

Martin County has developed the *Martin County Local Water Plan 2017 – 2026*.[27] This plan identifies and prioritizes "the areas and specific sites that are having the greatest impact on water and target financial resources as efficiently as possible to effectively correct the identified issues on these areas and sites." The plan lists various strategies to address the county's water planning goals. Agricultural nonpoint source pollution is listed as the "biggest challenge facing the county during the next decade."

[27] Martin County. 2016. *Martin County Local Water Plan 2017-2026*. Available online at: https://martinswcd.net/wp-content/uploads/2013/11/MartinCountyLocalWaterPlan2016-2.pdf. Accessed August 2025.

Figure 9. Zoning



5.4.6.2 Potential Impacts and Mitigation

The ROI for land use and zoning is the Project Area. Potential impacts are anticipated to be both short and long term but minimal. Construction and operation of the Extension Project is not expected to impact current land use or future growth in Martin County. Potential impacts can be mitigated through easement agreements.

A route permit from the MPUC, "supersedes and preempts all zoning, building, or land use rules, regulations, or ordinances promulgated by regional, county, local and special purpose government."[28] Nevertheless, land use and zoning inform MPUC decisions regarding a project's potential impact on "future development and expansion."[29] Additionally, the MPUC must "minimize human settlement and other land use conflicts."[30]

Land Use – Potential Impacts

Construction and operation of the Extension Project is not expected to impact land use within Martin County. However, existing land uses along the Application Alignment will experience short-term impacts during construction.

Land Use – Mitigation

Though there will be no long-term impacts anticipated from the Project, mitigation efforts will still take place. Big Bend sited the Application Alignment along road rights-of-way for most of its length to minimize impacts on non-developed areas. When transmission line construction is complete, Big Bend will restore the right-of-way and land uses will be allowed to continue as before with limited exceptions. No additional mitigation measures are proposed.

Zoning – Potential Impacts

No areas zoned as residential, commercial or industrial are crossed by the Application Alignment. Based on review of the zoning information, the likelihood of future residential, commercial, or industrial development within the Proposed Route is low. Should future industrial development occur, it would likely occur on the property owned by Great River Energy.

Based on preliminary design, up to four transmission line poles might be placed within the SL-1 District. Cedar Creek meanders on both sides of 220th Avenue along the Application Alignment. Because Big Bend is maximizing co-location with existing road right-of-way as well as routing the transmission line to avoid impacts on agricultural production, pole placement within the SL-1 District is unavoidable. Given the purpose of the SL-1 District to ensure sparse development for urban expansion areas until annexation and city services are available, potential impacts to Martin County zoning are not anticipated.

[28] Minnesota Statute 216I.18, Subdivision 1.

[29] Minnesota Statute 216I.05, Subdivision 11(2).

[30] Minnesota Statute 216I.05, Subdivision 11.

Zoning – Mitigation

Big Bend has routed the transmission line through predominately agricultural areas and has sited transmission structures in coordination with landowners to minimize impacts to their agricultural operations. Big Bend has minimized structure placement in the SL-1 district to the extent practicable. Furthermore, structures within the SL-1 district are prioritized on existing row cropped areas. No additional mitigation measures are proposed.

5.4.7 Noise

Noise is defined as unwanted sound. It might be made up of a variety of sounds of different intensities, across the entire frequency spectrum. Noise is measured in units of decibels on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight." The A-weighted scale (dBA) is used to reflect the selective sensitivity of human hearing. This scale puts more weight on the range of frequencies that the average human ear perceives, and less weight on those that people do not hear as well, such as very high and very low frequencies.

A transmission line can generate a small amount of sound due to corona activity. Corona is the manifestation of energy loss along the transmission line, and this energy loss can produce sound, such as buzzing or crackling. This noise can be greater in rainy or foggy conditions. During heavy rains, the sound of the rain is generally greater than the noise emitted from the transmission line and thus the transmission line noise is not noticeable. Corona noise levels are low until the transmission line operating voltage exceeds 345- to 500-kV.

Substation noise may result from the transformers, which is perceived as a humming sound. Transformers and transmission lines are equipped with circuit breakers which open to de-energize the transformers and transmission lines for fault conditions and for maintenance. Circuit breakers are rarely opened and closed, at which time there is sound associated with the mechanical operation of the breakers. Substation circuit breakers do not emit a humming sound during normal operation.

The MPCA has promulgated noise standards in Minn. R. ch. 7030. Noise standards are not dictated by local zoning. Instead, noise standards are based on 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 and cannot be exceeded for more than 10 percent of an hour (L_{10}) or 50 percent of an hour (L_{50}). Noise standards are shown in **Table 11**.

Table 11 Noise Area Classification				
	Daytime (7:00 a.m. – 10:00 p.m.)		Nighttime (10:00 p.m. – 7:00 a.m.)	
Noise Area Classification	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. ch. 7030				

Martin County provides the following explanation of existing noise impacts in its *What You Need to Know About Moving into the Country in Martin County*:

> Noise may be prevalent primarily during the day. However, there may also be noise in the evening from farm machinery during spring planting, fall harvest, and 3 to 4 hay harvests in the summer. Noise may also be evident throughout the year from cows mooing, calves bellering, feeding equipment, and other sources such as grain dryers, tractors, and other farm implements.[31]

5.4.7.1 Potential Impacts and Mitigation

The ROI for noise is the Local Vicinity. Construction-related impacts are expected to be short term and minimal. Operational impacts are anticipated to be of a small size, long term, and not impact unique resources. Potential impacts will be negligible to minimal.

The Extension Project is in a rural area. Ambient noise levels in these locations are generally between 35 and 40 dBA during daytime hours. Ambient noise levels will increase sporadically with passing vehicle traffic, high winds, or use of farm equipment, all-terrain vehicles, or snowmobiles. The primary noise receptors within the Local Vicinity are residences and farmsteads. These receptors are classified as NAC 1. **Table 8** and **Figure 10** identify residences within the Local Vicinity.

Specific impacts are associated with construction and operation.

Construction – Potential Impacts

Construction of the transmission line is expected to cause minimal, short-term noise impacts. Big Bend will minimize these unavoidable impacts to the extent possible. Noise impacts related to substation construction will be similar, except that, due to the location of these facilities, potential impacts are anticipated to be negligible to minimal.

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[31] Martin County. n.d. *What you need to know about moving into the country in Martin County.* Available online at: https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fcms9files.revize.com%2Fmartincounty25%2FGovernment%2FPlanning%2520%26%2520Zoning%2FImportant%2520Information%2520For%2520New%2520Rural%2520Homeowners.docx%3Ft%3D202506180943380%26t%3D202506180943380&wdOrigin=BROWSELINK. Accessed September 2025.

Vehicles and equipment will emit noise during construction. The amount of noise will vary depending on the type of activity occurring. Noise-producing activities are associated with clearing, grading (at substation locations, if necessary along the transmission line), material delivery, auguring foundation holes, setting foundations and structures, stringing conductors, and installing substation equipment. Noise from heavy equipment and increased vehicle traffic will be intermittent and will occur during daytime hours. Based on information from the United States. Department of Transportation,[32] the activities below are anticipated to have the following maximum noise level, measured at 50 feet:

- Clearing and grading: grader (85 dBA), chainsaw (84 dBA), and tractor (85 dBA);
- Material delivery: flatbed truck (74 dBA) and crane (81 dBA);
- Auguring foundation holes: augur drill rig (84 dBA); and
- Setting structures: crane (81 dBA).

Along the transmission line, construction activity would be present at a particular location for a few days, but on multiple occasions throughout the period between right-of-way clearing and restoration. As a result, construction noise will be highly intermittent in discrete locations. Noise from construction of the substations will be concentrated at the Substation Development Area. The closest residence is about 0.75 miles to the south. Construction will typically occur between 7 a.m. and 7 p.m. Monday through Friday. Point source sound decreases 6 dBA at every doubling of distance; therefore, an 85 dBA at 50 feet is perceived as a 49 dBA sound at 3,200 feet (0.6 miles).[33]

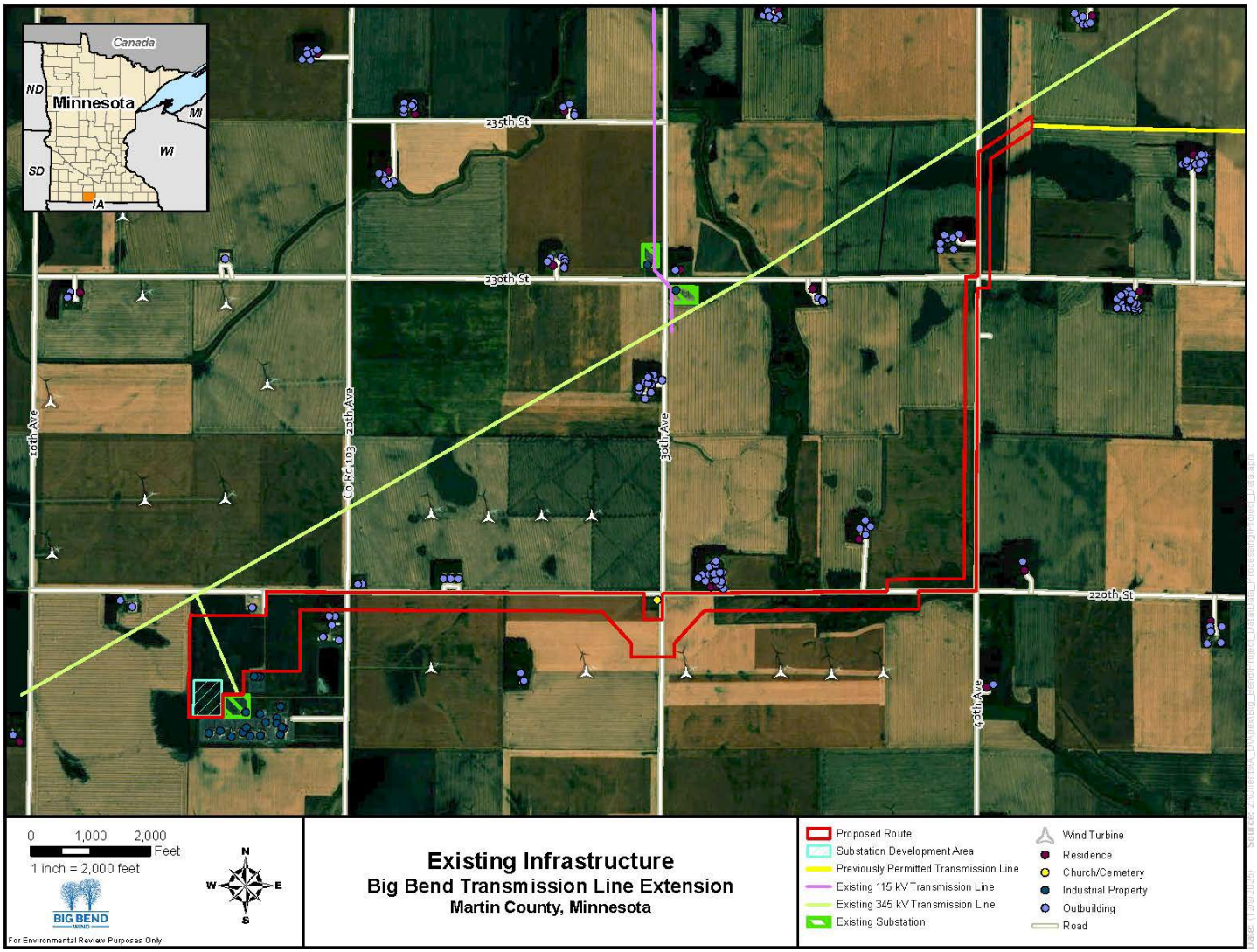
Construction – Mitigation

The 2025 Sample Route Permit, Section 5.3.6 Noise, requires compliance, “with noise standards established under [Minn. R.] 7030.0100 to 7030.0080. The Permittee shall limit construction and maintenance activities to daytime working hours to the extent practicable”. Big Bend and Great River Energy will use sound-control devices on vehicles and equipment (mufflers), will comply with noise standards, will conduct construction activities during daylight hours, and will not run vehicles and equipment unnecessarily.

[32] U.S. Department of Transportation Federal Highway Administration. 2017. *Construction Noise Handbook*. Available online at: https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/. Accessed September 2025.

[33] Minnesota Pollution Control Agency. 2015. *A Guide to Noise Control in Minnesota*. Available online at: https://www.pca.state.mn.us/sites/default/files/p-gen6-01.pdf. Accessed December 2025.

Figure 10. Existing Infrastructure



Operation – Potential Impacts

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 transmission line inaudible. Given the distance and existing natural gas turbines, substation noise will also be inaudible at the closest residence.

Operation – Mitigation

The 2025 Sample Route Permit, Section 5.3.6 Noise, requires compliance, "with noise standards established under [Minn. R.] 7030.0100 to 7030.0080. The Permittee shall limit construction and maintenance activities to daytime working hours to the extent practicable". The Applicants will comply with the noise standards and will limit maintenance activities to daytime working hours to the extent practicable.

5.4.8 Public Services

Transmission line projects have the potential to impact public services during both construction and operation. This section provides information about public services near the Extension Project including water and wastewater services; utilities; and other public services such as public utility infrastructure. It also discusses whether the Extension Project has the potential to affect these public services. **Section 5.5.2** discusses emergency services including police, fire, and ambulance services and nearby hospitals.

Water and Wastewater Services

Based on the Minnesota Department of Health's (MDH) Source Water Protection Web Map Viewer, most rural residences in Martin County are supplied with water by wells and are assumed to have private septic systems or drain fields. The closest wellhead protection area is southwest of Trimont. "Trimont operates in Martin County as a community public water system. It serves a population of 734. The source of supply for the system is groundwater."[34] These wells are 140 feet deep and are considered "not vulnerable."

Utilities

South Central Electric Association provides local distribution electrical service and Minnesota Energy Resources provides natural gas service in that portion of Martin County occupied by the Extension Project.[35, 36] The Extension Project is routed through the Trimont Area Wind Farm. An existing 345-kV transmission line and Lakefield Junction Station are within the Local Vicinity for portions of the transmission line route as well as the new substation area. Review of the National

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[34] Minnesota Department of Health. 2025a. *Trimont Source Water Assessment October 10, 2025.* Available online at: https://swareport.web.health.state.mn.us/SWA_Factsheet.html?pwsid=1460009#. Accessed October 2025.

[35] Minnesota Public Utilities Commission. 2025. *Maps.* Available online at: https://mn.gov/puc/activities/maps/. Accessed September 2025.

[36] Minnesota Energy Resources. 2025. *Service Area Map*. Available online at: https://www.minnesotaenergyresources.com/company/area. Accessed September 2025.

Pipeline Mapping System indicates there is a natural gas transmission pipeline near the Extension Project that feeds Lakefield Junction Station.[37] The Application Alignment does not cross the pipeline.

Other Public Services

Other public services within Martin County are located primarily within municipalities. For example, public works and utility departments design, build, and maintain streets and sidewalks, sanitary sewers, water mains, and public landscaping. These occur within the Local Vicinity.

5.4.8.2 Potential Impacts and Mitigation

The ROI for public services is the Project Area. Generally, potential impacts are anticipated to be minimal, of a small size, not effect a unique resource and can be mitigated.

Water and Wastewater Services – Potential Impacts

The Extension Project does not cross any domestic wells. A single well, associated with Lakefield Junction Station, is located within the Proposed Route as further discussed in **Section 5.8.9**. Based on a review of aerial imagery, the Proposed Right-of-Way is distant from homes and does not overtake septic systems.

On September 10, 2025, the Department of Health, Drinking Water Protection Section provided comments on the Extension Project and there are no drinking water supply management areas within the Route.

Water and Wastewater Services – Mitigation

The Department of Health, Drinking Water Protection Section, also noted in their September 10, 2025, letter that the Extension Project meets setback requirements from wells and asked that they are also met during construction (see **Section 1.5**). The Applicants will comply with these setback requirements.

Utilities – Potential Impacts

No impacts to existing distribution lines are expected. The transmission line will cross the existing 345-kV transmission line before reaching the Step-Up Substation. Big Bend will coordinate with Xcel Energy when crossing the existing 345-kV transmission line. Based on preliminary design, Big Bend plans to cross under this 345-kV line at a perpendicular angle on the Great River Energy-owned parcel. Big Bend and Great River Energy will also coordinate when constructing and interconnecting the Ste-up and Interconnection Substations. Should an outage at the existing Lakefield Generating Substation be necessary, Great River Energy will coordinate with MISO and NERC to address any impacts to the electrical grid.

[37] Pipeline and Hazardous Materials Safety Administration. 2025. *National Pipeline Mapping System*. Available online at: https://www.npms.phmsa.dot.gov/. Accessed September 2025.

