GREAT RIVER ENERGY

APPLICATION TO THE
MINNESOTA PUBLIC UTILITIES COMMISSION
FOR A ROUTE PERMIT

LAKE EUNICE 115 KV TRANSMISSION CONVERSION PROJECT

DOCKET NO.
ET2/TL-19-311

GREAT RIVER ENERGY™

June 3, 2019

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LIST OF ACRONYMS

ACRONYMS	
ACSR	Aluminum Conductor Steel Reinforced
ALJ	Administrative Law Judge
BMPs	Best Management Practices
BPA	Bonneville Power Administration
Commission	Minnesota Public Utilities Commission
dBA	Decibel – A weighted
DC	Direct Current
DNR	Minnesota Department of Natural Resources
EA	Environmental Assessment
EERA	Energy Environmental Review and Analysis
EF	Electric Fields
ELF	Extremely Low Frequency
EMF	Electromagnetic Fields
EPA	United States Environmental Protection Agency
EQB	Minnesota Environmental Quality Board
G	Gauss
HVTL	High Voltage Transmission Line
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IEEE	Institute of Electrical and Electronic Engineers
IMDs	Implantable Medical Devices
kV	Kilovolt
kV/m	Kilovolts Per Meter
mA rms	MilliAmperes Root Mean Square
MF	Magnetic Fields
mG	Milligauss
MISO	Midcontinent Independent System Operator
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MRO	Midwest Reliability Organization
MW	Megawatt
NAC	Noise Area Classifications
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NHIS	Natural Heritage Inventory System
NIEHS	National Institute of Environmental Health Sciences
NLEB	Northern Long-eared Bat
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
Project	Lake Eunice 115 kV Transmission Conversion Project
PWI	Public Waters Inventory
ROW	Right-of-Way

ACRONYMS	
SHPO	State Historic Preservation Office
SWPPP	Stormwater Pollution Prevention Plan
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WHO	World Health Organization

Route Permit Application – Alternative Process Completeness Checklist

Authority	Required Information	Location in Application
Minn. Stat. § 216E.04, subd. 2(3)	**Alternative Review of Applications**. Alternative review is available for high voltage transmission lines of between 100 and 200 kV	§ 2.1
Minn. Stat. § 216E.04, subd. 4; Minn. R. 7850.2800, Subp. 1(C)	Subpart 1. **Eligible Projects**. An applicant for a site permit or a route permit for one of the following projects may elect to follow the procedures of parts 7850.2800 to 7850.3900 instead of the full permitting procedures in parts 7850.1700 to 7850.2700: **high voltage transmission lines of between 100 and 200 kV**	Appendix A
Minn. R. 7850.2800, Subp. 2.	Subpart 2. **Notice to PUC**. An applicant for a permit for one of the qualifying projects in subpart 1, who intends to follow the procedures of parts 7850.2800 to 7850.3700, shall notify the PUC of such intent, in writing, at least ten days before submitting an application for the project	Appendix A
Minn. R. 7850.3100	**Contents of Application** (alternative permitting process) The applicant shall include in the application the same information required in part 7850.1900, except the applicant need not propose any alternative sites or routes to the preferred site or route. If the applicant has rejected alternative sites or routes, the applicant shall include in the application the identity of the rejected sites or routes and an explanation of the reasons for rejecting them	This document.
Minn. R. 7850.1900, Subp. 2 (applicable per Minn. R. 7850.3100)	**Route Permit for HVTL** A. a statement of proposed ownership of the facility at the time of filing the application and after commercial operation	§ 3.1
	B. the precise name of any person or organization to be initially named as permittee or permittees and the name of any other person to whom the permit may be transferred if transfer of the permit is contemplated	§ 3.1
	C. rejected alternative routes and the reasons for rejecting	§ 5.1
	D. a description of the proposed high voltage transmission line and all associated facilities including the size and type of the high voltage transmission line	§ 4.1; 4.2
	E. the environmental information required under 7850.1900, Subp. 3	Chapter 7
	F. identification of land uses and environmental conditions along the proposed routes	§§ 7.3; Chapter 7
	G. the names of each owner whose property is within any of the proposed routes for the high voltage transmission line	Appendix C
	H. United States Geological Survey topographical maps or other maps acceptable to the chair showing the entire length of the high voltage transmission line on all proposed routes	Figure 1-3; Figures 7.4 & 7.5; Appendix B