Utilities – Mitigation

Should outages be necessary along existing distribution lines, Big Bend and Great River Energy will coordinate with South Central Electric Association. Big Bend will coordinate with Xcel Energy when crossing the existing 345-kV transmission line. Based on preliminary design, Big Bend plans to cross under this 345-kV line at a perpendicular angle on the Great River Energy-owned parcel. Big Bend and Great River Energy will also coordinate when constructing and interconnecting the Step-up and interconnection substations. Should an outage at the existing Lakefield Substation be necessary, Great River Energy will coordinate with MISO and NERC to address any impacts to the electrical grid.

Other Public Services – Potential Impacts

Construction activities have the potential to impact other public services, such as buried utilities, if they are not properly identified prior to land disturbance activities. The striking of buried utilities can interrupt service, and depending on the type of utility, can create safety hazards for workers and the public.

Other Public Services – Mitigation

Prior to any land disturbance activities, the Big Bend and Great River Energy will locate and mark underground utilities using the Gopher State One-Call system. If the Applicants need to cross an underground utility or other underground infrastructure with heavy equipment, they will employ BMPs, such as construction matting, to protect the infrastructure if necessary. No additional mitigation is proposed.

5.4.9 Recreation

Transmission lines and substations can interfere with recreational activities. Alternatively, a transmission line might increase recreational opportunities, for example, clearing and continued maintenance of the right-of-way could increase opportunities for wildlife viewing or hunting.

Recreational opportunities in Martin County include fishing, boating, water sports, swimming, biking, bird watching, hiking, hunting and snowmobiling among other activities. There are no state lands within the Local Vicinity of the Extension Project including state parks, state forests, state trails, wildlife management areas, aquatic management areas, or scientific and natural areas. No federal or county parks, or federal forests or refuges are within the Local Vicinity. There are no mapped snowmobile trails in the Local Vicinity; however, snowmobiling might occur along road ditches. Recreational activities in the Local Vicinity of the Extension Project occur on private lands.

5.4.9.1 Potential Impacts and Mitigation

The ROI for recreation is the Local Vicinity. Potential impacts are anticipated to be short and long term, of a small size, and not affect unique resources. Overall, potential impacts are anticipated to be minimal. Should impacts occur, they would be mostly associated with construction activities. Potential impacts can be mitigated.

Potential Impacts

Short-term increases in noise and dust emissions would occur during construction of the Extension Project, which could detract from public enjoyment of nearby recreational activities on

private lands. Construction of the Extension Project will not affect public access to nearby recreational opportunities. Moreover, construction is not anticipated to limit recreational opportunities on private land. The Substation Development Area is located on Great River Energy-owned property.

Temporary disruptions to snowmobile use along road ditches could occur if construction of the transmission line occurs during the winter months and there is adequate snow cover. Given there are no designated snowmobile trails in the area, users would be expected to use the ditch on the opposite side of the roadway. Any disruptions would be minimal, short term, and would resolve with the completion of construction.

Similarly, if construction occurs during an open hunting season, the increased activity could temporarily disturb wildlife and change movement patterns, indirectly affecting hunting activities. However, given the extent of agricultural activity and the prevalence of habitat in the Local Vicinity, wildlife such as deer and upland game birds would not be expected to relocate.

Long term impacts include aesthetic changes to the landscape that might be visible to individuals recreating on private lands. Given the extent of electrical infrastructure already present, including the Trimont Wind Farm, any impact to recreational activities would be incremental and negligible.

Direct impacts related to aesthetics and noise can indirectly impact recreational resources and individuals participating in recreational events. **Section 5.4.1** discusses potential aesthetic impacts, and **Section 5.4.7** discusses potential noise impacts.

Mitigation

There are no conditions in the 2025 Sample Route Permit that specifically address recreation. However, mitigating direct impacts to certain resources also mitigates indirect impacts to recreational resources.

The 2025 Sample Route Permit contains conditions related to aesthetics in Section 5.3.7. These conditions include considering landowner input when placing structures and preserving the natural landscape to the extent possible by not unnecessarily destroying the natural surroundings. Additionally, transmission structures shall be placed to minimize the loss of agricultural land, forests and wetlands, and to avoid homes and farmsteads, among other conditions. Many other provisions in the 2025 Sample Route Permit also indirectly mitigate aesthetic impacts. For example, Section 5.3.10 Vegetation Management requires Big Bend to minimize the number of trees removed and to preserve windbreaks to the maximum extent practicable. General conditions can also mitigate aesthetic impacts, such as Section 5.3.18 Restoration and 5.3.19 Cleanup.

The 2025 Sample Route Permit, Section 5.3.6 Noise, requires compliance, “with noise standards established under [Minn. R.] 7030.0100 to 7030.0080. The Permittee shall limit construction and maintenance activities to daytime working hours to the extent practicable.”

5.4.10 Socioeconomics

Existing socioeconomic conditions within Martin County are reported in **Table 12.** Martin County has a very small population compared to the State of Minnesota as a whole, comprising less than one-tenth of Minnesota’s total population. In Martin County the percentage of persons who identify as white only, not Hispanic or Latino, is higher than the state level.

Table 12
Socioeconomic Indicators

Location	Population	Percent Total Minority [a]	Median Household Income	Persons in Poverty
Minnesota	5,706,494	23.3%	$87,117	9.3%
Martin County	19,606	11.3%	$62,969	11.1%

[a] "Minority" refers to people who reported their ethnicity and race as something other than non-Hispanic White.

Source: 2023 American Community Survey 5-Year Estimates (Tables: DP05 Demographic and Housing Estimates; S1701 Poverty Status in the Past 12 Months; S1901 Income in the Past 12 Months); 2020 Decennial Census (Table P1 Total Population). Available online at: https://data.census.gov/. Accessed September 2025.

According to the United States Census Bureau, the top three industries of employment in the State of Minnesota are education, health, and social services at 26.1 percent, manufacturing at 12.8 percent, and retail trade at 11 percent.[38] The top three industries of employment in Martin County are the same with deviations from the total percentage of people employed. Employment in the education, health, and social services industry is slightly lower at 24 percent, manufacturing is higher at 16.2 percent, and retail trade slightly higher at 12.5 percent.[39]

5.4.10.1 Potential Impacts and Mitigation

The ROI for socioeconomics is the County. Potential impacts are anticipated to be short term, of a small size, and not affect a unique resource. Impacts are expected to be positive. Mitigation is not proposed.

Potential Impacts

Construction of the Extension Project would have minimal, short-term impacts on the existing socioeconomic conditions in Martin County. The Extension Project would not result in long-term or significant changes in the population size or demographics, or significantly affect employment or income. Construction and operation of the Extension Project is not anticipated to create or remove jobs or result in the permanent relocation of individuals to or from the area.

The communities near the Extension Project will likely experience short-term positive economic impacts related to the increase in expenditures during construction. Construction of the Extension Project would take approximately 9 months, and the construction workforce would be approximately 50 workers. Construction personnel would likely commute to the Extension Project on a daily or weekly basis instead of relocating to the area. The influx of additional construction personnel in the area will have a small positive impact on the local economy from construction crew expenditures in the local community (for example, lodging, fuel, food). Construction

[38] United States Census Bureau. n.d. *Minnesota*. Available online at: https://data.census.gov/profile/Minnesota?g=040XX00US27. Accessed September 2025.

[39] United States Census Bureau. n.d. *Martin County, Minnesota*. Available online at: https://data.census.gov/profile/Martin_County,_Minnesota?g=050XX00US27091. Accessed September 2025.

materials (for example, lumber, concrete, aggregate) might be purchased from local vendors when feasible.

No additional permanent staff will be necessary for operation and maintenance of the Extension Project. Therefore, the Extension Project is not expected to have a long-term effect on population trends, economic conditions, or employment. However, the Extension Project will have a long-term beneficial impact on the local tax base from the incremental increase in revenues generated by utility property taxes.

Property value impacts from transmission lines are difficult to measure because of the multiple factors that can impact a property's value. While potential impacts vary, high voltage transmission lines generally have "no significant impact or a slight negative impact on residential properties".[40]

Mitigation

As the overall socioeconomic impact of the Extension Project is anticipated to be positive, no mitigation is proposed. Section 9.5 of the 2025 Sample Route Permit requires permittees, its contractors, and subcontractors to "pay no less than the prevailing wage rate as defined in Minn. Stat. § 177.42". Additionally, these entities are "subject to the requirements and enforcement provisions under Minn. Stat. §§ 177.27, 177.30, 177.32, 177.41 to 177.435, and 177.45".

5.4.11 Transportation

Transmission line projects have the potential to affect local transportation networks such as roadways, railroads, airports, and airstrips. Use of heavy equipment during construction could damage existing road surfaces and local roadways could experience temporary lane closures during construction. In addition, the influx of construction contractors could increase traffic volumes on local roadways.

The FAA and MnDOT have both established guidelines for development of transmission lines near public airports. The FAA has developed height restrictions for development near public airports and has developed guidelines for placement of buildings and other structures near high frequency omni-directional range navigation systems. MnDOT has established zoning areas around public airports that restrict the area where buildings and other structures can be placed. Both the FAA and MnDOT guidelines apply only to public airports and are not applicable to private airstrips.

Roadways

The Extension Project follows and crosses township and county roads. These roads are graveled; not paved. **Table 13Table 13** identifies where the Application Alignment parallels or crossed roads, and provides traffic volumes, where available.

[40] Pitts, Jennifer M. and Jackson, Thomas O, PhD, MA1. 2024. *Power Lines and Property Values Revisited.* The Appraisal Journal, Fall 2024. Available online at: https://rpa-inc.com/wp-content/uploads/2020/03/Power-Lines-and-Property-Values-Revisited.pdf. Accessed September 2025.

Table 13
Township and County Roads

Highway / Road Name	Jurisdiction [a]	Parallel / Intersects	Traffic Volumes (SEQ # / Year) [b]
40th Avenue	Cedar Township	Parallel	NA
230th Street / County Road 150	Martin County	Intersect	62 (27087 / 2023)
220th Street	Cedar Township	Parallel	NA
30th Avenue	Cedar Township	Intersect	NA
20th Avenue / County Road 103	Martin County	Intersect	94 (27088 / 2022)

[a] MnDOT. n.d. EMMA: Enterprise MnDOT Mapping Application. Available online at: https://webgis.dot.state.mn.us/emma/#data_s=id%3AdataSource_2-emma_op_8668-1-3%3A18581. Accessed September 2025.

[b] MnDOT. n.d. Traffic Mapping Application. Available online at: https://www.arcgis.com/apps/webappviewer/index.html?id=7b3be07daed84e7fa170a91059ce63bb. Accessed September 2025.

Railroads

The Application Alignment does not cross a railroad. The nearest railroad is over 3 miles east of the Extension Project at its closest point.

Airports and Airstrips

There are no public-use airports or heliports operating within one mile of the Extension Project. No private air strips were identified within one mile of the Application Alignment.[41] Aerial crop spraying is discussed in **Section 5.6.1**.

5.4.11.2 Potential Impacts and Mitigation

The ROI for transportation is the Proposed Right-of-Way, except for airports, which is the Project Area. Potential impacts are associated with construction of the Extension Project. Impacts are anticipated to be short term, of a small size, and not affect a unique resource. Potential impacts can be mitigated.

Roadways – Potential Impacts

Construction of the Extension Project could create minor traffic increases along local roadways from construction vehicles and material and equipment delivery. This increase would be temporary and traffic volumes would return to normal after construction activities are complete.

[41] Minnesota Department of Transportation. n.d.. *EMMA: Enterprise MnDOT Mapping Application*. Available online at: https://webgis.dot.state.mn.us/emma/#data_s=id%3AdataSource_2-emma_op_8668-1-3%3A18581. Accessed September 2025.

Roadways – Mitigation

Temporary road or lane closures could occur during construction to ensure the safety of construction crews and the traveling public. While the transmission line is being constructed, the electrical conductors will be strung on support structures using a pulley system or a tensioner mounted on the back of a digger/derrick truck. Roads and nearby land might need to be temporarily closed for safety reasons when stringing electrical conductors between support structures across these features. 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 would be communicated in advance and might cause traffic delays given the need to detour traffic. No location would be inaccessible. Once the crossing is complete, the road(s) will be reopened.

After the completion of construction, the Applicants will ensure that county and township roads used during construction are returned to pre-construction conditions. The Applicants will meet with township road supervisors 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.

Section 5.3.14 of the 2025 Sample Route Permit addresses public roads. The Applicants will be required to notify road authorities of the roads that will be used during construction of the Extension Project as well as acquire all necessary permits for oversize or overweight loads. The Applicants are also required to promptly repair any damage to roads, among other provisions.

Railroads – Potential Impacts

There are no railroads within the Proposed Right-of-Way. Impacts will not occur.

Railroads – Mitigation

No mitigation is proposed.

Airports and Airstrips – Potential Impacts

There are no airports within the Project Area. Impacts will not occur.

Airports and Airstrips – Mitigation

No mitigation is proposed.

5.5 Public Health and Safety

Construction and operation of the Extension Project has the potential to impact public health and safety. Potential impacts and measures to mitigate these impacts are discussed below.

5.5.1 Electric and Magnetic Fields

Electric fields and magnetic fields (EMF) arise from the electrical potential (voltage) and the movement of an electrical charge (current) associated with the transmission and use of electricity. EMF are invisible just like radio, television, and cellular phone signals, all of which are part of the electromagnetic spectrum. The frequency of transmission line EMF in the United States is 60

hertz and falls in the extremely low frequency range of the electromagnetic spectrum (any frequency below 300 hertz).

Electric fields on a transmission line are solely dependent upon the voltage of the line, not the current. Electric-field strength is measured in kilovolts per meter (kV/m), and the strength of an electric field decreases rapidly as the distance from the source increases. Electric fields are easily shielded or weakened by most objects and materials, such as trees or buildings.

Although there is no state or federal standard for transmission line electric field exposures, the Environmental Quality Board developed a standard of a maximum electric field limit of 8-kV/m at one meter (3.28 feet) above ground; this standard has been regularly applied by the MPUC.[42]

The Applicants referred to MPUC docket TL-23-388[43] to identify estimates for electric field density. In this docket, the applicant proposed a 161-kV transmission line like the Project. See **Table 14** for a comparison of this project and the Extension Project.

Table 14
Extension Project/TL-23-388 Comparison

Feature	Extension Project	TL-23-388
Voltage	161	161
# of Circuits	1	1
Structure Height (feet)	70 to 120	70 to 110
Span Length (feet)	600 to 800	400 to 800
Right-of-way Width (feet)	100 to 150	100
Average Load (Amps)	1,130	541
Historic Peak (Amps)	N/A	1,115
Max Load (Amps)	1,400	2,000

The calculations provided were well below the MPUC standard of 8.0 kV/m at 1.21 kV/m. **Table 15** summarizes the electric fields for that proposed 161-kV transmission line.[44]

Magnetic fields are created by the electrical current (measures in amperes) moving through a transmission line. The strength of a magnetic field is proportional to the electrical current and is typically measured in milliGauss (mG). As with electric fields, the strength of a magnetic field

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[42] *In the Matter of the Route Permit Application by Great River Energy and Xcel Energy for a 345 kV Transmission Line from Brookings County, South Dakota to Hampton, Minnesota*, Docket No. ET-2/TL-08-1474, Order Granting Route Permit (September 14, 2010).

[43] Minnesota Department of Commerce. 2025. *Environmental Assessment: Wabasha 161 kV Transmission Line Relocation Project*. Available online at: https://puc.eip.mn.gov/sites/default/files/2025-05/Revised_FINAL_EA_Wabasha%20161%20kV%20Transmission%20Line_MDOC.pdf. Accessed December 2025.

[44] Supra note 42 citing Dairyland Power Cooperative. *Application to the Minnesota Public Utilities Commission for a Certificate of Need and Route Permit to Relocate an Existing 161-kV Transmission Line in Wabasha County, MN*. Available online at: https://puc.eip.mn.gov/sites/default/files/2025-05/Revised_FINAL_EA_Wabasha%20161%20kV%20Transmission%20Line_MDOC.pdf. Retrieved December 2025.

decreased rapidly as the distance from the source increases. Unlike electric fields, however, magnetic fields are not shielded or weakened by objects or materials.

There are no federal or Minnesota exposure standards for magnetic fields. The Environmental Quality Board and the MPUC have recognized Florida (a 150-mG limit) and New York (a 200-mG limit) state standards. Both state standards are to be considered at the edge of ROW. Studies of the health effects from magnetic fields conclude that the evidence of health risk is weak. The general standard is one of prudent avoidance.