Authority	Required Information	Location in Application
	I. identification of existing utility and public rights-of-way along or parallel to the proposed routes that have the potential to share right-of-way with the proposed line	§ 6.3
	J. the engineering and operational design concepts for the proposed high voltage transmission line, including information on the electric and magnetic fields of the transmission line	§§ 4.2; 6.8
	K. cost analysis of each route, including the costs of constructing, operating, and maintaining the high voltage transmission line that are dependent on design and route	§ 4.3
	L. a description of possible design options to accommodate expansion of the high voltage transmission line in the future	§ 6.2
	M. the procedures and practices proposed for the acquisition and restoration of the right-of-way, construction, and maintenance of the high voltage transmission line	§§ 6.4; 6.5; 6.6; 6.7
	N. a listing and brief description of federal, state, and local permits that may be required for the proposed high voltage transmission line	§ 2.4; Table 2-1
	O. a copy of the Certificate of Need or the certified HVTL list containing the proposed high voltage transmission line or documentation that an application for a Certificate of Need has been submitted or is not required	§ 2.5
Minn. R. 7850.1900, Subp. 3	**Environmental Information** A. a description of the environmental setting for each site or route	§ 7.1
	B. a description of the effects of construction and operation of the facility on human settlement, including, but not limited to, public health and safety, displacement, noise, aesthetics, socioeconomic impacts, cultural values, recreation, and public services	§ 7.2
	C. a description of the effects of the facility on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining	§ 7.4
	D. a description of the effects of the facility on archaeological and historic resources	§ 7.5
	E. a description of the effects of the facility on the natural environment, including effects on air and water quality resources and flora and fauna	§ 7.6
	F. a description of the effects of the facility on rare and unique natural resources	§ 7.7
	G. identification of human and natural environmental effects that cannot be avoided if the facility is approved at a specific site or route	Chapter 7
	H. a description of measures that might be implemented to mitigate the potential human and environmental impacts identified in items A to G and the estimated costs of such mitigative measures	Chapter 7
Minn. R. 7850.2100, Subp. 2 (applicable per Minn. R. 7850.3300)	**Notice of Project** Notification to persons on PUC's general list, to local officials, and to property owners	To be provided

Authority	Required Information	Location in Application
Minn. R. 7850.2100, Subp 4	Publication of notice in a legal newspaper of general circulation in each county in which the route is proposed to be located.	To be published
Minn. R. 7850.2100. Subp. 5	Confirmation of notice by affidavits of mailing and publication with copies of the notices	Submit when available
Minn. R. 7850.4100	**Factors to be Considered in Permitting a HVTL** A. effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services	§ 7.2
	B. effects on public health and safety	§ 7.2
	C. effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining	§ 7.4
	D. effects on archaeological and historic resources	§ 7.5
	E. effects on the natural environment, including effects on air and water quality resources and flora and fauna	§ 7.6
	F. effects on rare and unique natural resources	§ 7.7
	G. application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity	§§ 4.2; 6.2
	H. use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries	§§ 4.2; 6.3
	I. use of existing large electric power generating plant sites	Not applicable
	J. use of existing transportation, pipeline, and electrical transmission systems or rights-of-way	§ 6.3
	K. electrical system reliability	§§ 8.1
	L. costs of constructing, operating, and maintaining the facility which are dependent on design and route	§ 4.3
	M. adverse human and natural environmental effects which cannot be avoided	Chapter 7
	N. irreversible and irretrievable commitments of resources	§ 7.9
Minn. R. 7850.4300, Subps. 1 and 2	Prohibited Routes **Wilderness areas**. No high voltage transmission line may be routed through state or national wilderness areas **Parks and natural areas**. No high voltage transmission line may be routed through state or national parks or state scientific and natural areas unless the transmission line would not materially damage or impair the purpose for which the area was designated and no feasible and prudent alternative exists. Economic considerations alone do not justify use of these areas for a high voltage transmission line	No wilderness areas or parks are crossed

Authority	Required Information	Location in Application
Minn. Stat. §216E.03, Subd.7 (applicable per Minn. Stat. §216E.04, Subd. 8)	**Considerations in designating sites and routes** (1) Evaluation of research and investigations relating to the effects on land, water and air resources of large electric power generating plants and high voltage transmission lines and the effects of water and air discharges and electric and magnetic fields resulting from such facilities on public health and welfare, vegetation, animals, materials and aesthetic values, including base line studies, predictive modeling, and evaluation of new or improved methods for minimizing adverse impacts of water and air discharges and other matters pertaining to the effects of power plants on the water and air environment	Chapter 7
	(2) Environmental evaluation of sites and routes proposed for future development and expansion and their relationship to the land, water, air and human resources of the state	§ 6.2
	(3) Evaluation of the effects of new electric power generation and transmission technologies and systems related to power plants designed to minimize adverse environmental effects	Not applicable
	(4) Evaluation of the potential for beneficial uses of waste energy from proposed large electric power generating plants	Not Applicable
	(5) Analysis of the direct and indirect economic impact of proposed sites and routes including, but not limited to, productive agricultural land lost or impaired	§ 7.3; 7.4
	(6) Evaluation of adverse direct and indirect environmental effects that cannot be avoided should the proposed site and route be accepted	Chapter 7
	(7) Evaluation of alternatives to the applicant's proposed site or route proposed pursuant to subdivisions 1 and 2	Chapter 5
	(8) Evaluation of potential routes that would use or parallel existing railroad and highway rights-of way	§ 6.3; Chapter 7
	(9) Evaluation of governmental survey lines and other natural division lines of agricultural land so as to minimize interference with agricultural operations	§§ 6.3; 7.4.1
	(10) Evaluation of the future needs for additional high voltage transmission lines in the same general area as any proposed route, and the advisability of ordering the construction of structures capable of expansion in transmission capacity through multiple circuiting or design modifications	§§ 6.2
	(11) Evaluation of irreversible and irretrievable commitments of resources should the proposed site or route be approved	Chapter 7
	(12) When appropriate, consideration of problems raised by other state and federal agencies and local entities	Not applicable

1 SUMMARY OF THE APPLICATION

1.1 Introduction

Great River Energy is applying to the Minnesota Public Utilities Commission (Commission) for a Route Permit to convert approximately a 0.80 mile portion of Great River Energy's 41.6 kilovolt (kV) LR-LET transmission line to 115 kV standards in Becker County, Minnesota (Project) to serve the proposed 115 kV conversion of the Lake Eunice Substation.