Table 15
TL-23-388 Estimated Electric Fields (kV/m)

Operating Voltage	Max Voltage	Electric Field (kV/m) at Distance (ft) from Proposed Alignment One meter (3.28 feet) above ground						
		-100	-50	-25	Max	25	50	100
161-kV	169-kV	0.14	0.51	0.84	1.21	1.05	0.44	0.11

The Applicants also referred to MPUC docket TL-23-388 for estimated magnetic field strengths. **Table 16** summarizes the magnetic fields calculated for that proposed transmission line configuration with power flow at historic average loading, historic peak loading, and the electrical limit for the transmission line. The maximum magnetic field at the electrical limit is 199.06 mG. Magnetic field strengths would be lower than 80 mG at the edge of the 100-foot right-of-way, which is well below the Minnesota recognized standards.

Because the actual power flow on a transmission line could potentially vary throughout the day depending on electric demand, the actual magnetic field level could also vary widely from hour to hour. In any case, the typical magnitude of the magnetic field associated with the proposed transmission line is expected to be well below the calculated intensity at the expected peak loading.

Table 16
TL-23-388 Historic and Estimated Magnetic Fields (mG)

Voltage	Line Current (Amperes)	Magnetic Field (mG) at Distance (ft) from Proposed Alignment						
		-100	-50	-25	Max	25	50	100
161-kV Average Load	541	6.33	17.32	30.83	43.67	34.62	19.43	6.85
161-kV Historic Peak	1,115	13.16	36.38	65.64	94.17	74.02	40.91	14.23
161-kV Electrical Limit	2,000	24.22	69.66	132.10	199.06	151.31	78.83	26.22

5.5.1.1 Potential Impacts and Mitigation

The ROI for EMF is the Proposed Right-of-Way. As shown above, the levels of EMF from the Extension Project are below acceptable Minnesota limits for electric fields and magnetic fields.

EMF – Potential Impacts

The Minnesota Department of Health, in *A White Paper On Electric and Magnetic Field (EMF) Policy and Mitigation Options*, concluded "that the current body of evidence is insufficient to establish a cause and effect relationship between EMF and adverse health effects. However, as with many other environmental health issues, the possibility of a health risk from EMF cannot be dismissed."[45]

EMF – Mitigation

The 2025 Sample Route Permit, Section 5.4.2 Electric Field, requires the transmission line to be "designed, constructed, and operated in such a manner that the electric field measured one meter above ground level immediately below the transmission line shall not exceed 8.0 kV/m rms [root mean square]." This condition is expected to be included in the route permit issued for the Extension Project should a route permit be issued for the Extension Project.

Implantable Medical Devices – Potential Impacts

EMF may interfere with implantable electromechanical medical devices, such as pacemakers, defibrillators, neurostimulators, and insulin pumps. Most of the research on electromagnetic interference and medical devices relates to pacemakers. Laboratory tests indicate that interference from magnetic fields in pacemakers is not observed until 2,000 mG—a field strength significantly greater than predicted for this type of development, thus no impact is expected from magnetic fields.

Electric fields may interfere with a pacemaker's ability to sense normal electrical activity in the heart. However, modern "bipolar" cardiac devices are much less susceptible to interactions with electric fields. Medtronic and Guidant, manufacturers of pacemakers and other implantable medical devices, have indicated that electric fields below 7 kV/m are unlikely to cause interactions affecting operation of most of their devices. The electric fields for the Extension Project are well below levels at which modern bipolar devices are susceptible to interaction with the fields. In the unlikely event that a pacemaker is impacted, the effect is typically a temporary asynchronous pacing (commonly referred to as reversion mode or fixed rate pacing). The pacemaker will return to its normal operation when the person moves away from the source of the interference.[46]

Implantable Medical Devices – Mitigation

No mitigation is proposed.

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[45] Minnesota State Interagency Working Group on EMF Issues. 2002. *EMF White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options.* Available online at: https://mn.gov/eera/web/project-file?legacyPath=/opt/documents/EMF%20White%20Paper%20-%20MN%20Workgroup%20Sep%202002.pdf. Accessed September 2025.

[46] Application to the Minnesota Utilities MPUC for a Route Permit, Bull Moose 150 kV Extension Project, Great River Energy, Docket No. ET2/TL-15-628. August 7, 2015.

5.5.2 Emergency Services

Emergency services are provided by a variety of entities in Martin County and the surrounding counties. Emergency responders near the Extension Project are discussed below.

Police, Fire, and Ambulance Services

Public emergency services within the County are provided by local law enforcement and emergency response agencies located in nearby communities. The Martin County Sheriff's Office provides law enforcement to communities near the Extension Project. Additionally, the city of Trimont has a local police department.[47] Fire service is provided by the Trimont Fire Department. "The Trimont Fire Department consists of twenty-five volunteers trained in fire suppression, rescue, and other situations. The Fire Department is well equipped with a pumper, two tankers, a rescue truck, a grass rig, and a boat. Protection is provided to the City as well as portions of six townships."[48] Ambulance response is provided by regional and local ambulance services. The city of Trimont provides ambulance services.[49] Trimont is less than 10 miles from Lakefield Junction Station by road.

Hospitals

Nearby hospitals include Windom Area Health in Windom (Cottonwood County), the Sanford Jackson Medical Center in Jackson (Jackson County) and the Fairmont Medical Center in Fairmont (Martin County). Smaller medical clinics or medical centers in the area include Sanford Health Mountain Lake Clinic in Mountain Lake, Mayo Clinic Health System in St. James and Fairmont, and various eye clinics, dental offices, and chiropractors.

Allied Radio Matrix for Emergency Response

The Allied Radio Matrix for Emergency Response (ARMER) system is a radio communication system that is utilized by first responders across Minnesota. The ARMER system "is Minnesota's primary two-way 700 to 800 MHz trunked public safety radio system for all state agencies as well as all Police, Fire, EMS, city, county, federal and tribal governments. The system was developed to improve communication amongst emergency service providers during natural and man-made disasters."[50]

5.5.2.2 Potential Impacts and Mitigation

The ROI for emergency services is the County. Potential impacts will be short term, of a small size and minimal. Impacts can be mitigated. Long-term impacts are not anticipated.

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[47] City of Trimont. 2025a. *Ambulance.* Available online at: https://trimontmn.com/ambulance. Accessed September 2025.

[48] City of Trimont. 2025b. *Fire Department.* Available online at: https://trimontmn.com/fire-department. Accessed September 2025.

[49] City of Trimont. 2025a. *Ambulance.* Available online at: https://trimontmn.com/ambulance. Accessed September 2025.

[50] Minnesota Department of Health. 2025b. *ARMER Radio System*. Available online at: https://www.health.state.mn.us/communities/ep/taccomm/armerradio.html. Accessed September 2025.

Potential Impacts

Temporary road or lane closures during construction could slow emergency response. The ARMER system is used across Minnesota. Broadcast frequencies are above 700 MHz.[51] As discussed in **Section 5.4.4**, radio frequency noise, should it occur, would be below this range; therefore, the ARMER system will not be impacted. ARMER towers vary in height but are generally over 330 feet tall. As such, the Extension Project is not expected to cause line-of-sight concerns.[52]

Mitigation

Big Bend will coordinate any closures and detours with emergency responders. Should an accident occur during construction, it would be handled through local ambulance services. Injured persons would be taken to the nearest hospital or clinic depending on the severity of their injury.

5.5.3 Public and Worker Safety

Construction and operation of the Extension Project will involve risks to the public and workers. Public risks are associated with electrocution. Electrocution risks are associated with unauthorized entry to a substation. Electrocution can also occur if a person or equipment, such as large machinery or a pole saw, gets too close to an overhead transmission line. Contact with a downed power line also poses a risk; these risks are most associated with distribution lines. Lastly, vehicle collisions with transmission line poles could occur. The hazards present at a transmission line or substation construction site are similar to those at most any large construction site. Generally, safety concerns include electrocution, falls, confined spaces, fires and explosions, sprains, strains, fractures, and environmental stress.[53] Transportation-related accidents are also a significant risk for all industries.

5.5.3.1 Potential Impacts and Mitigation

The ROI for public and worker safety is the Proposed Right-of-Way. Potential impacts are anticipated to be short- and long-term, of a small size, and can be mitigated. Overall impacts are expected to be minimal.

Potential Impacts

There are risks associated with construction and operation of a transmission line. Construction presents the potential for injuries such as falls and slips, equipment-use related injuries, or electrocution. Operation of a transmission line presents a potential risk to public safety if the transmission line or structures are damaged by inclement weather or by unauthorized entry to the substations. Unauthorized entry to the substations would expose the public to electrocution risks. A potential for electrocution exists should individuals approach the energized lines. Individuals

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[51] Minnesota Department of Health. 2025b. *ARMER Radio System*. Available online at: https://www.health.state.mn.us/communities/ep/taccomm/armerradio.html. Accessed September 2025

[52] Kimball and Associates. 2008. *Allied Ratio Matrix for Emergency Response (ARMER) Phases 4-5-6 Cost Audit Report.* Available online at: https://www.lrl.mn.gov/docs/2009/mandated/090123.pdf. Accessed September 2025.

[53] U.S. Department of Labor Occupational Safety and Health Administration (OSHA). 2025. *Electric Power Generation, Transmission, And Distribution Industry Hazards*. Available online at https://www.osha.gov/power-generation/industry-hazards. Accessed December 2025.

can also be exposed to electrocution if they contact the transmission line from the ground whether in machinery or other means. This event is most often associated with distribution lines. Overall, construction and operation of the Extension Project is not expected to have a negative impact on public health or safety.

Mitigation

As required by Section 5.5.1 of the 2025 Sample Route Permit, the Extension Project will meet or exceed NESC standards. The substations 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, the substations will be fenced and accessible only by authorized personnel. Signage around the substations will warn the public of the safety risks associated with the energized equipment. Substations will be fenced, gated, and locked. The Applicants or their contractor will provide or require necessary safety equipment, including fall arrest equipment, and provide daily “tailgate” safety trainings. All work must comply with OSHA requirements.

5.5.4 Induced Voltage and Stray Voltage

Induced Voltage

When an EF reaches a nearby conductive object, such as a vehicle or a metal fence, it can induce a voltage on the object. The magnitude of this voltage is dependent on many factors, including the object’s capacitance, shape, size, orientation and location, resistance with respect to ground, and the weather conditions.

Stray Voltage

Neutral-to-earth voltage or “stray voltage” is a condition that can occur on the electric service entrances to structures from distribution lines. More precisely, stray voltage is a voltage that exists between the neutral wire of the service entrance and grounded objects in buildings such as barns and milking parlors.

5.5.4.1 Potential Impacts and Mitigation

The ROI for induced and stray voltage is the Proposed Right-of-Way. Potential impacts will be minimal and can be mitigated.

Induced Voltage – Potential Impacts

If an object is insulated or semi-insulated from the ground and a person touches it, a small current could pass through the person’s body to the ground. This might be accompanied by a spark discharge and mild shock, similar to what can occur when a person walks across a carpet and touches an object or person. The main concern with induced voltage is not the magnitude of the voltage induced, but the current that would flow through a person to the ground should the person touch the object.

Stray Voltage – Potential Impacts

Transmission lines (like the Extension Project) do not, by themselves, create stray voltage because they do not connect to businesses and residences. Transmission lines can, however, induce a current on a distribution circuit that is parallel and immediately under the transmission line.

Induced Voltage – Mitigation

To ensure the safety of people in the proximity of high voltage transmission lines, the NESC requires that any discharge be less than five milliAmperes root mean square (mA rms). The Applicants would ensure that any fixed conductive object in close proximity or parallel to the Project, such as a fence or other permanent conductive fixture, would be grounded so any discharge would be less than the five mA rms NESC limit.

The 2025 Sample Route Permit, Section 5.4.1 Grounding, requires that the transmission line be designed, constructed, and operated "in a manner so that the maximum induced steady-state short-circuit current shall be limited to five milliamperes root mean square (rms) alternating current between the ground and any non-stationary object within the right-of-way, including but not limited to large motor vehicles and agricultural equipment. All fixed metallic objects on or off the right-of-way, except electric fences that parallel or cross the right-of-way, shall be grounded to the extent necessary to limit the induced short-circuit current between ground and the object so as not to exceed one [mA] rms under steady state conditions of the transmission line and to comply with the ground fault conditions specified in the [NESC]." Additionally, the Applicants would be required by this section of the 2025 Sample Route Permit to "address and rectify any induced current problems that arise during transmission line operation."

Stray Voltage – Mitigation

Appropriate measures, such as proper grounding, will be taken to prevent stray voltage problems. To ensure the safety of persons in the proximity of high voltage transmission lines, the NESC requires that any discharge be less than five mA rms, and the 8 kV/m limit ensures that this level is not exceeded. If a landowner has stray voltage concerns on their property, the Applicants suggest they contact their electric service provider to discuss the situation with technical staff, including the possibility of an on-site investigation.

Additionally, the 2025 Sample Route Permit, Section 5.5.1 Safety Codes and Design Requirements, requires the Applicants to "meet or exceed all relevant local and state codes, the NESC, and [NERC] requirements."

5.6 Land-based Economies

Construction and operation of the Extension Project has the potential to impact land-based economies. Potential impacts and measures to mitigate these impacts are discussed below.

5.6.1 Agriculture

As described in **Section 5.4.6**, most of the land crossed by the transmission line is classified as cultivated cropland. The Substation Development Area is on land owned by Great River Energy

and is within an industrial facility outside of agricultural production despite the NLCD indicating the area is pasture/hay agricultural land.

According to the U.S. Department of Agriculture's 2022 Census of Agriculture, there are 823 farms in Martin County with an average size of 552 acres. Since 2017, the number of farms has decreased but farm size has increased. Farms in Martin County are generally larger than the average size of all Minnesota farms (388 acres). The value of agricultural products sold and net cash farm income increased by 48 percent and 78 percent, respectively. Agricultural statistics from the 2022 Census of Agriculture are provided in **Table 17**.

Table 17
Summary of Agricultural Production

Location	Martin County	Minnesota
Number of Farms	823	65,531
Average Farm Size (acres)	552	388
Land in Farms (acres)	454,025	25.4 million
Crop Market Value	$461 million	$17.1 billion
Top 3 Crops (acreage)	corn, soybeans, vegetables	corn, soybeans, forage
Livestock Market Value	$482 million	$11.3 billion
Top 3 Livestock (farm)	hogs and pigs, cattle and calves, and sheep and lambs	turkeys, layers, hogs and pigs

Prime Farmland

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). 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 might be considered prime farmland if the limiting factor is mitigated (for example, by draining or irrigating).

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 (for example, 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 state agencies, typically in association with local soil conservation districts or other local agencies.

As shown in **Table 18,** farmland soil classifications within the Proposed Right-of-Way are similar to Martin County as a whole.

Table 18
Farmland Class

Farmland Class	Proposed Right-of-Way		Martin County	
	Acres	Percent	Acres	Percent
Prime Farmland	24.4	31.6%	147,245	32%
Farmland of Statewide Importance	4.1	5.2%	45,797	10%
Not Prime Farmland	7.5	9.7%	30,698	7%
Prime Farmland if Drained	41.4	53.6%	237,196	51%
Other Prime Farmland	0	0.0%	5,988	1%
Total	**77.4**	**100%**	**466,924**	**100%**

Conservation Easements

The Conservation Reserve Enhancement Program (CREP) is an offshoot of the Conservation Reserve Program (CRP), which is a land conservation program established by the United States Department of Agriculture (USDA) and administered by the Farm Service Agency 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.[54] 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 Reserve Program.[55] Enrollment in the CRP and CREP is voluntary and participation in the program comes with certain restrictions on the types of development allowed on parcels enrolled in the program, if such development is inconsistent with the conservation goals of the program. No CREP or Reinvest in Minnesota parcels have been identified within the Proposed Right-of-Way.

5.6.1.2 Potential Impacts and Mitigation

The ROI for agriculture is the Proposed Right-of-Way. Construction of the transmission line could cause short term impacts during construction. Long term impacts will also occur; these impacts will be of a small size and not affect a unique resource. Substation construction and operation will not impact agriculture given their location within the existing Lakefield Junction Station on Great River Energy-owned property not used for agricultural production. Substation impacts will be negligible. Potential impacts can be mitigated.

Potential Impacts

Direct impacts on soil can result in indirect impacts on agricultural operations. Soil is discussed in **Section 5.8.7**. Construction of the transmission line could cause temporary crop damage, disrupt normal farming activities and introduce invasive plants or noxious weeds. The estimated permanent impacts from each transmission structure foundation will be up to 3 feet in diameter at

[54] U.S. Department of Agriculture Farm Service Agency. 2025. *Conservation Reserve Enhancement Program (CREP)*. Available online at: https://www.fsa.usda.gov/resources/programs/conservation-reserve-enhancement-program-crep. Accessed September 2025.