Great River Energy proposes to remove 3.65 miles of the 10.24 mile 41.6 kV LR-LET transmission line and build a 0.80 mile 115 kV transmission line between the existing Lake Eunice Substation and the existing Great River Energy LR-CF 115 kV transmission line.

Great River Energy anticipates start of construction in fall 2020 and energization of the 115 kV line in spring 2021.

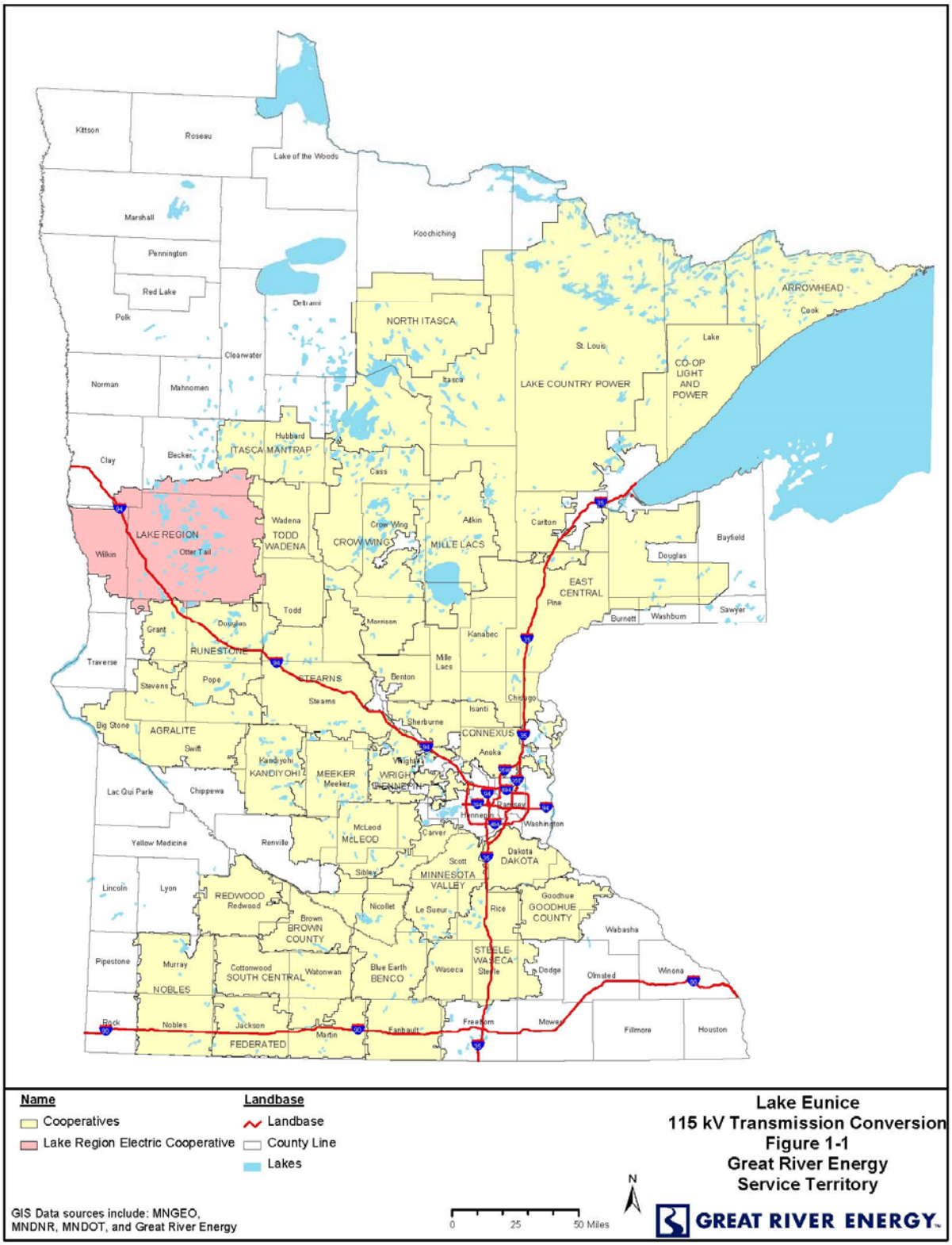
1.2 Great River Energy

Great River Energy is a not-for-profit generation and transmission cooperative based in Maple Grove, Minnesota. Great River Energy provides electrical energy and related services to 28 member cooperatives, including Lake Region Electric Cooperative, the distribution cooperative serving the area in which the new transmission line would be located (**Figure 1-1**). Great River Energy's distribution cooperatives, in turn, supply electricity and related services to more than 685,000 residential, commercial, and industrial customers in Minnesota and Wisconsin. Lake Region Electric Cooperative provides electricity and related services to approximately 27,800 residential, commercial and industrial customers in Minnesota.