[55] Minnesota Board of Water and Soil Resources. 2025. *Reinvest in Minnesota Overview*. Available online at: https://bwsr.state.mn.us/reinvest-minnesota-overview. Accessed September 2025.

the surface. Drain tile, should it exist along the final transmission line alignment, could be damaged when auguring structure holes. Soil compaction or rutting could occur from repeated access to the right-of-way. Soil compaction has the potential to decrease yield after construction is complete. Given the limited on-the-ground footprint and the extent of prime farmland within Martin County, the Extension Project does not create disproportionate impacts to prime farmland.

Long term impacts on agricultural production will occur where structures are placed in cultivated fields. Structures in cultivated fields act as barriers and can hinder efficient operation of large machinery. Potential impacts during maintenance activities or repairs could occur if crop damage occurs.

Mitigation

Impacts from transmission line construction would be mitigated through the proper use and installation of BMPs, such as minimizing the number of vehicles in the right-of-way, protecting topsoil, and reducing compaction, erosion, and spread of invasive plants or noxious weeds. Big Bend will coordinate with landowners or farm operators regarding construction timing. Big Bend will attempt to avoid crop losses by constructing the transmission line before spring planting or after harvest. If this is not possible, or if crop losses occur from maintenance or repair of the transmission line, Big Bend will compensate the landowner or farm operator for crop damages. Big Bend will work with landowners to identify drain tile locations. Restoration efforts will include decompacting soils and restoring temporary access modifications, as further discussed in the draft VMP (see **Appendix G**).

The Application Alignment does not cross CRP or CREP easements. However, if these easements are identified during the easement and title clearance process and final transmission line design requires structures to be placed on parcels enrolled in CRP or CREP programs, Big Bend will work with landowners and the Farm Service Agency to address potential impacts and fully compensate landowners for lost CRP or CREP revenue resulting from the Extension Project.

Big Bend proposes to minimize impacts on agricultural land by placing structures along field edges, as closely as feasible (within 15 feet) from the edge of road rights-of-way or parcel lines. Furthermore, Big Bend will make reasonable efforts to work with landowners to finalize structure locations. Big Bend has minimized impacts to agricultural land by routing the transmission line in coordination with landowners and siting structures to minimize impacts to agricultural land. For example, the Route generally follows roads at the edge of agricultural fields. In the two instances where the route traverses fields (at the northeast portion of the Route and around the cemetery), Big Bend is proposing longer spans to avoid structures in the middle of agricultural fields.

The final spacing and location of structures will be designed to accommodate the movement of farm equipment within agricultural fields while still maintaining safety and design standards. Long term impacts from the placement of structures or guying can be mitigated through easement agreements.

The 2025 Sample Route Permit addressed agricultural production. Soil and erosion control measures are required by Section 5.3.8. Section 5.3.11 requires that landowners be notified at least 14 days prior to the application of pesticides. Section 5.3.12 requires Big Bend to avoid the spread of invasive species by developing an Invasive Species Prevention Plan. Big Bend must also take “all reasonable precautions” to avoid the spread of noxious weeds as required by

Section 5.3.13. Section 5.3.21 requires Big Bend to fairly restore or compensate landowners for damages, including damages to crops or drain tile.

5.6.2 Forestry

There are no forestry operations along the Proposed Right-of-Way. Wooded areas near the Extension Project consist of shelter belts or wind breaks surrounding farmsteads or areas of trees near riparian areas along Cedar Creek. These areas might be used for personal use timber harvest. Big Bend made every effort to develop an Application Alignment that minimizes tree clearing. Based on the Application Alignment and associated Proposed Right-of-Way, approximate 3 acres would be cleared for construction and operations of the Extension Project.

5.6.2.1 Potential Impacts and Mitigation

The ROI for forestry is the Proposed Right-of-Way.

Potential Impacts

No forestry operations are present; therefore, no impacts will occur.

Mitigation

Mitigation is not proposed.

5.6.3 Mining

Mining is not a major industry in Martin County. Gravel operations are found throughout the county; however, based on MnDOT's Aggregate Source Information System there are no gravel pits within the Proposed Right-of-Way.[56] According to the United States Geological Service there is one prospect mine located in the Proposed Route. Review of 1991 aerial imagery in this location shows grassland but no mining operation. The area has been cultivated cropland since 2015.

5.6.3.1 Potential Impacts and Mitigation

The ROI for mining is the Proposed Right-of-Way. Potential impacts are not expected to occur; therefore, no mitigation is proposed.

Potential Impacts

No mining operations are located within this location. The Substation Development Area is owned by Great River Energy, and no mining operations will occur on this property. Future mining operations would be precluded from the transmission line ROW .

Mitigation

No mitigation measures are proposed.

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[56] Minnesota Department of Transportation. 2025. *Aggregate Source Information System*. Available online at: https://www.dot.state.mn.us/materials/aggsource.html. Accessed September 2025.

5.6.4 Tourism

Tourism generates outside revenue for the local economy. It can be the result of local events, commercial activities, or use of public lands. Tourism near the Extension Project would center around the outdoor recreational opportunities described in **Section 5.4.9**; however, tourist opportunities are most associated with public, not private, lands.

5.6.4.1 Potential Impacts and Mitigation

The ROI for tourism is the Local Vicinity. Potential impacts are not expected to occur; therefore, no mitigation is proposed.

Potential Impacts

The Extension Project does not cross public lands or regional or community event sites. As such, impacts on tourism are not expected. Direct impacts to recreation can cause indirect impacts to tourism. Recreation is discussed in Section 5.4.9.

Mitigation

The Applicants have minimized impacts on tourism by routing the transmission line and siting the substations to avoid public recreational areas and municipalities where tourism is most prevalent. Measures to mitigate direct impacts to recreation can indirectly mitigate impacts to tourism. Recreation is discussed in Section 5.4.9.

5.7 Archaeological and Historic Resources

Cultural resources can be defined as physical evidence or place of past human activity and include archaeological and historic architectural resources that provide important information about the history of human occupation and alteration of the landscape over time. Archaeological resources include prehistoric and historic artifacts, structural ruins, and earthworks or rock art that are typically found either partially or completely below the ground surface. Historic architectural resources include standing structures, such as buildings and bridges, as well as historic districts and landscapes.

Big Bend hired Tetra Tech, Inc. to conduct a Phase Ia Literature Review for the Extension Project. The Project Area was investigated through a review of Minnesota's Statewide Historic Inventory Portal (architectural resources and inventory forms) and through a review of the OSA Site Portal (archaeological resources, previous cultural resource investigations, and site forms). These reviews were conducted on August 26, 2025. An onsite review of previous cultural resource investigations was also conducted at the SHPO on September 2, 2025.

Five previously conducted archaeological investigations were identified intersecting 111 acres of the Proposed Route. Three of the previous investigations were for a proposed wind farm, one investigation was for a proposed Big Bend Transmission Line, and one investigation was for a proposed pipeline. All of the previous investigations failed to identify cultural resources within the Proposed Route.

Table 19
Previously Recorded Archaeological and Historic Architectural Resources

Cultural Resource Category	Project Area	Proposed Route
Archaeological Sites	1	0
Total Eligible for NRHP [a]	0	0
Historic Architectural Resources	29	3
Total Eligible for NRHP [a]	0	0
Total Previously Recorded Cultural Resources	**30**	**3**
Total NRHP-eligible Resources	**0**	**0**

[a] The number of NRHP-eligible resources shown is a subset of the total number of archaeological sites or historic architectural resources.
Note: NRHP = National Register of Historic Places

No previously documented archaeological resources were identified within the Proposed Route during the file review. However, one previously documented archaeological resource (21MR0075) was identified within the Project Area. Site 21MR0075 consists of a Precontact lithic isolated find. The site is currently unevaluated for listing in the National Register of Historic Places (NRHP).

Three previously inventoried architectural resources were identified within the Proposed Route. Two resources are currently unevaluated for listing in the NRHP, and one has been determined not eligible for listing in the NRHP. An additional 29 previously inventoried architectural resources were identified within the Project Area. Of these 29 architectural resources, 26 resources are unevaluated for listing in the NRHP and 3 resources are not eligible for listing in the NRHP.

Tetra Tech recommended the completion of a Phase I Archaeological Investigation for the 79 acres of unsurveyed portions of the Proposed Route, which would include a pedestrian survey and reporting on those results. Big Bend provided the Phase Ia Cultural Resources Investigation to the SHPO for review on September 22, 2025 (see **Appendix E**).

As discussed in **Section 1.5**, six Tribes responded to Applicant's pre-application coordination outreach. The Leech Lake Band of Ojibwe responded noting the Extension Project has been added to their Off Reservation/Land Claim Areas Review list; no further response has been received. Mille Lacs Band of Ojibwe responded directing Applicants to contact Jamie Edwards; Jaimie Edwards was also included on the pre-application coordination so no further outreach was conducted. The Shakopee Mdewakanton Sioux Community responded with no concerns regarding the Extension Project. The White Earth Band THPO also responded indicating that the Project is outside of their review area and that they would defer to the Shakopee Mdewakanton Sioux Community, Lower Sioux Indian Community and Upper Sioux Indian Community THPOs.

The Lower Sioux Indian Community and Upper Sioux Community THPOs both responded with interest in the proposed Project. The Upper Sioux Community has requested additional information and may be interested in conducting a site visit and/or field surveys.

5.7.1.1 Potential Impacts and Mitigation

The ROI, or area of potential effect (APE) for archaeological resources is the Proposed Right-of-Way. Impacts to archeological resources are not anticipated. Impacts to architectural resources are unavoidable but can be mitigated in part. The visual APE associated with historic resources

is one-half mile from the Application Alignment, based on the height of the proposed structures. The Extension Project's transmission line structures and conductors would create new aesthetic impacts that could detract from historic architectural structures; however, given the presence of existing electrical infrastructure any impact would be incremental and minimal, as further discussed in Section 5.4.1.

Potential Impacts

Construction and operation of transmission lines and substations has the potential to impact archaeological and historic resources. Archaeological resources could be impacted by the disruption or removal of subsurface archaeological materials, structural remains, or earthworks during transmission line construction. Historic architectural resources may be impacted by the placement of a transmission line within the established viewshed of an historic property, which could affect the integrity of the viewshed in a way that decreases the historic value of the resource.

Mitigation

Big Bend will conduct field surveys within the APE, if deemed necessary based on coordination with SHPO, that could host previously unrecorded cultural resources. If archaeological or historic architectural resources that are considered potentially eligible for listing on the NRHP are identified as a result of field surveys, Big Bend will work with SHPO to identify measures to avoid, minimize or mitigate any effects to these resources. Additionally, should any Tribal Nation request to participate in field surveys, Big Bend will accommodate this request.

If previously unidentified archaeological resources are discovered during construction, measures will be implemented in accordance with the Extension Project's Unanticipated Discoveries Plan.

The 2025 Sample Route Permit, Section 5.3.15, requires workers to be trained about the need to avoid cultural properties and requires that every effort must be made to avoid impacts to identified archaeological and historic resources.

5.8 Natural Environment

Construction and operation of the Extension Project has the potential to impact the natural environment. Potential impacts and measures to mitigate these impacts are discussed below.

5.8.1 Air Quality

Section 109(b) of the Clean Air Act 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 Clean Air Act 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. Minnesota is currently in compliance with air quality standards.[57]

In Minnesota, air quality is tracked using air quality monitoring stations across the State. The MPCA uses data from these monitors to calculate the Air Quality Index (AQI), on an hourly basis, for O_3, $PM_{2.5}$, SO_2, NO_2, and CO. The pollutant with the highest AQI value for a particular hour sets the overall AQI for that hour. The AQI is used to categorize the air quality of a region as one of five levels of quality: good, moderate, unhealthy for sensitive groups, unhealthy, or very unhealthy.[58]

The Extension Project is located nearest to the air quality monitor in Marshall, Minnesota. This station monitors for O_3 and $PM_{2.5}$. The AQI for Marshall for the past five years is provided in **Table 20**.

Table 20
Days in Each Air Quality Index Category (Marshall, MN)

Year	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy
2023	206	142	10	3	0
2022	303	51	0	2	0
2021	263	91	3	2	0
2020	309	51	0	0	0

Source: MPCA, 2025. Annual count of days in each AQI category. Available online at: https://data.pca.state.mn.us/views/Minnesotaairqualityindex/AQIExternal?%3Aembed=y&%3AisGuestRedirectFromVizportal=y. Accessed September 2025.

In general, the days with "unhealthy" AQI occurred in the summer due to wildfire smoke from fires to the north and west of the State.

Potential air quality impacts associated with the Extension Project come from two primary sources: short-term emissions from construction activities and ozone and nitrogen oxide emissions from operating the facility.

Martin County provides the following explanation of existing impacts on air quality in its *What You Need to Know About Moving into the Country in Martin County*: "Dust may be a nuisance, especially during dry conditions combined with high farm traffic on gravel roads. Dust will occur during grain harvest, hay baling, and other times during the year."[59]

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[57] Minnesota Pollution Control Agency. 2023. *National Ambient Air Quality Standards and air monitoring.* Available online at: https://www.pca.state.mn.us/sites/default/files/aq4-33.pdf. Accessed September 2025.

[58] Minnesota Pollution Control Agency. 2025e. *Understanding the air quality index (AQI).* Available online at: https://www.pca.state.mn.us/air-water-land-climate/understanding-the-air-quality-index-aqi. Accessed September 2025.

[59] Martin County, n.d. *What you need to know about moving into the country in Martin County.* Available online at: https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fcms9files.revize.com%2Fmartincounty25%2

5.8.1.1 Potential Impacts and Mitigation

The ROI for Air Quality is the County. Potential impacts during construction are expected to be short-term, of a small size, and not affect a unique resource. Temporary and localized air quality impacts caused by construction vehicle emissions and fugitive dust from clearing and construction are expected to occur. Exhaust emissions from diesel equipment will vary during construction but will be minimal and temporary. The magnitude of emissions is influenced heavily by weather conditions and the specific construction activity taking place.

Potential Impacts

Air emissions from construction equipment would include carbon dioxide, O_3, $PM_{2.5}$, SO_2, NO_2, and CO. Emissions would be dependent on weather conditions, the number and type of equipment operating at any given location, and the period of operation required for construction at that location. Emissions from construction would be similar to those from agricultural activities common in the County and would only occur for short periods of time in localized areas.

Table 21 summarizes the estimated potential emissions of criteria pollutants from construction activities for the Extension Project. Detailed construction emission calculations are provided as **Appendix H**. Greenhouse gas emissions are addressed in **Section 5.8.3**.

Table 21
Estimate of Criteria Pollutants from Construction Activities

Description	Emissions (tons)					
	NO_X	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Transmission Line						
Off-road engine emissions	7.82	1.51	0.57	0.00	0.27	0.26
Fugitive dust from unpaved roads	--	--	--	--	0.38	0.04
Fugitive dust from earthmoving	--	--	--	--	6.64	0.7
SUBTOTAL	7.82	1.51	0.57	0.00	7.28	1.0
Step-up and Interconnection Substations						
Off-road engine emissions	20.25	3.92	1.45	0.01	0.71	0.70
Fugitive dust from unpaved roads	--	--	--	--	0.05	0.00
Fugitive dust from earthmoving	--	--	--	--	1.25	0.13
SUBTOTAL	20.25	3.92	1.45	0.01	2.01	0.83
PROJECT TOTAL	**28.07**	**5.87**	**2.02**	**0.01**	**9.29**	**1.83**

Notes: NO_x – nitrous oxides; CO – carbon monoxide; VOC – volatile organic compound; SO_2 – sulfur dioxide; PM_{10} – particulate matter less than 10 microns in diameter; and $PM_{2.5}$ – Particulate matter less than 2.5 microns in diameter

FGovernment%2FPlanning%2520%26%2520Zoning%2FImportant%2520Information%2520For%2520New%2520Rural%2520Homeowners.docx%3Ft%3D202506180943380%26t%3D202506180943380&wdOrigin=BROWSELINK. Accessed September 2025.

During operation of the transmission line, air emissions would be minimal. An insignificant amount of ozone is created due to corona from the operation of transmission lines. 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 insignificant.

Design of the transmission line also influences its 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.

Mitigation

During construction, 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. Dust 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, Big Bend may employ construction-related practices to control fugitive dust such as application of non-chlorinated 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.

The emission of ozone from the operation of a transmission line of the voltages proposed for the Extension Project is not anticipated to have a significant impact on air quality and no mitigation is proposed.

The 2025 Sample Route Permit, Section 5.3.23, requires use of non-chloride products for onsite dust control during construction.

5.8.2 Climate Change and Resilience

The Applicants reviewed climate trends for Martin County using the MDNR Minnesota Climate Trends website.[60] From 1980 to 2024, Martin County experienced an increase in overall temperature of 0.37 degrees Fahrenheit per decade. During this same period, the average low temperature increased 0.45 degrees Fahrenheit per decade. Precipitation has increased in Martin County by 0.65 inches per decade with periods of extended drought from 1987 to 1990 and 2011 to 2014.[61] The overall drought severity index shows a trend of 0.16 per decade. This is based on the Palmer Drought Severity Index, which is an index that generally corresponds to moisture excess or deficit. A positive number represents moisture excess, so 0.16 per decade corresponds with less severe drought over time.