Great River Energy's generation system includes a mix of baseload and peaking plants, including coal-fired, natural gas and oil plants as well as wind generators (approximately 3,450 megawatts (MW)). Great River Energy owns over 4,600 miles of transmission line (69 kV or higher) in Minnesota, North Dakota, South Dakota, and Wisconsin.

Great River Energy's transmission network is interconnected with the regional transmission grid to promote reliability and Great River Energy is a member of the Midwest Reliability Organization (MRO) and the Midcontinent Independent System Operator (MISO).

Figure 1-1. Great River Energy Service Territory



1.3 Project Contact

The contact for the Lake Eunice 115 kV Transmission Conversion Project is:

Marsha Parlow
Great River Energy
Transmission Permitting Specialist
12300 Elm Creek Blvd.
Maple Grove, MN 55369
763-445-5215
mparlow@grenergy.com

1.4 Proposed Project

The proposed 0.8 mile overhead 115 kV high voltage transmission line (HVTL) will be located in Becker County, Minnesota (**Figure 1-2**). Great River Energy currently owns the 10.24 mile 41.6 kV LR-LET line with Lake Region Cooperative's 12.5 kV distribution underbuild attached. The proposed project will convert 0.80 mile of the overhead line to 115 kV, remove 3.65 miles of 41.6 kV and maintain the existing 12.5 kV distribution underbuild. Great River Energy will lean the existing 41.6 kV with the distribution underbuild circuit while constructing the new 115 kV to minimize outage times. Great River Energy will also need to temporarily move the 41.6 kV tap on Lake Region Electric Cooperative's property to make room for substation construction. After the conversion to 115 kV, the south 0.80 mile and north 2.85 miles of the 41.6 kV conductor will be removed. Lake Region Electric Cooperative will own the remaining 6.59 miles of the 41.6 kV line for distribution purposes and retain all existing distribution lines in the area (**Figure 1-3**).

Single-pole wood structures with horizontal post insulators will be used for most of the transmission line. Laminated wood poles or steel poles may be required in some locations (for angles poles, or in areas where soil conditions are poor and guying is not practical). Typical pole heights will range from 70 to 80 feet above ground and spans between poles will range from 200 to 300 feet. Section 4 provides more details on the proposed design of the proposed HVTL.

Great River Energy is requesting approval of a 200-foot route width for the transmission line and a wider route width (400 feet) in the vicinity of the substation to accommodate routing the line into the Lake Eunice Substation (**Figure 1-4**). Route width is defined as the area in which Great River Energy will confine its search for the appropriate location of the transmission line. This width will provide flexibility as the Applicant works with landowners and addresses engineering constraints in developing a final alignment for the proposed 115 kV HVTL. This route width is referred to within this Application as the proposed route.

Right-of-way width (ROW) is the area encompassed by the transmission line easement. The proposed new 115 kV line will require a 90-foot-wide ROW. It includes space for the transmission centerline as well as a buffer of approximately 45 feet on either side of the centerline that will remain clear of trees/vegetation and other structures for safety purposes. (**Figure 1-4**). Great River Energy will need to acquire additional easement width for the new 115 kV transmission line.

The Project will cost approximately $1.5 million dollars.

Figure 1-2. Regional Transmission System

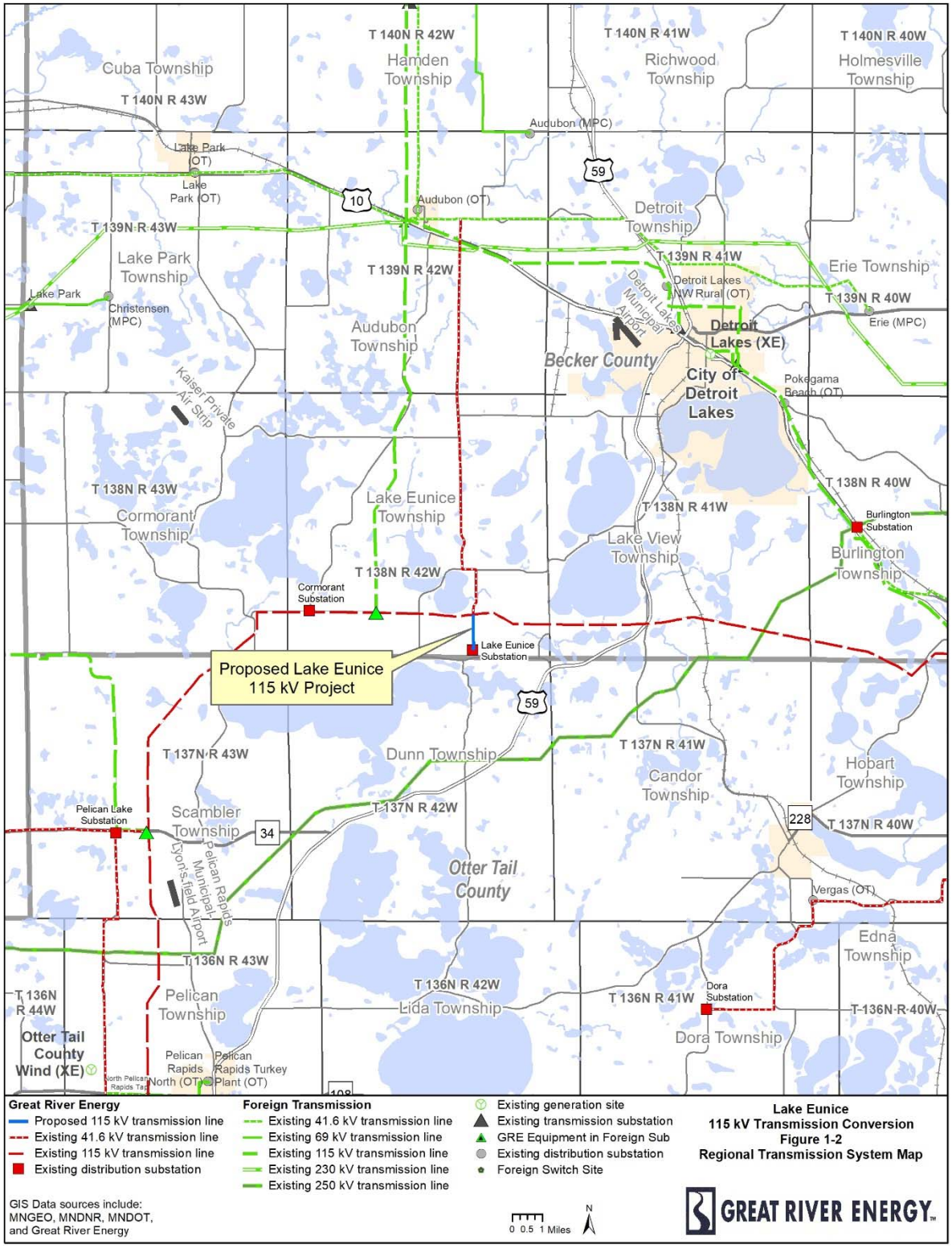


Figure 1-3. Proposed Project

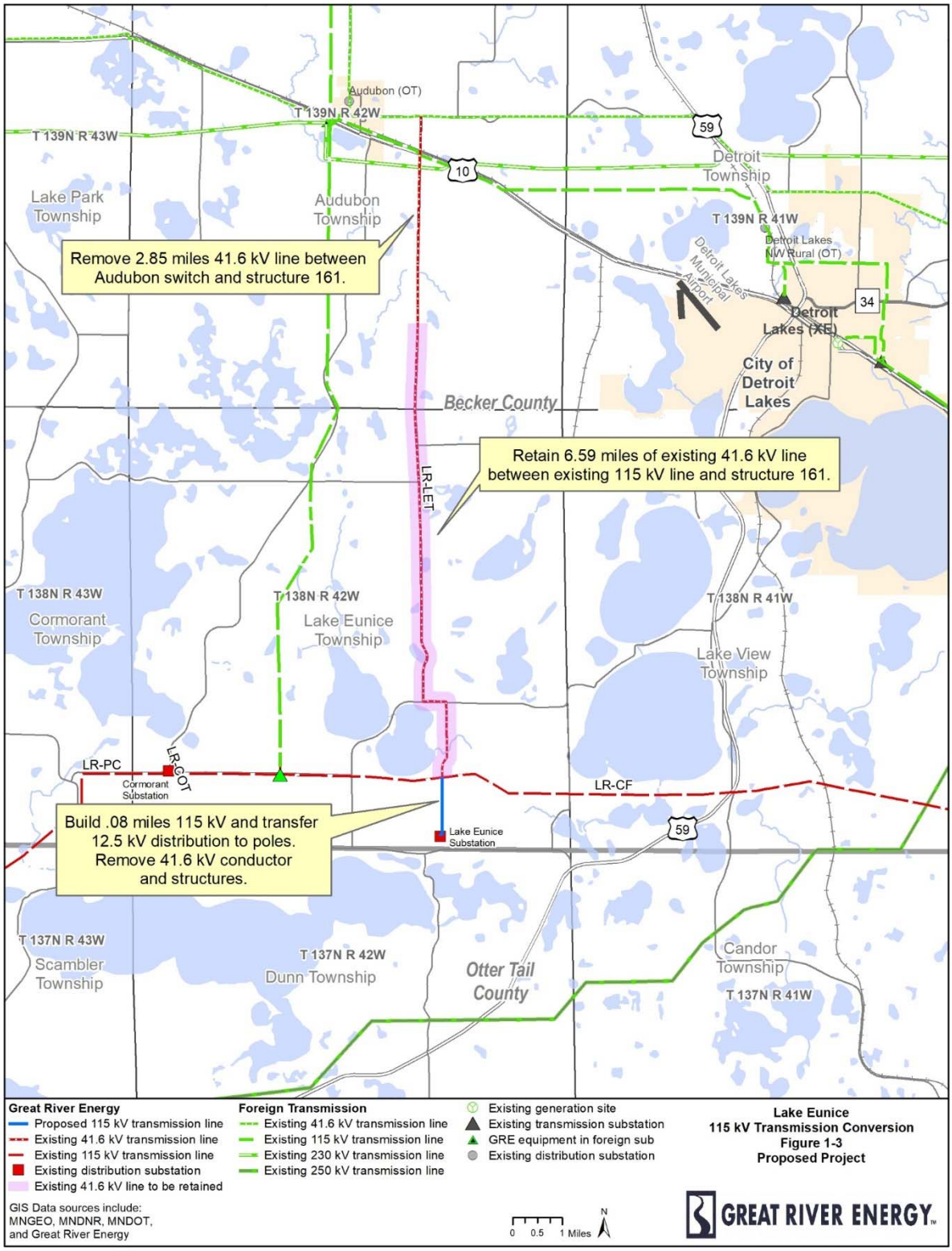
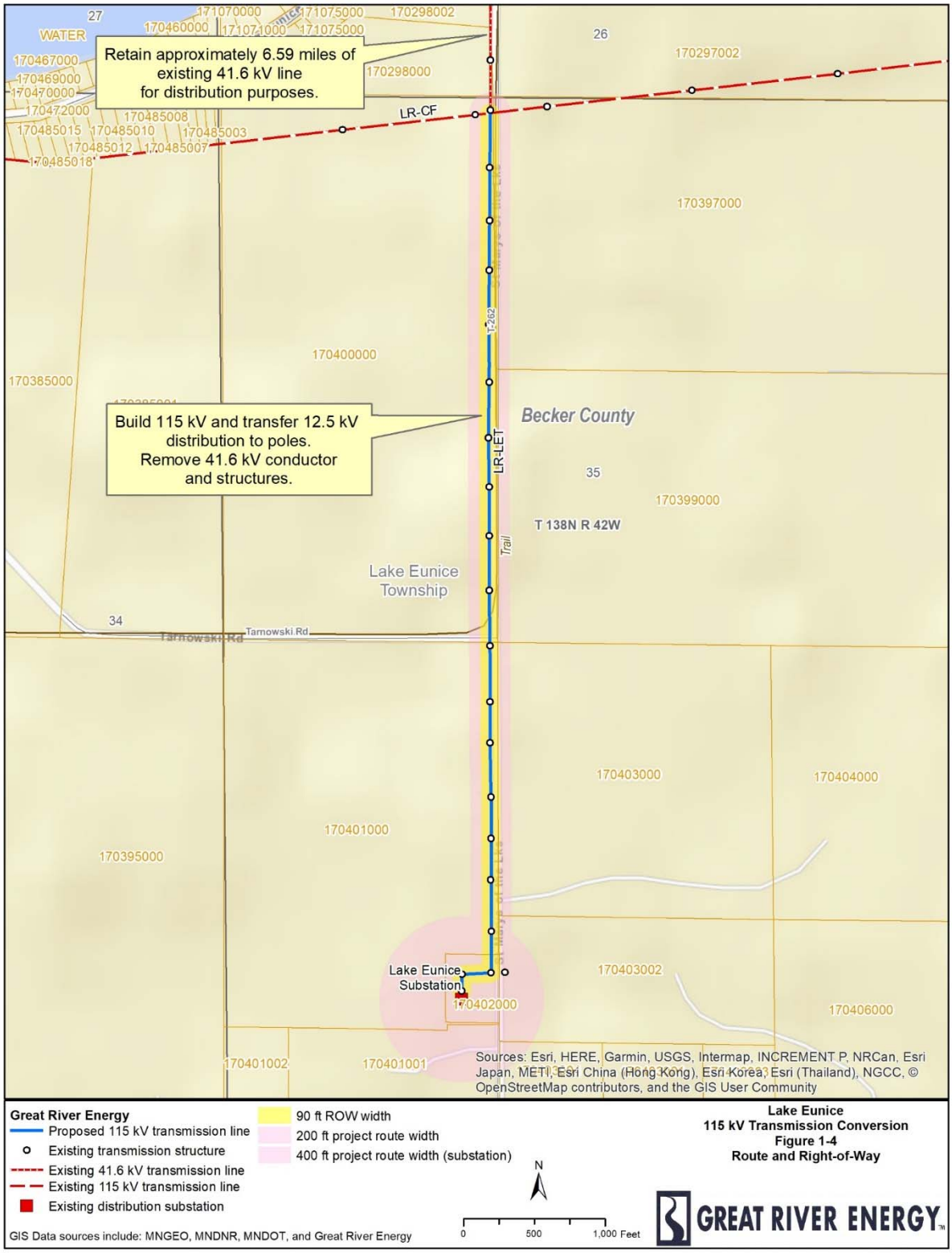


Figure 1-4. Proposed Project Route and Right-of-Way



1.5 Project Need and Purpose

The project is being proposed to improve electrical service to members in the rural area southwest of Detroit Lakes, Minnesota including Lake Eunice, Dunn and Lake View townships (**Figure 1-2**). These proposed upgrades will allow over ten miles of 41.6 KV radial transmission to be replaced by a 0.8 mile 115 KV loop fed transmission line. This new line will improve the reliability of the transmission feeding the Lake Eunice Substation and thus improve the reliability of the approximate 2,000 members served off of this substation.

1.6 Proposed Route

The proposed 115 kV line (**Figure 1-2**) will connect to the converted Lake Eunice Substation, head north along St. Marys of the Lakes road for about 0.8 mile and connect to the existing LR-CF 115 kV transmission line owned by Great River Energy. The requested 200-foot route width would be centered on the existing 41.6 kV transmission line and a 400 feet around the existing Lake Eunice Substation. This will provide flexibility in developing a final alignment and 90-foot ROW for the proposed 115 kV HVTL inside that route (**Figure 1-3**)

1.7 Potential Environmental Effects

Great River Energy analyzed the potential environmental effects from the proposed Project. No significant unavoidable impacts will result from construction of the proposed 115 kV transmission line.