[60] Minnesota Department of Natural Resources. 2025c. *Climate Trends.* Available online at: https://www.dnr.state.mn.us/climate/climate_change_info/climate-trends.html. Accessed September 2025.

[61] Minnesota Department of Natural Resources. 2025d. *Minnesota Climate Trends.* Available online at: https://arcgis.dnr.state.mn.us/ewr/climatetrends. Accessed September 2025.

The Minnesota Environmental Assessment Worksheet Guidance: Developing a Carbon Footprint and Incorporation Climate Adaptation and Resilience Projections[62] was used to estimate the occurrence of extreme heat, drought, wildfire, and flooding hazards. To provide conservative estimates, the "higher emissions" category was used. The estimates shown in the following two paragraphs are associated with an increase or decrease from the baseline period of 1976 to 2005 into the early century (2015 to 2044).

The number of days with a maximum temperature above 90-, 95-, and 100-degrees Fahrenheit could increase by 18.1 days, 7.3 days, and 1.6 days, respectively. Cooling degree days, a measure associated with the demand for energy to cool buildings, might increase by 377.7 cooling-degree days to 1,087 cooling-degree days showing an increase demand for electricity in Martin County.

Annual precipitation might increase by about one inch from baseline. No significant change in the number of days per year with no precipitation or the maximum number of consecutive dry days is predicted. Additionally, while total precipitation could increase, that increase is not expected to significantly increase the number of consecutive wet days or increase the number of days with greater than one, two, or three inches of total precipitation. Except for maximum temperature, metrics related to wildfire potential remain steady.

The EPA's Climate Resilience Evaluation and Awareness Tool also projects potential impacts from climate change on future weather events.[63] The Applicants used this tool to show how a changing climate could affect the intensity of storms. The model uses two scenarios: "stormy" and "not as stormy." Accordingly, the change in storm intensity might increase by 7.6 percent or by as much as 29.2 percent into 2060.

5.8.2.1 Potential Impacts and Mitigation

The ROI for climate change and resilience is the County. Potential impacts are anticipated to be long-term, of a small size, and not affect a unique resource.

Potential Impacts

Total precipitation and intensity of future storms are expected to increase; however, models indicate that days with precipitation totals over one inch are not expected to increase significantly over current levels.[64] Wildfire risks are not anticipated to increase over future conditions.

The Project will not have a measurable impact on climate change. Factors contributing to climate change include land use conversion, water usage, and greenhouse gas emissions. The Project will convert a small area of land on the Great River Energy parcel listed on NLCD as agricultural to gravel for the substations, as discussed in Sections 3.3, 5.4.6, and 5.8.8. The small size of this

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[62] U.S. Climate Resilience Toolkit. 2025. *Climate Mapping for Resilience and Adaptation.* Available online at: https://livingatlas.arcgis.com/assessment-tool/explore/details. Accessed September 2025.

[63] U.S. Environmental Protection Agency. 2025. *CREAT Climate Change Scenarios Projection Map*. Available online at: https://epa.maps.arcgis.com/apps/MapSeries/index.html?appid=3805293158d54846a29f750d63c6890e. Accessed September 2025.

[64] University of Minnesota. 2025. *Minnesota Climate Mapping and Analysis Tool.* Available online at: https://climate.umn.edu/MN-CliMAT. Accessed December 2025.

converted area will not have an impact on the local climate. During regular operation, the Project will not require any water. Greenhouse gas emissions are discussed in Section 5.8.3.

Mitigation

In general, Big Bend will locate structures in upland areas and will span areas with hydric soils, wetland features, and other areas that are subject to long periods of increased moisture to the greatest extent practicable. This will prevent structures and footings from long-term exposure to standing water and will ensure that facilities are structurally sound for the lifetime of the Extension Project. As discussed in Section 3.2, Big Bend will engineer the structures and footings for the specific soil types and geotechnical conditions at each structure location. Depending on the conditions at each structure location, either wood or steel monopoles will be used, and each structure will either be directly embedded in the ground or installed in concrete foundations. Therefore, increased risks to the Extension Project associated with flooding are not anticipated.

Transmission lines and substations are designed with extreme weather in mind, mitigating potential effects from the chance of increased number and intensity of severe storms. The structures and wires will be designed to meet modern wind-resistance and elevated temperature standards set by current electrical codes and Big Bend design standards. Big Bend will proactively manage vegetation along the transmission line to reduce the possibility of trees or tree limbs impacting the conductors. Information about additional safety equipment and plans is provided in Section 3.4.

After completion of construction, Big Bend will revegetate the disturbed non-row-cropped areas according to the VMP, provided in Appendix G. This revegetation will stabilize the land disturbed by construction activities.

Models show that more electricity will be needed to cool homes. The Extension Project helps to bring electricity to the grid that can be used immediately to help cool homes or stored for future use. This impact will be long-term and positive.

5.8.3 Greenhouse Gas Emissions

The State of Minnesota is taking significant action to reduce the amount of greenhouse gas emissions produced in the state. As of 2022, Minnesota has experienced a 14 percent reduction in greenhouse gas emissions across all sectors based on 2005 levels.[65] While electrical generation caused emissions decreased by 50 percent, greenhouse gas emissions from residential, commercial, and industrial sources increased. Transportation is now the highest emitting source of greenhouse gas emissions in Minnesota.[66]

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[65] Minnesota Pollution Control Agency and Minnesota Department of Commerce. 2023. *Greenhouse Gas Emissions in Minnesota 2005-2020.* Available online at: https://www.pca.state.mn.us/sites/default/files/lraq-2sy23.pdf. Accessed September 2025.

[66] Minnesota Pollution Control Agency. n.d.b. *GHG emissions and sequestration from 2005 to 2022, by sector.* Available online at: https://data.pca.state.mn.us/views/Greenhousegasemissionsdata/Emissionsbysector2005-2022?%3Aembed=y&%3AisGuestRedirectFromVizportal=y. Accessed September 2025.

5.8.3.1 Potential Impacts and Mitigation

The ROI for greenhouse gases is the County. Minnesota's Greenhouse Gas Inventory[67] shows emissions within Minnesota totaled 126,140,738 metric tons (139,046,363 short tons) of carbon dioxide equivalent (CO_2e) in 2022.

Potential Impacts

Construction of the Extension Project will result in greenhouse gas emissions from fuel combustion in construction equipment, commuter vehicles, and delivery trucks. **Table 22** summarizes the estimated potential emissions of greenhouse gases from construction activities for the Extension Project. Emissions are based on typical counts of diesel-fueled construction equipment, expected hours of operation, and estimated vehicle miles traveled. Detailed greenhouse gas emission calculations for the Extension Project are provided as **Appendix H**. At the completion of construction activities, all construction-related greenhouse gas emissions would cease. The Extension Project's preliminary estimate of greenhouse gas emissions, when compared to statewide levels, would be negligible.

Table 22
Preliminary Estimate of Greenhouse Gas Emissions

Description	Emissions (short tons)			
	CO_2	CH_4	N_2O	CO_2e
TRANSMISSION LINE				
Off-Road Engine Emissions	362.43	0.01	0.00	363.62
Commuters and Delivery Vehicles	59.90	0.00	0.00	59.90
SUBTOTAL	422.33	0.01	0.00	423.52
SUBSTATIONS				
Off-Road Engine Emissions	1,027.46	0.04	0.01	1,030.83
Commuters and Delivery Vehicles	130.48	0.00	0.00	130.48
SUBTOTAL	1,157.93	0.04	0.01	1,161.31
PROJECT TOTAL	1,580.26	0.06	0.01	1,584.83

Notes: CO_2 – carbon dioxide; CH_4 – methane; 1 short ton CH_4 = 25 short tons CO_2e; N_2O – nitrous oxide; 1 short ton N_2O = 298 short tons CO_2e, CO_2e – carbon dioxide equivalent

Source: CFR. 2025. Global Warming Potentials. 40 CFR 98 Table A-1. Available online at: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98#Table-A-1-to-Subpart-A-of-Part-98. Accessed September 2025

Direct impacts from operation of the Extension Project are limited to inspection and maintenance activities, which will be intermittent and short term. Minnesota passed the Next Generation Energy Act in 2007, which required the state to reduce greenhouse gas emissions by 80% between 2005 and 2050. These goals were updated in 2023 to reflect the state's Climate Action Framework; the current goals are to reduce emissions 50% by 2030 and achieve net-zero emissions by 2050. The

[67] Minnesota Pollution Control Agency. n.d.c. *Minnesota greenhouse gas emissions and statutory goals.* Available online at: https://data.pca.state.mn.us/views/Greenhousegasemissionsdata/TotalGHGemissionsgoals?%3Aembed=y&%3AisGuestRedirectFromVizportal=y. Accessed September 2025.

Extension Project will assist the state in achieving this goal through the transmission of renewable energy.

Mitigation

Big Bend will reduce the amount of greenhouse gas emissions from construction equipment by maintaining the equipment in good condition according to manufacturer's recommendations and by reducing idling time.

During operations, the Applicants will monitor the sulfur hexafluoride (SF_6) gas levels in the substation breakers as part of routine monitoring of substation equipment. Should a loss of SF_6 be detected, the SF_6 is extracted to a separate tank to allow the breaker to be repaired. Any gas collected from decommissioned breakers is shipped offsite for recycling. Indirect impacts are associated with consumption of the electricity provided by the transmission line. No additional mitigation is proposed.

5.8.4 Geology and Topography

The land surface in southwestern Minnesota was heavily influenced by the most recent glaciation. Ice sheets crossed the region several times during the Wisconsin glaciation, depositing a mantle of drift 100 to 600 feet thick in most places. The dominant landform in the Minnesota River Prairie ecological subsection is loamy ground moraine. Topography is level to gently rolling till plains, moraines, lake plains, and outwash plains.[68]

According to the Minnesota Geological Survey, depth to bedrock in the Proposed Right-of-Way is over 150 feet deep. Topography along the Proposed Route from the starting point east of 40th Avenue west to the Step-up Substation is generally depicted in **Figure 11**.[69] This representation does not depict the Application Alignment.

[68] Minnesota Department of Natural Resources. 2025b. *Minnesota River Prairie Subsection.* Available online at: https://www.dnr.state.mn.us/ecs/251Ba/index.html. Accessed September 2025.

[69] Minnesota Department of Natural Resources. n.d. *MnTOPO*. Available online at: https://www.dnr.state.mn.us/maps/mntopo/index.html. Accessed September 2025

Figure 11. Topography (East to West)

5.8.4.1 Potential Impacts and Mitigation

The ROI for geology and topography is the Proposed Right-of-Way. Potential impacts will be long term and negligible.

Potential Impacts

Based on the anticipated depth of transmission line and substation foundations, bedrock will not be impacted by the Extension Project. Construction of the Extension Project will not impact topography. The transmission line and substations will be constructed at existing grade If grading does occur it will be limited to structure and substation locations.

Mitigation

Once constructed, the area would then be graded to blend with existing topography and drainage patterns. Abrupt elevation changes will not be created. While abrupt elevation changes and significant grading will not occur along the transmission line, the 2025 Sample Route Permit, Section 5.3.8, requires that contours shall be graded so that all surfaces blend with the natural terrain.

5.8.5 Public and Designated Lands

As discussed in **Section 5.4.9**, the Extension Project does not cross public or designated lands. This includes state or national designated wilderness areas; state or national parks; and state scientific and natural areas (Minn. R. 7850.4300).

5.8.5.1 Potential Impacts and Mitigation

The ROI for public and designated lands is the Proposed Right-of-Way.

Potential Impacts

The Proposed Right-of-Way does not cross public or designated lands; therefore, impacts will not occur.

Mitigation

No mitigation is proposed.

5.8.6 Rare and Unique Natural Resources

The USFWS Information for Planning and Conservation (IPaC) website was reviewed to obtain an unofficial list for federally listed endangered and threatened species, proposed species, candidate species, and designated critical habitat that may occur in the vicinity of the Proposed Route. Merjent, Inc., on behalf of Big Bend, submitted a formal Natural Heritage Review Request (2025-00796) on September 19, 2025, through MDNR's Minnesota Conservation Explorer (MCE) system and a response was received on September 19, 2025 (see **Appendix E**).

Federally Listed Species

Based on the species list provided by the USFWS (see **Appendix E**), one federally threatened species and two proposed species have been previously documented within the vicinity of the Extension Project, as shown in **Table 23**. Species proposed for listing are not legally protected under the federal Endangered Species Act. No federally designated critical habitat is present within the Proposed Route.

Table 23
Federally Listed Species Potential

Common Name	Scientific Name	Federal Status
Prairie bush clover	*Lespedeza leptostachya*	Threatened
Monarch butterfly	*Danaus plexippus*	Proposed Threatened
Western regal fritillary	*Argynnis idalia occidentalis*	Proposed Threatened
Northern long-eared bat [a]	*Myotis septentrionalis*	Endangered

[a] The IPaC report for the Extension Project did not include the northern long-eared bat (NLEB) and the Extension Project area lacks suitable summer habitat for the NLEB; however, the NLEB has the potential to occur in Martin County. Any tree clearing will be conducted during the winter months when the species is not present on the landscape. Based on the commitment to clear trees in the winter months and because the species list provided by the USFWS for the Extension Project did not include the NLEB, this species is not discussed further below.

Prairie Bush Clover

The federally threatened prairie bush clover is a tallgrass prairie species that is native to the upper Mississippi River Valley. Its current range is limited to discrete locations in Minnesota, Illinois, Iowa, and Wisconsin. This species is a long-lived prairie plant that may take up to five years to mature. Adult plants germinate in May, growing rapidly until blooming in mid-July and subsequently flowering annually with light pink flowers loosely arranged in an open spike. Prairie bush clover can be found in undisturbed remnant prairie and in tallgrass prairie habitats that have had previous disturbances such as mowing, burning, cultivation, or grazing. The species occurs on dry-mesic prairies on north-, northeast- or northwest-facing slopes in southwestern Minnesota. In Minnesota, most populations occur in prairies that were formerly or are currently pasture. The main threats to the species include conversion of remnant prairie to cropland or developed areas,

the spread of invasive plant species, dominant vegetation encroachment, drought, and hybridization.[70][71]

Monarch Butterfly

The monarch butterfly is a large butterfly with an approximate 3- to 4-inch wingspan and characterized by bright orange coloring on the wings with distinctive black borders and veining, serving as a warning sign to predators of their toxicity. In North America, the species is split into two populations (eastern and western), both well known for their long-distance migration. During the fall, both populations begin migrating to their overwintering locations, where they require a specific microclimate with a temperature that prevents excessive lipid depletion but also prevents freezing. At overwintering sites, monarchs undergo reproductive diapause until the spring when males and females begin mating before dispersing north again. The eastern population migrates from Mexico to Canada, reproducing 2 to 3 generations while migrating. The western population migrates north and east from coastal California toward the Rockies and Pacific Northwest, also reproducing into multiple generations.

Throughout the migration corridor and during the breeding cycles, monarchs can be found in a wide variety of habitats including prairies, grasslands, urban gardens, road ditches, and agricultural fields if there is a healthy and abundant supply of nectar resources for foraging that is diverse and of sufficient quality. The patch size and location of this type of habitat is important for monarchs as well. Milkweed must also be of sufficient quality and quantity as it is the sole host plant for oviposition and for the larvae to feed on until the larvae pupates into a butterfly.[72]

Western Regal Fritillary

The western regal fritillary is found in large, intact, contiguous native tallgrass prairie habitats in portions of Arkansas, Colorado, Illinois, Indiana, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, Wisconsin, and Wyoming. Regal fritillaries can range widely with females potentially traveling up to 100 miles searching for three main habitat components: violet hostplants for larvae, nectar plants for adults, and native grasses to provide protection throughout the life cycle. Adults can be found foraging in both upland and wet prairie habitats; however, habitat can only be considered suitable for all life stages if violet species are present to provide shelter and forage for larvae. The density of violets seems to correlate positively to number of butterflies within a given area. Habitat alteration has reduced the species' range and abundance.

Adults mate once annually in mid to late summer; however, females undergo reproductive diapause until fall. Eggs hatch in about 3-4 weeks and then larvae quickly seek duff material where they overwinter. When active in spring, larvae begin feeding on young violets. Mortality is high during the larvae stage. After a 2–4-week pupae stage in late spring, adults emerge in early

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[70] U.S. Fish and Wildlife Service. 2025a. *Prairie Lespedeza*. Available online at: https://www.fws.gov/species/prairie-lespedeza-lespedeza-leptostachya. Accessed September 2025.

[71] Minnesota Department of Natural Resources. 2025e. *Rare Species Guide: Lespedeza leptostachya*. Available online at: https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PDFAB27090. Accessed September 2025.

[72] U.S. Fish and Wildlife Service. 2025b. *Monarch Butterfly (Danaus plexippus) Species Status Assessment Report, Version 2.3 (December 2024)*. Available online at: https://www.fws.gov/sites/default/files/documents/2025-01/ssa_monarch-butterfly_2024.pdf. Accessed September 2025.

summer. Dispersal of adults may be driven by localized threats or poor habitat conditions, and success is dependent upon connectivity of suitable habitat, availability of nectar sources, and habitat patch sizes among other factors.[73]

State-listed Species and Ecologically Significant Areas

Based on the MCE response from the MDNR, there were no state-listed species or state species of special concern with documented occurrences, or ecologically significant areas within the Project Area.

5.8.6.1 Potential Impacts and Mitigation

Federally Listed Species

Prairie Bush Clover – Potential Impacts

The extent of remaining populations of prairie bush clover is well-known in Minnesota; these are present in the Project Area within the Inner Coteau, Coteau Moraines, Minnesota River Prairie, Oak Savanna, and Rochester Plateau subsections. Suitable habitat may be present near Cedar Creek. A field assessment to determine if the federally-listed prairie bush clover (*Lespedeza leptostachya*) is present within the Proposed Route was completed by a MDNR-certified listed-species surveyor for plants from Midwest Natural Resources on October 6, 2025. Results of the assessment confirmed that the species is not present within the Proposed Route.

Prairie Bush Clover – Mitigation

No mitigation is proposed.

Monarch Butterfly – Potential Impacts

Suitable habitat for monarchs may be present within the Proposed Right-of-Way and Proposed Route. Construction of the Extension Project will result in short-term adverse impacts on suitable habitat, including localized physical disturbance and compaction. Construction activities involving establishment and use of access roads, staging, and stringing areas would also have short-term impacts on suitable habitat by concentrating surface disturbance and equipment use. The movement of construction equipment to, from, and between various work sites has the potential to introduce or spread invasive species.

Monarch Butterfly – Mitigation

The Applicants will restore the Proposed Right-of-Way in accordance with the draft VMP provided in **Appendix G**. The Applicants will allow for and encourage native species to naturally re-establish in temporarily disturbed areas that are not actively cropped. Permanent seed mixes include native seed varieties commonly found and available from local seed distributors. The permanent seed mixes are designed to augment the natural colonization of bare ground by local,

[73] Federal Register. 2024. *Endangered and Threatened Wildlife and Plants; Endangered Status for the Eastern Regal Fritillary, and Threatened Status With Section 4(d) Rule for the Western Regal Fritillary.* Vol. 89, No. 151. Available online at: https://www.govinfo.gov/content/pkg/FR-2024-08-06/pdf/2024-16982.pdf. Accessed September 2025.

native seed sources. The Applicants will also manage documented occurrences of terrestrial plant invasive and noxious species as further described in the draft VMP.

If the USFWS determines the species should be listed and protections for the species will coincide with the Extension Project's planning, permitting, and/or construction, the Applicants will review these activities for potential impacts to the species, develop appropriate avoidance and mitigation measures, and coordinate with the USFWS as appropriate. No additional mitigation is proposed.

Western Regal Fritillary – Potential Impacts

Suitable habitat for the species may be present within the Proposed Right-of-Way and Proposed Route. Construction of the Extension Project will result in short-term adverse impacts on suitable habitat, including localized physical disturbance and compaction. Construction activities involving establishment and use of access roads, staging, and stringing areas would also have short-term impacts on suitable habitat by concentrating surface disturbance and equipment use. The movement of construction equipment to, from, and between various work sites has the potential to introduce or spread invasive species.

Western Regal Fritillary – Mitigation

The Applicants will restore the Proposed Right-of-Way in accordance with the draft VMP provided in **Appendix G**. The Applicants will allow for and encourage native species to naturally re-establish in temporarily disturbed areas that are not actively cropped. Permanent seed mixes include native seed varieties commonly found and available from local seed distributors. The permanent seed mixes are designed to augment the natural colonization of bare ground by local, native seed sources. The Applicants will also manage documented occurrences of terrestrial plant invasive and noxious species as further described in the draft VMP.

If the USFWS determines the species should be listed and protections for the species will coincide with Project planning, permitting, and/or construction, the Applicants will review the Extension Project's activities for potential impacts to the species, develop appropriate avoidance and mitigation measures, and coordinate with the USFWS as appropriate. No additional mitigation is proposed.

Bald and Golden Eagles – Potential Impacts

Bald eagles (*Haliaeetus leucocephalu*s) and golden eagles (*Aquila chrysaetos*) are not legally protected under the Endangered Species Act or by the state of Minnesota; however, they are protected under the BGEPA and the MBTA. Currently, the MDNR and USFWS do not maintain a database of known eagle nests, activity, foraging areas, or winter roost areas. As discussed in Section 5.6.2, there is limited tree clearing along the Proposed Right-of-Way. The Applicants do not anticipate impacts to bald eagles or bald eagle nests during construction or operations of the Project.

Bald and Golden Eagles – Mitigation

If eagle nests are identified prior to or during construction, the Applicants will record their location and comply with the requirements of BGEPA to ensure regulatory compliance. No additional mitigation is proposed.

State-Listed Species and Ecologically Significant Areas – Potential Impacts

Based on the MCE review, there are no records of a state-listed endangered or threatened species or state species of special concern within the Project Area.

Few areas of pre-settlement vegetation such as native prairie and floodplain forest remain. Grassland-prairie complexes are typically privately owned and grazed. Suitable habitat for protected and at-risk plant species may be present in these areas of remnant pre-settlement vegetation.[74] These areas are typically associated with managed lands such as a Wildlife Management Area or an existing conservation easement.

There are no MDNR Wildlife Management Areas or Aquatic Management Areas[75] crossed by the Proposed Right-of-Way or Proposed Route. There are no MDNR-designated Lakes of Biological Significance, Wild Rice Lakes, Trout Lakes, Trout Streams, Outstanding Resource Waters or Priority Shallow Lakes within the Proposed Right-of-Way or Proposed Route. Designated important bird areas do not exist with the Proposed Route. There are no MDNR Native Prairies, MDNR Native Plant Communities, or Minnesota Biological Survey Sites of Biodiversity Significance within the Proposed Right-of-Way or Proposed Route. In addition, and as further discussed in Section 5.8.9, there are no calcareous fens within 5 miles of the Extension Project.

State-Listed Species and Ecologically Significant Areas – Mitigation

No mitigation is proposed.

5.8.7 Soils

Soil characteristics were assessed using the USDA Soil Survey Geographic Database (SSURGO). The SSURGO database is a digital version of the original county soil surveys developed by Natural Resources Conservation Service (NRCS) for use with geographic information systems. It provides the most detailed level of soils information for natural resource planning and management.

5.8.7.1 Soil Characteristics

The Applicants reviewed SSURGO data to identify wind or water erodible soils, hydric soils, soils with revegetation concerns, and soils prone to compaction. Prime farmland and farmland of statewide importance soils are discussed in Section **5.6.1**. **Table 24** presents the total acres of each of these soil characteristics that are within the Proposed Route and Proposed Right-of-Way. These tables are an overestimation of potential impacts as they show soils intersecting the route, not necessarily where structures or workspace will be located. Soils can have more than one characteristic, meaning they can be counted more than once.

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[74] Minnesota Department of Natural Resources. 2006. *Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife Set of Species in Greatest Conservation Need.* Available online at: https://files.dnr.state.mn.us/assistance/nrplanning/bigpicture/cwcs/chapters_appendix/appendix_b.pdf. Accessed September 2025.

[75] Minnesota Department of Natural Resources. 2025f. *Recreation Compass.* Available online at: https://www.dnr.state.mn.us/maps/compass/index.html . Accessed September 2025.

Table 24
Summary of Soil Characteristics

Soil Characteristics	Right-of-Way		Proposed Route	
	Acres	Percent	Acres	Percent
Prime Farmland [a]	65.9	85.2%	165.9	87%
Farmland of Statewide Importance [b]	4.1	5.2%	8.1	4%
Wind Erodible [c]	0.0	0.0%	1.9	1%
Water Erodible [d]	0.0	0.0%	0.0	0%
Hydric [e]	48.9	63.2%	133.2	70%
Revegetation Concerns [f]	7.4	9.6%	16.2	9%
Compaction-Prone [g]	61.6	79.6%	148.2	82%
TOTAL	**77.4**	**100%**	**190.1**	**100%**

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 4 or greater.
[g] Includes soils in somewhat poor to very poor drainage classes with surface textures of clay loam and finer.

5.8.7.2 Hydric Soils

Hydric soils are generally indicative of long periods of saturation or flooding during soil formation and can indicate wetland environments if vegetation and other hydrologic factors are present. “A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.”[76] Some soils designated as hydric have phases that are not hydric depending on water table, flooding, and ponding characteristics.[77] “Hydric soils along with hydrophytic vegetation and wetland hydrology are used to define wetlands.”[78] Wetland impacts are further discussed in **Section 5.8.9**.

There are 48.9 acres of soils within the Proposed Right-of-Way that are classified as hydric.

[76] U.S. Department of Agricultural National Resources Conservation Service. 2024. *Title 430 – National Soil Survey Handbook.* Available online at: https://directives.nrcs.usda.gov//sites/default/files2/1725389663/National%20Soil%20Survey%20Handbook%20%28entire%20handbook%29.pdf. Accessed September 2025.

[77] https://efotg.sc.egov.usda.gov/references/Public/MO/HoltIntroductiontoHydricSoilInterpretations.pdf

[78] U.S. Department of Agricultural National Resources Conservation Service. 2024. *Title 430 – National Soil Survey Handbook.* Available online at: https://directives.nrcs.usda.gov//sites/default/files2/1725389663/National%20Soil%20Survey%20Handbook%20%28entire%20handbook%29.pdf. Accessed September 2025.

5.8.7.3 Compaction-Prone Soils[79]

Soil compaction modifies the structure and reduces the porosity and moisture-holding capacity of soils. The degree of compaction depends on moisture content and soil texture. Fine-textured soils with poor internal drainage that are moist or saturated during construction are the most susceptible to compaction and rutting.

Soils classified as having somewhat poor to very poor drainage classes and surface textures of clay loam and finer are considered to have a high potential for compaction.

There are 61.6 acres of compaction prone soils within the Proposed Right-of-Way.

5.8.7.4 Potential Impacts and Mitigation

The ROI for soils is the Proposed Right-of-Way. Potential impacts are anticipated to be of a small size, short-term, and not affect a unique resource within Martin County. Impacts can be mitigated.

Potential Impact

During construction, soil compaction, rutting and localized soil erosion may occur during clearing and grading of work areas, travel along the right-of-way, and erecting structures and stringing conductors. Similar impacts can occur when constructing the substations. In addition, potential soil impacts might result from excavation, stockpiling, and redistribution of soils. Ground disturbance and soil exposure would be primarily limited to the structure locations. Construction of the substation will result in a new impervious surface. Until permanent stormwater controls are in place, this could lead to increased erosion through stormwater runoff. Soils at the substation locations will be covered with gravel. Compaction will occur in these areas.

A minimal amount of wind- or water-erodible soils, and soils with revegetation concerns are within the Proposed Right-of-Way. Soils categorized as wind erodible might require additional mitigation measures to minimize the likelihood of soil migration outside of construction workspaces. Soils with revegetation concerns can indicate a need for additional mitigation measures during restoration to ensure revegetation efforts are successful. Because of their relative scarcity within the right-of-way, these soil characteristics are not likely to influence the overall potential impacts of the Extension Project on soils. For this reason, these characteristics are not discussed further in this Application.

Mitigation

Compaction-prone soils, particularly within agricultural fields, may require additional mitigation measures during construction to minimize compaction and/or additional protocols during restoration of Extension Project workspaces. The draft VMP (see **Appendix G**) provides additional details on the decompaction process during restoration.

Impacts to soils would be mitigated through the proper use and installation of BMPs, such as minimizing the number of vehicle trips within the right-of-way to reduce compaction and protection and maintenance of topsoil, during construction of the transmission line. Should significant

[79] University of Minnesota Extension. 2025. *Soil Compaction*, Retrieved from: https://extension.umn.edu/soil-management-and-health/soil-compaction.

compaction occur in agricultural areas, it can be mitigated by implementing the decompaction methods outlined in the draft VMP (**Appendix G**).

Big Bend will also develop a Stormwater Pollution Prevention Plan (SWPPP) that complies with the MPCA State Disposal System (SDS) Construction Stormwater (CSW) Permit; implementation of the SWPPP will minimize the potential for soil erosion during construction.

Landowners will be compensated accordingly for any localized soil compaction that might occur. Refer to **Section 5.6.1** for additional information related to agricultural impacts.

The 2025 Sample Route Permit, Section 5.3.8 Soil Erosion and Sediment Control, requires the Applicants to "implement reasonable measures to minimize erosion and sedimentation during construction" among other requirements.

5.8.8 Vegetation

The Proposed Route is in the Minnesota River Prairie subsection of the North Central Glaciated Plains Section in the Prairie Parkland Province, as defined by the ECS of Minnesota. Vegetation in the Minnesota River Prairie subsection prior to European settlement was generally tallgrass prairie with scattered wetlands.[80] Dominant grasses in upland tallgrass prairie included big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), sideoats grama (*Bouteloua curtipendula*), and little bluestem (*Schizachyrium scoparium*).[81] The subsection was also characterized by areas of wet prairies with bluejoint grass (*Calamagrostis canadensis*), prairie cordgrass (*Spartina pectinata*), and sedges (*Carex spp.*). Riparian and floodplain forests comprised of silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), elm (*Ulmus spp.*), and willow (*Salix spp.*) occurred along the Minnesota River and other streams.[82]

Current land use in the Minnesota River Prairie subsection is now dominated by agriculture, primarily active row crop fields with some pasture, as described in **Section 5.3** and shown on **Figure 8**. Other current land uses include small amounts of forest, wetlands, open water, and developed areas.

5.8.8.1 Potential Impacts and Mitigation

The ROI for vegetation is the Proposed Right-of-Way. Potential impacts along the transmission line are anticipated to be short and long term, of a small size and not affect a unique resource. Construction of the substations will result in permanent removal of a maintained grassland vegetation type. Potential impacts are unavoidable but can be mitigated in part.

Potential Impacts

The acreage of each land cover type crossed by the Proposed Route is provided in **Table 10**. Impacts on vegetation from the transmission line will primarily be associated with cultivated crop areas. Construction of the Extension Project will result in short-term adverse impacts on existing

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[80] Minnesota Department of Natural Resources. 2025b. *Minnesota River Prairie Subsection.* Available online at: https://www.dnr.state.mn.us/ecs/251Ba/index.html. Accessed September 2025.

[81] Minnesota Department of Natural Resources. 1988. *Natural Vegetation of Minnesota.* Available online at: https://files.dnr.state.mn.us/eco/mcbs/natural_vegetation_of_mn.pdf. Accessed September 2025.

[82] MDNR, supra notes 80, 81.

vegetation, including localized physical disturbance and compaction. Construction activities involving establishment and use of access roads, staging, and stringing areas would also have short-term impacts on vegetation by concentrating surface disturbance and equipment use.

Construction would also result in long-term impacts on vegetation by permanently removing vegetation at each structure location and maintaining the operational right-of-way free of tall trees and shrubs during the life of the Extension Project. As discussed in **Section 5.6.2**, approximately 3 acres of trees and shrubs would be cleared from the Proposed Right-of-Way during construction.

The movement of construction equipment to, from, and between various work sites has the potential to introduce or spread invasive species. Terrestrial plant invasive and noxious species in Minnesota are regulated by the Minnesota Department of Agriculture (MDA),[83] and aquatic invasive and noxious species are regulated by the MDNR.[84] The MDNR also manages terrestrial plant invasive and noxious species on public lands and at public waters. The MDNR maintains a geospatial dataset of terrestrial invasive and noxious species observations.[85] According to this dataset, no observations have been documented within 1.5 miles of the Extension Project.

Mitigation

Big Bend has designed the Application Alignment to minimize tree clearing by co-locating with existing infrastructure rights-of-way to the extent practicable.

The Applicants will restore the Proposed Right-of-Way in accordance with the draft VMP provided in **Appendix G**. The Applicants will allow for and encourage native species to naturally re-establish temporarily disturbed areas that are not actively cropped. Permanent seed mixes include native seed varieties commonly found and available from local seed distributors. The permanent seed mixes are designed to augment the natural colonization of bare ground by local, native seed sources.