No homeowners will be displaced by construction of the 115 kV transmission line. All agricultural land impacted during construction will be returned to its natural condition as nearly as possible and landowners will be compensated for any losses from construction. All water bodies in the area will be protected during construction. The electric fields associated with the new line (0.36 kilovolts per meter) will be significantly less than the maximum levels permitted by state regulators (8 kilovolts per meter). No stray voltage issues are anticipated to affect farm animals along the route.

The Department of Commerce, Energy Environmental Review and Analysis (EERA) unit is responsible for environmental review of the Project. Upon application acceptance by the Commission, the Department of Commerce will prepare an Environmental Assessment (EA) for the Project that analyzes potential environmental impacts from the Project.

1.8 Public Involvement

The proposed Project crosses two private parcels (**Appendix B**). Great River Energy's land agent has contacted the two private landowners and provided information on the Project.

The public will have an opportunity to review this application and submit comments to the Commission about the Project. A copy of the application will be available on the Commission eDockets website at www.mn.gov/puc, on the EERA website at http://mn.gov/commerce/energyfacilities, and on the Great River Energy webpage at www.greatriverenergy.com. Additionally, a paper copy of this application will be available at the Detroit Lakes Public Library for the public to review.

A scoping meeting will be conducted by EERA in the Project area within 60 days of the Commission's acceptance of this application as complete. The purpose of the scoping meeting is to inform the public regarding the proposed Project and associated permitting process, answer questions about the proposed Project and permitting process, and to solicit public comments and suggestions for matters to examine during environmental review. After the EA is issued, a public hearing will be held in the Project area. At this hearing, members of the public will be given an opportunity to ask questions and submit comments.

There are two options for citizens/landowners/interested persons to receive project information:

1. **Subscribe to the docket** (self-service, must subscribe for each docket of interest), receive email notifications when new documents are filed. Note - subscribing may result in a large number of emails.
    1. mn.gov/puc
    2. Select link under the blue box - *Energy Facilities*
    3. Select link at the bottom - *Energy Facilities Project Database*
    4. Select the blue box under Resources - *How to Participate*
    5. Under Public Participation select tab - *Mailing Lists*
    6. Select the blue link - *electronic docket here*
    7. Type your e-mail address
    8. For *Type of Subscription*, select *Docket Number*
    9. For *Docket Number*, select *19* in the first box, type *311* in the second box
    10. Select *Add to List*
    11. Select *Save*
2. **Sign up for the project mailing list** – sign up to receive notices about project milestones and opportunities to participate (meetings, comment periods, etc.); may request email or US Mail (not self-service, must contact PUC staff to sign up). Contact consumer.puc@state.mn.us or 651-296-0406 or 1-800-657-3782 with the docket number (*19-311*), your name, mailing address and email address.

State staff contact information is provided below.

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1.9 Conclusion

With regard to route selection for high voltage transmission lines, the applicable rules are found in Minnesota Rules Chapter 7850. This Project addresses the criteria for a route permit: the transmission line conserves resources, minimizes environmental impacts, and minimizes effects on human settlement and land-based economies by paralleling (immediately adjacent to) or using an existing transmission line ROW.

2 GENERAL PROJECT INFORMATION

2.1 Route Permit

Minnesota Statutes Section 216E.03, subdivision 2, provides that "[n]o person may construct a high voltage transmission line without a route permit from the commission." A high voltage transmission line (HVTL) is defined by Minnesota Statutes Section 216E.01, subdivision 4, as "a conductor of electric energy and associated facilities designed for and capable of operation at a nominal voltage of 100 kilovolts or more and is greater than 1,500 feet in length." Because the Project consists of a 115 kilovolt transmission line that is greater than 1,500 feet, a route permit is required.

The rules that apply to the review of route permit applications are found in Minnesota Rules Chapter 7850. Minnesota Rule 7850.1900, subparts 2 and 3, set forth the information that must be included in a route permit application.

Minnesota Statutes Section 216E.04, subdivision 2(3) provides for an Alternative Review Process for transmission lines between 100 and 200 kilovolts; therefore, this Project qualifies for alternative review. The permitting timeline for the Alternative Review Process is shorter than the timeline required for transmission lines over 200 kV. Great River Energy notified the Commission on May 8, 2019, pursuant to Minnesota Rule 7850.2800, subpart 2 of its intent to utilize the Alternative Review Process and file its Route Permit Application under Minnesota Rules 7850.2800 to 7850.3900. A copy of the notification letter is provided in **Appendix A**.

Under the Alternative Review Process, an applicant is not required to propose any alternative routes, but must disclose any other routes that were considered but rejected by the applicant (Minn. Stat. § 216E.04, subd. 3.). Further, an Environmental Impact Statement is not required under the Alternative Review Process. Instead, the Department of Commerce is required to prepare an EA (Minn. Stat. § 216E.04, subd. 5). Unlike the full route permit process for higher voltage lines, which requires a formal contested case hearing, the Commission has discretion to determine what kind of public hearing to conduct (Minn. Stat. § 216E.04, subd. 6). The Alternative Review Process procedures are discussed below **in Section 2.2**.