The Applicants will manage documented occurrences of terrestrial plant invasive and noxious species that are listed as “eradicate”[86] or “control”[87] under the “Prohibited Noxious Weed” category by the MDA. Further, the Applicants will adhere to the conditions set forth by the MDNR Utility License to Cross Public Waters for the crossing of Cedar Creek.

The Applicants will implement the BMPs identified in the draft VMP (see **Appendix G**) during construction of the Extension Project construction to minimize impacts to vegetation and the

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[83] Minn. Stat. § 18.75-18.913

[84] Minnesota Department of Natural Resources. 2025g. *Invasive Species in Minnesota.* Available online at: https://www.dnr.state.mn.us/invasives/index.html. Accessed September 2025.

[85] Minnesota Geospatial Commons. 2025. *Terrestrial Invasive Species Observations.* Available online at: https://gisdata.mn.gov/dataset/env-invasive-terrestrial-obs. Accessed September 2025.

[86] Prohibited noxious weeds placed on the noxious weed eradicate list are plants that are not currently known to be present in Minnesota or are not widely established. These species must be eradicated (Minnesota Statute §18.771 (b)(1)). This list is available at: https://www.mda.state.mn.us/plants-insects/minnesota-noxious-weed-list.

[87] Prohibited noxious weeds placed on the noxious weed control list are plants that are already established throughout Minnesota or regions of the state. Species on this list must be controlled (Minnesota Statute §18.771 (b)(1)). This list is available at: https://www.mda.state.mn.us/plants-insects/minnesota-noxious-weed-list.

potential for the introduction or spread of terrestrial plant invasive and noxious species. Examples include:

- All construction equipment will be clean prior to entering the work site.
- The Applicants will adhere to the requirements of the MPCA SDS CSW Permit, including stabilization, and implementation, maintenance and repair of erosion and sediment control BMPs. Certified weed-free straw or weed-free hay will be used for erosion and sediment control BMPs.
- Limiting grading and excavation to areas surrounding structure foundations, and only as needed along access roads and workspace areas for a level and safe working area.
- Where temporary grading is required, the Applicants will protect topsoil and replace topsoil and will stabilize and restore soil as described in the VMP.
- Minimally disturbed areas will be allowed to restore naturally. Where supplemental seeding is required, seed mixes labelled “Noxious Weeds; None Found” will be used in accordance with regulations and will utilize yellow tag seed when available.
- Infestations of MDA-listed eradicate or control species will be manually, mechanically, or chemically managed.
- Collected invasive materials will be secured and disposed of at an offsite location to avoid dispersal.

The Applicants will not conduct activities within waterbodies; therefore, no mitigation to manage aquatic invasive and noxious species are proposed.

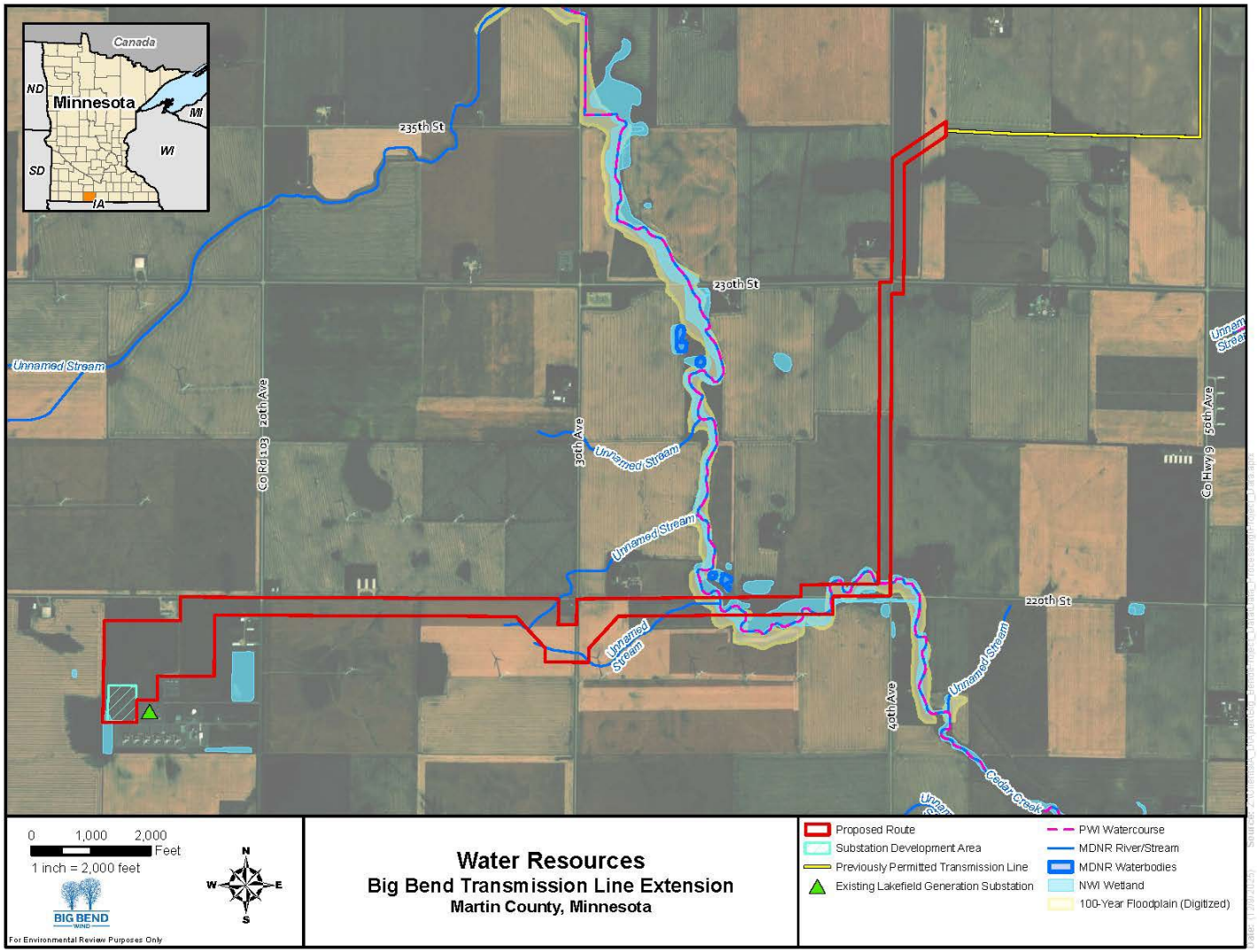
The 2025 Sample Route Permit addresses vegetation, invasive species, and noxious weeds. Section 5.3.10 requires that the minimum number of trees be removed and that low growing species will be left undisturbed, to the extent possible, in the right-of-way, among other requirements. Sections 5.3.12 and 5.3.13 state Big Bend must employ BMPs to avoid the potential introduction and spread of invasive species on lands disturbed by project construction activities and take all reasonable precautions against the spread of noxious weeds during all phases of construction.

5.8.9 Water Resources

Hydrologic features in the Proposed Route and along the Proposed Right-of-Way are shown on **Figure 12**. Hydrologic features such as wetlands, lakes, rivers, and floodplains perform several important functions within a landscape, including flood attenuation, groundwater recharge, water quality protection, and wildlife habitat production. The Extension Project is located within the Blue Earth Watershed within the Minnesota River Basin.[88]

[88] Minnesota Department of Natural Resources. Undated. *Minnesota’s watershed basins*. Available online at: https://www.dnr.state.mn.us/watersheds/map.html. Accessed September 2025.

Figure 12. Water Resources



Lakes, Rivers, Streams, and Ditches

The MDNR National Hydrography Dataset[89] indicates that three rivers and streams are crossed by the Proposed Route a total of nine times. In Minnesota, rivers, streams, and lakes may be designated as Public Waters and included in the MDNR's Public Waters Inventory (PWI) if they meet the criteria set forth in Minn. Stat. § 103G.005, subd. 15. These waters are listed in the PWI and meet the criteria set forth in statute. A license from the MDNR is required to cross PWI waters with an electric transmission line (Minn. Stat. § 84.415). The MDNR PWI was reviewed to identify Public Waters crossed by the Proposed Route; the Proposed Route crosses Cedar Creek (Cedar Run Creek), a perennial Public Watercourse, four times.

Table 25 provides a summary of waterbodies crossed by the Proposed Route and the Proposed Right-of-Way. These are also displayed in **Appendix B**. Due to the way Cedar Creek meanders in this location, there are more crossings within the Proposed Right-of-Way than within the Proposed Route.

Table 25
Waterbodies Crossed by the Proposed Right-of-Way

Waterbody Feature	Proposed Route Crossing (no.)	Proposed Right-of-Way Crossings (no.)
Stream and River Crossings by Right-of-Way	9	9
PWI Stream and River Crossings by Right-of-Way	4	5
PWI Basins within Right-of-Way	0	0
Shallow Lakes within Right-of-Way	0	0

Water Quality

Under the Clean Water Act (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.

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 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 MPCA has jurisdiction over determining 303(d) waters in the State of Minnesota.

[89] Minnesota Department of Natural Resources. 2024b. *MDNR Hydrography Dataset*. Available online at: https://gisdata.mn.gov/dataset/water-dnr-hydrography. Accessed August 2025.

This reach of the Cedar Creek (Cedar Run Creek) is identified as a 303(d) water with impairments for dissolved oxygen and fecal coliform.[90]

Floodplains

"A floodplain is flat, or nearly flat, land adjacent to a stream or river that experiences occasional or periodic flooding. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which includes areas covered by the flood but which do not experience strong current."[91] Floodplains function to prevent damage by detaining debris, sediment, water, and ice. The Federal Emergency Management Agency (FEMA) delineates floodplains and determines flood risks in areas susceptible to flooding. The base flood elevations that FEMA uses, known as the 100-year flood, has a one percent chance of occurring each year.[92] Floodplain maps covering the Proposed Right-of-Way are not available as a spatial layer download from FEMA. The available PDF file was digitized for use in geographic information system software.

The Proposed Right-of-Way crosses the FEMA-designated 100-year floodplain areas along Cedar Creek. There are no 500-year floodplain areas crossed by the Proposed Route or within the Substation Area. Floodplains are displayed on **Figure 12**.

Groundwater

The MDNR divides Minnesota into six groundwater provinces. The Extension Project is in the Western Province. "The glacial sediment in [this province] is typically fine-grained (e.g., clay and silt) and may contain only limited extents of surficial and buried sand aquifers. Province 5 contains fractured bedrock commonly buried deeply beneath glacial sediment and is of limited use as an aquifer."[93] Groundwater availability in the Western Province is rated as "moderate" in surficial sands, "limited" in buried sands, and "limited" in bedrock.[94]

The MDH enforces the federal Safe Drinking Water Act including the National Primary Drinking Water Regulations created under the Act. The Extension Project is not located within the boundaries of any Drinking Water Supply Management Areas or Wellhead Protection Areas.[95]

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[90] Minnesota Pollution Control Agency.. 2024. *Minnesota's 2024 Impaired Waters List (wq-iw1-81). Approved by the U.S. EPA – April 2024*. Available online at: https://www.pca.state.mn.us/air-water-land-climate/minnesotas-impaired-waters-list#:~:text=Approved%20by%20U.S.%20EPA%20in%20April%202024%2C%20Minnesota%27s,list%3B%20Appendix%20A%20of%20the%20Statewide%20mercury%20TMDL. Accessed September 2025.

[91] New World Encyclopedia. n.d. *Floodplain*. Available online at: https://www.newworldencyclopedia.org/entry/Floodplain. Accessed September 2025.

[92] Minnesota Department of Natural Resources. 2025h. *Floodplain Maps and Technical Resources*. Available online at: https://www.dnr.state.mn.us/waters/watermgmt_section/floodplain/fema_firms.html. Accessed September 2025.

[93] Minnesota Department of Natural Resources. 2025i. *Minnesota groundwater provinces 2021.* Available online at: https://www.dnr.state.mn.us/waters/groundwater_section/mapping/provinces.html. Accessed September 2025.

[94] Minnesota Department of Natural Resources. 2021. *Minnesota groundwater provinces 2021.* Available online at: https://files.dnr.state.mn.us/waters/groundwater_section/mapping/provinces/2021-provinces.pdf. Accessed September 2025.

[95] Minnesota Department of Health. 2025c. *Source Water Protection Web Map Viewer.* Available online at: https://experience.arcgis.com/experience/14825b159b2e4dc686736d98e39ebce7. Accessed September 2025.

The County Well Index (CWI) is a database that contains subsurface information for over 533,000 water wells drilled in Minnesota.[96] CWI is maintained by the Minnesota Geological Survey (MGS) in partnership with the MDH. The data are derived from well contractors' logs of geologic materials encountered during drilling and later interpreted by geologists at the MGS. The CWI indicates that there is one functioning well within the Proposed Route. Well ID 734597 is 213 feet deep. Several sealed wells are also shown in the Proposed Route along with test wells. The sealed well is 342 feet deep. There are no wells within the right-of-way.

According to the MDNR, the depth of the water table near the Extension Project ranges from 0 to 10 feet. "The water table is the upper surface of the subsurface zone that is saturated with water. The depth of the water table below the land's surface was estimated using [NRCS] depth to water table in saturated soils data, surface water elevation, the static water level within certain wells, and a digital elevation model."[97]

Wetlands

Wetlands are areas with hydric (wetland) soils, hydrophilic (water-loving) vegetation, and wetland hydrology (inundated or saturated much of the year). Wetlands are part of the foundation of water resources and are vital to the health of waterways and communities that are downstream. Wetlands detain floodwaters, recharge groundwater supplies, remove pollution, and provide fish and wildlife habitat. Wetlands are also economic drivers because of their key role in fishing, hunting, agriculture, and recreation. Wetlands vary widely due to differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors. Wetlands that are hydrologically connected to the nation's navigable rivers are protected federally under Section 404 of the CWA. In Minnesota, wetlands are also protected under the Wetland Conservation Act.

The USFWS produced maps of NWI wetlands based on aerial photographs and NRCS soil surveys starting in the 1970s. The NWI data were further updated for the state of Minnesota through a multi-agency effort led by the MDNR and were published in 2019. Wetlands identified by the Minnesota NWI may be inconsistent with current wetland conditions; however, Minnesota NWI data is the most accurate and readily available database of wetland resources within the Project Area and were therefore used to identify potential wetlands occurring within the Proposed Route. Wetland complexes and small isolated wetlands are concentrated along Cedar Creek. Most of these wetlands are freshwater emergent wetlands. Wetlands are displayed on the detailed maps in **Appendix B**. The Applicants also reviewed the MDNR Public Waters Inventory -- Basins dataset; there are no records of PWI wetlands within the Proposed Route.[98]

Calcareous fens are a rare and unique type of peat-accumulating wetland with unique vegetation influenced by its calcium-rich (non-acidic) chemistry, low oxygen and relatively cold soil conditions, and upwelling groundwater hydrology.[99] Fens are protected under Minn. Stat. §

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[96] Minnesota Department of Health. 2025d. *Minnesota Well Index*. Available online at: https://mnwellindex.web.health.state.mn.us/. Accessed September 2025.

[97] University of Minnesota Duluth. 2025. *Minnesota Natural Resource Atlas: Water Table – Depth.* Available online at: https://mnatlas.org/resources/?id=k_0279. Accessed September 2025.

[98] Minnesota Department of Natural Resources. 2025j. *Public Waters Inventory – Basins*. Available online at: https://gisdata.mn.gov/dataset/water-mn-public-waters. Accessed September 2025.

[99] Minnesota Department of Natural Resources. n.d. *Calcareous Fens: Amazing, Rare, Irreplaceable*. Available online at: https://files.dnr.state.mn.us/natural_resources/water/wetlands/calcareous_fen_fact_sheet.pdf. Accessed September 2025.

103G.223, which provides that calcareous fens may not be filled, drained, or otherwise degraded, wholly or partially, by an activity, unless approved by the MDNR through a management plan. Based on the review of the MDNR's Calcareous Fen geospatial dataset,[100] there are no fens within 5 miles of the Extension Project.

Table 26 summarizes wetlands crossed by the Proposed Route and Proposed Right-of-Way.

5.8.9.1 Potential Impacts and Mitigation

The ROI for water resources is the Proposed Right-of-Way. As surface waters will be spanned and wetlands will be avoided, potential impacts are anticipated to be negligible. If impacts do occur, they will be short term, of a small size, and not affect a unique resource. Impacts can be mitigated.

The 2025 Sample Route Permit, Section 5.3.9, requires a variety of measures to mitigate potential impacts to wetlands, waterbodies, and floodplains. This includes spacing structure locations to span and avoid these resources, accessing these areas in a way that minimizes travel through them, and constructing during frozen ground conditions to the extent possible, among other requirements.

Lakes, Rivers, Streams and Ditches – Potential Impacts

The Extension Project will have minor, mostly short-term effects on surface water resources. Surface water features will be spanned by the transmission line, and no structures will be installed in those water resources.

Lakes, Rivers, Streams and Ditches – Mitigation

The Applicants will obtain an NPDES/SDS CSW permit from the MPCA for construction of the Extension Project. The Applicants will utilize erosion and sediment control BMPs (e.g., silt fencing) to mitigate the potential for sediment to reach receiving surface waters. Big Bend does not currently anticipate installing temporary bridges across streams during construction to access structure locations. If bridge installation is required, Big Bend will follow the construction procedures described in Section 3.2.5. During Project operations, the Proposed Right-of-Way along Cedar Creek will be maintained in a permanently vegetated state. Additionally, Big Bend has received as-built drawings of drainage facilities from Martin County and will design structure locations to avoid these County facilities.

Following completion of construction activities, the Applicants will restore the Proposed Right-of-Way as described in the draft VMP. No permanent impacts on surface water resources are anticipated.

Water Quality – Potential Impacts

As discussed above, the reach of Cedar Creek that is crossed by the Proposed Right-of-Way is impaired for dissolved oxygen and fecal coliform. The Extension Project would not contribute to the impairment of fecal coliform. Potential impacts associated with construction activities could

[100] Minnesota Department of Natural Resources. 2024b. *Calcareous Fens – Source Feature Points*. Available online at: https://gisdata.mn.gov/dataset/biota-nhis-calcareous-fens. Accessed August 2025.

include increased sedimentation and turbidity associated with stormwater runoff from adjacent exposed soils during rainstorm events. Increased turbidity and localized sedimentation can contribute to decreased dissolved oxygen.

Water Quality – Mitigation

As discussed above, the Applicants will apply for coverage under the MPCA NPDES/SDS CSW permit from the MPCA and will develop an SWPPP that will identify BMPs to be implemented during construction to minimize erosion and sedimentation impacts to surface waters.

Floodplains – Potential Impacts

The Extension Project crosses the 100-year floodplain. This might require transmission line structures to be placed within floodplain. The placement of transmission line structures in floodplains is not anticipated to alter the flood storage capacity of the floodplain based on the minimal size and cross section of individual transmission line structures.

Floodplains – Mitigation

Big Bend will construct structures within the floodplain in accordance with the standards provided in Minn. R. ch. 6120.5800, Subps. 3D and 4E.

Groundwater – Potential Impacts

There are no verified wells in the Proposed Right-of-Way. The Extension Project does not cross a Wellhead Protection Area or Drinking Water Supply Management Area, which was confirmed by Department of Health staff on September 12, 2025 (see **Section 1.5**). Due to the shallow groundwater table, it is possible that structure installation or substation site preparation will encounter groundwater.

Groundwater – Mitigation

Big Bend will coordinate with the well owner, as needed, when constructing the transmission line.

A water use permit from the MDNR is required for all uses withdrawing more than 10,000 gallons of water per day or 1 million gallons per year. While this is not expected, the Applicants would obtain coverage under the MDNR's Temporary Projects General Permit No 1997-0005, which authorizes temporary water appropriation for construction dewatering, as necessary.

Wetlands – Potential Impacts

The Proposed Right-of-Way crosses 3.51 acres NWI mapped wetlands (see **Table 26** and **Figure 12**). Prior to construction, Big Bend will conduct a wetland delineation to confirm wetland boundaries along the permitted route. None of the crossed wetlands are classified as PWI wetlands.

Table 26
NWI Wetlands Crossed by the Proposed Route and Proposed Right-of-Way

Wetland Feature	Proposed Route		Proposed Right-of-Way	
	Acres	Percent	Acres	Percent
Freshwater Emergent	9.01	86%	2.8	79%
Riverine	0.73	7%	0.2	5%
Shallow Marsh	0.31	3%	0.3	9%
Shallow Open Water Community	0.39	4%	0.3	7%
TOTAL	**10.44**	**100%**	**3.5**	**100%**

Temporary impacts to wetlands may occur where temporary access or construction workspace is required, and/or where the permanent right-of-way occurs in non-woody vegetation wetland communities requiring vegetation clearing.

Permanent impacts to wetlands occur when structures or other permanent infrastructure are installed in wetlands, or when woody wetland vegetation communities occur within the permanent right-of-way where Big Bend will conduct regular vegetation maintenance to remove tall trees and shrubs (i.e., permanent conversion). No changes in water flow or retention are anticipated.

Wetlands – Mitigation

Prior to construction, Big Bend will conduct a wetland delineation to confirm wetland boundaries along the permitted route. Furthermore, Big Bend will conduct clearing in wetlands using low ground pressure equipment, working on construction mats, and/or during frozen ground conditions. Staging or stringing setup areas will not be placed within or adjacent to water resources to the extent practicable.

The substation upgrades will not be sited in wetlands. As discussed in **Section 3.2.1**, the maximum span distance between structures is approximately 800 to 1,100 feet. Based on the current Application Alignment, all wetlands can be spanned by the transmission line. During the final design process, Big Bend will minimize wetland impacts by placing the structures to span and avoid wetlands, to the extent practicable.

If unanticipated wetlands are discovered, and where it is not possible to span a wetland, several measures will be utilized to minimize impacts during construction:

- When feasible, construction will be scheduled during frozen ground conditions.
- When construction during frozen ground conditions is not feasible, construction mats and/or low ground pressure equipment will be used to protect wetland vegetation.
- Construction crews will attempt to access wetlands with the least amount of physical impact to the wetlands.

Once construction of the Extension Project is completed, disturbed soil will be restored to previous conditions to the extent possible, and areas will be reseeded with vegetation similar to that which was removed with a seed mixture certified as free of noxious or invasive weeds (see the draft VMP provided in **Appendix G)**.

Should impacts to wetlands occur, Big Bend will comply with the CWA and the Minnesota Wetland Conservation Act processes as required and necessary. These processes are outlined in Section 2.3.

The 2025 Sample Route Permit, Section 5.3.9 Wetland and Water Resources, requires wetlands to be avoided and, when wetlands cannot be avoided, potential impacts should be limited to the area immediately adjacent to structure locations, among other requirements. “The Permittee shall restore wetland and water resource areas disturbed by construction activities to pre-construction conditions in accordance with the requirements of applicable state and federal permits or laws and landowner agreements.”

5.8.10 Wildlife and Habitat

The wildlife species that inhabit the Proposed Right-of-Way are typical of those found in agricultural and grassland-prairie complexes. Wildlife species that occur in wetland and riparian areas might also be present in the Proposed Right-of-Way. Species adapted to agricultural landscapes that likely reside near Extension Project are listed in **Table 27.**

Table 27
Wildlife Species

Common Name	Scientific Name
Mammals	
Red fox	*Vulpes vulpes*
Virginia opossum	*Didelphis virginiana*
Striped skunk	*Mephitis mephitis*
White-tailed deer	*Odocoileus virginianus*
White-tailed jackrabbit	*Lepus townsendii*
Eastern cottontail	*Sylvilagus floridanus*
Raccoon	*Procyon lotor*
Thirteen-lined ground squirrel	*Spermophilus tridecemlineatus*
Coyote	*Canis latrans*
Birds	
Wild turkey	*Meleagris gallopavo*
Ring-necked pheasant	*Phasianus colchicus*
Mourning dove	*Zenaida macroura*
Western meadowlark	*Sturnella neglected*
Bobolink	*Dolichonyx oryzivorus*
Eastern bluebird	*Sialia sialis*
Field sparrow	*Spizella pusilla*
Reptiles and Amphibians	
Great Plains toad	*Anaxyrus cognatus*
Northern leopard frog	*Lithobates pipiens*
Plains garter snake	*Thamnophis radix*
Fish	
White sucker	*Catostomus commersonii*

Table 27 Wildlife Species	
Common Name	**Scientific Name**
Bullhead	*Ameiurus spp.*
Channel catfish	*Ictalurus punctatus*
Long-nose gar	*Lepisosteus osseus*
Source: MDNR. 2025. Animals. Available online at: https://www.dnr.state.mn.us/animals/index.html. Accessed September 2025.	

As stated previously in Section 5.8.6, there are no MDNR Wildlife Management Areas or Aquatic Management Areas[101] crossed by the Proposed Right-of-Way. There are no MDNR-designated Lakes of Biological Significance, Wild Rice Lakes, Trout Lakes, Trout Streams, Outstanding Resource Waters or Priority Shallow Lakes within the Proposed Right-of-Way. Designated important bird areas do not exist with the Proposed Route.

5.8.10.1 Potential Impacts and Mitigation

The ROI for wildlife and their habitat is the Proposed Right-of-Way, except that the ROI for birds is the Local Vicinity. There is minimal potential for the permanent displacement of wildlife, loss of habitat or habitat fragmentation from construction of the Extension Project. Wildlife that inhabits natural areas within the immediate area of construction could be impacted in the short term. The distance that animals will be displaced will depend on the species. Additionally, these animals will be typical of those found in agricultural settings and will not incur population level effects due to construction.

Potential Impacts

Most impacts on wildlife habitat would be temporary with the exception of limited tree clearing. Because the transmission line will be constructed along roadways and does not cross forested land, habitat fragmentation will not occur. Potential impacts on wildlife during construction would be primarily related to temporary disturbance and displacement; wildlife may be acclimated to human activity due to the agricultural activity within the Local Vicinity.

Raptors, waterfowl, and other bird species may be affected by the construction and placement of the transmission lines. Avian collisions are a possibility after the completion of the transmission lines. Waterfowl are typically more susceptible to transmission line collision, especially if the transmission line is placed between agricultural fields that serve as feeding areas, or between wetlands and open water, which serve as resting areas.

Mitigation

The Applicants will restore the Proposed Right-of-Way in accordance with the draft VMP provided in **Appendix G** and will allow for and encourage native species to naturally re-establish temporarily disturbed areas. Permanent seed mixes for the Extension Project include native seed

[101] Minnesota Department of Natural Resources. 2025f. *Recreation Compass.* Available online at: https://www.dnr.state.mn.us/maps/compass/index.html . Accessed September 2025.

varieties commonly found and available from local seed distributors. The permanent seed mixes are designed to augment the natural colonization of bare ground by local, native seed sources.

Extension Project design and construction will be done in accordance with Avian Power Line Interaction Committee (APLIC) guidelines. Big Bend will conduct tree clearing during the winter months to minimize impacts to nesting birds and other species.

The 2025 Route Permit, Section 5.3.16, requires cooperation with MDNR about bird diverter locations and of APLIC standards.

5.9 Unavoidable Impacts

Minn. Stat. § 216I.05, subd. 4(a)(9), requires that an application include "a list that identifies human and natural environmental effects that are unavoidable if the facility is approved at a specific site or route." The Extension Project will be designed, constructed, and operated in manner that mitigates potential impacts to the greatest extent possible. However, even with mitigation measures, there will be impacts that cannot be avoided. These impacts are distinct based on the phase of the project: construction or operation.

Unavoidable impacts associated with construction could include:

- Fugitive dust emissions on and near gravel roads.
- Greenhouse gas emissions.
- Vegetative clearing at substation locations.
- Minor amounts of habitat loss.
- Noise disturbances and visual impacts.
- Soil compaction.
- Short-term traffic delays.
- Temporary construction dewatering.
- Temporary disturbance and displacement of wildlife; impacts on individuals.

Unavoidable impacts associated with operation could include:

- Continued maintenance of tall growing woody vegetation.
- Conversion of agricultural land at structure locations and maintained grasslands in the Substation Development Area.
- Increased EMF on the landscape. (Potential impacts from EMF are minimal and are not expected to impact human health.)
- Incremental increase in the potential for avian collisions or electrocution.

- Potential interference with AM radio signals.
- Limited greenhouse gas emissions from maintenance activities.
- Incremental visual changes to the landscape.

5.10 Irreversible and Irretrievable Impacts

Minn. Stat. § 216I.05, subd. 11(b)(11), requires the Commission to consider "irreversible and irretrievable commitments of resources" when determining whether to issue Route Permit. "Resource commitments are irreversible when it is impossible or very difficult to redirect that resource to a different future use; an irretrievable commitment of resources means the resource is not recoverable for later use by future generations."

Irreversible resource commitments associated with the Extension Project will include the land use associated with the transmission line structures and the substations. As discussed in **Section 3.6**, the estimated service life of the proposed Extension Project is approximately 40 years. However, it is anticipated that there will continue to be a need for the transmission line and associated substation after 40 years and that infrastructure would likely be replaced or upgraded to extend its useful life. Therefore, while the Extension Project could be decommissioned after 40 years of service, and the area occupied by the transmission line and substations could be restored to an agricultural or other use and transmission line and substation components, such as conductors and transformers, could be repurposed or recycled, this is unlikely to happen in the reasonably foreseeable future because the need for the Extension Project will likely persist.

Irretrievable resource commitments associated with the Extension Project are related to construction activities. The use of aggregate, concrete, fuel, human labor, steel, water, wood, and other consumable resources is irretrievable. Funding could be irretrievable in part.

5.11 Cumulative Potential Effects

Minn. R. ch. 4410.0200, subp. 11, defines "cumulative potential effects" to mean "the effect on the environment that results from the incremental effects of a project in addition to other projects in the environmentally relevant area that might reasonably be expected to affect the same environmental resources, including future projects actually planned or for which a basis of expectation has been laid, regardless of what person undertakes the other projects or what jurisdictions have authority over the projects."

In the EA for the Big Bend Wind Farm, Red Rock Solar Project, and Big Bend Wind 161-kV Transmission Line Project (EERA EA),[102] Minnesota Department of Commerce Energy Environmental Review and Analysis staff defined "environmentally relevant area" to be "locations where the potential effects of the project coincide with the potential effects of other projects to impact the elements studied in this EA. Generally, this area includes the ROI for the different resource elements." The EA concluded that none of the identified projects were in the

[102] Minnesota Department of Commerce. 2022. Big Bend Wind and Red Rock Solar Environmental Assessment. Available online at: https://puc.eip.mn.gov/node/7341. Accessed August 2025.

environmentally relevant area, but the potential for cumulative potential effects existed along transportation routes used for access or deliveries.

The Applicants reviewed the list of current and reasonably future projects provided in the EERA EA (see **Table 28**). These projects will not occur within the environmentally relevant area or are otherwise complete.

Table 28
Reasonably Foreseeable Future Projects Identified in the EERA EA

Project	Location	Status
Wolf Lake Connection Trail	City of Windom	Outside Martin County
Plum Creek Wind Farm	Cottonwood, Murray, and Redwood Counties	Outside Martin County
U.S. Highway 14 Expansion	Nicollet to New Ulm	Outside Martin County
U.S. Highway 14 RCUT Construction	City of Eagle Lake	Outside Martin County
Interstate 90 Resurfacing	Sherburn to Fairmont	Complete
Pavement Replacement and Bridge Rehab Trunk Highways 60/15	City of Madelia	Outside Martin County
US Highway 169 Resurfacing	Winnebago to Blue Earth	Outside Martin County
US Highway 169 Bridge Replacements	City of St. Peter	Outside Martin County
Interstate 90 Concrete Overlay	SD/MN Border to City of Beaver Creek	Outside Martin County

The Applicants reviewed LGU's websites, including Martin County and Trimont, the Environmental Quality Board and MPUC interactive project viewers. The MPUC project database was reviewed. Martin County and MnDOT road projects were identified. No MnDOT projects are proposed in the environmentally relevant area. Martin County plans to conduct work on County Highway 38 east of Trimont.[103] This project is on the "Years 5-10" horizon; therefore, it is not reasonably foreseeable for the purposes of this analysis. Identified reasonably foreseeable future projects are shown on **Table 29**.

Table 29
Reasonably Foreseeable Future Projects

Project	Location	Description
Lake Charlotte Solar Project	About 2.5 miles north of the City of Fairmont	150 MW Solar Farm and Battery Energy Storage System

[103] Martin County. 2025. *Martin County Minnesota 5 Year Construction Plan.* Available online at: https://cms9files.revize.com/martincounty25/Government/Highway/Construction/5%20Year%20Construction%20Plan%20-%20April%202025.pdf?t=202508221708250&t=202508221708250. Accessed September 2025.

The EERA EA concluded "there is potential for impact to transportation routes [the Applicants] and their contractor will use for accessing the Project Area or getting equipment and materials to the Project Area."[104]

Section 5.3.14 of the 2025 Sample Route Permit requires that the "appropriate governing bodies having jurisdiction over all state, county, city or township roads that will be used during the construction phase of the project" be advised of the Extension Project. Should traffic related concerns be identified by road authorities, Big Bend and Great River Energy will work with the road authority to mitigate potential effects. As such, cumulative effects with the Extension Project and future projects in the environmentally relevant area are anticipated to be negligible.

[104] Minnesota Department of Commerce. 2022. Big Bend Wind and Red Rock Solar Environmental Assessment. Available online at: https://puc.eip.mn.gov/node/7341. Accessed August 2025. At page 365.

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