2.2 Regulatory Process

As a result of legislation passed in 2005, the Commission has jurisdiction over route permits (2005 Minn. Laws ch. 97, art. 3, § 17). Minnesota Statutes Section 216E.02, subdivision 2, states that "[t]he commission is hereby given the authority to provide for site and route selection for large electric power facilities." The legislature transferred these siting and routing responsibilities to the Commission to "ensure greater public participation in energy infrastructure approval proceedings and to better integrate and align state energy and environmental policy goals with economic decisions involving large energy infrastructure" (2005 Minn. Laws ch. 97, art. 3, § 17).

The regulatory process described in this section is the process that is followed to satisfy all the requirements under the alternative process route permit rules (Minnesota Rules Chapter 7850).

In accordance with Minnesota Statute Section 216E.04, subdivision 4, within 15 days of filing this Route Permit Application, Great River Energy will mail a notice of the filing to potentially affected landowners, to those persons who have registered their names with the Commission and expressed an interest in large energy projects, and to the area tribal government and local units of government whose jurisdictions are reasonably likely to be affected by the proposed Project. In addition, Great River Energy will publish notice in two local newspapers announcing the filing of this Application (Minn. Stat. § 216E.04, subd. 4; Minn. R. 7850.2100).

An electronic version of the Application will be available on eDockets in docket number 19-311 and the EERA project webpage. The Application will also be available on Great River Energy's transmission projects webpage (https://greatriverenergy.com/project/lake-eunice-115-kv-transmission-conversion/) with a link to the Lake Eunice 115 kV Transmission Conversion Project by clicking on Northwest Minnesota on the page.

Upon acceptance of an application for a route permit as complete, the Department of Commerce, EERA conducts an environmental review of the project (Minn. R. 7850.3700). The environmental review provides an overview of the resources and potential impacts and mitigation measures associated with the proposed project.

The process EERA must follow in preparing the EA is set forth in Minnesota Rule 7850.3700. This process requires EERA to schedule at least one scoping meeting in the area of the proposed project. The purpose of the meeting is to advise the public of the Project, to solicit public input into the scope of the environmental review, and allow for public comment. Great River Energy and EERA will both have representatives at the public meeting to answer questions and provide information for the public. The public meeting will be held within 60 days after the Application is accepted and deemed complete.

Once the public meeting has been held, the commissioner of the Department of Commerce will issue a scoping decision describing the issues and alternatives that will be evaluated in the EA. EERA will prepare the EA based on the scoping decision. Upon completion of the EA, EERA will publish notice of its availability in the *EQB Monitor*, a weekly publication of the Environmental Quality Board (EQB) that can be accessed on the EQB webpage, www.eqb.state.mn.us/monitor.html, and will send notice to persons who have placed their names on the project mailing list (see **Section 1.8)**. A copy of the EA will be available electronically through eDockets and the EERA webpage, and in paper copy at the Detroit Lakes Public Library.

After the EA is issued, a public hearing will be held to again solicit public input and to create an administrative record. The Commission will select a person to preside at the hearing; it may be an administrative law judge (ALJ) from the Office of Administrative Hearings or another person acceptable to the Commission. The Commission will establish the procedures to be followed at the hearing (Minn. R. 7850.3800). The EA will become part of the record for consideration by the Commission. Interested persons will be notified of the date of the public hearing and will have an opportunity to participate in the proceeding.

Once the hearing is concluded, a report will be prepared based on the record. After the report is issued, the matter will come to the Commission for a decision. At that time, the Commission may afford interested persons an opportunity to provide additional comments.

A route permit under the Alternative Review Process can be issued in six months after the Commission's determination that the Application is complete (Minn. Stat. § 216E.04, subd. 7).

Great River Energy anticipates that a final decision on the route permit for this Project can be made by spring 2020.

2.3 Landowner Coordination

The proposed Project ROW crosses two private parcels (PIDs 170401000 and 170400000). Great River Energy's land agent has contacted the two private landowners (**Figure 1-4**) and provided information on the Project.

2.4 Other Permits/Approvals

In addition to the route permit sought in this Application, other permits may be required to construct the Project depending on the actual route selected and the conditions encountered during construction. A list of the local, state and federal permits that may be required for this Project is provided in **Table 2-1**.

2.4.1 Local Approvals

Great River Energy will work with local units of government to address any concerns related to the following possible approvals.

Road Crossing/Right-of-Way Permits
These permits may be required to cross or occupy county or township road ROW.

Over width/Loads Permits
These permits may be required to move over width or heavy loads on county, township, or city roads.

Driveway/Access Permits
These permits may be required to construct access roads or driveways from county, township, or city roadways.

Table 2-1. List of Possible Permits

Permit	Jurisdiction
Local Approvals	
Road Crossing/ROW Permits	County, Township
Lands Permits, Building Permits	County, Township
Overwidth Loads Permits	County, Township
Driveway/Access Permits	County, Township
Minnesota State Approvals	
Endangered Species Consultation	Minnesota Department of Natural Resources – Ecological Services
Licenses to Cross Public Waters and Lands	Minnesota Department of Natural Resources – Lands and Minerals
Wetland Conservation Act	Board of Water and Soil Resources
National Pollutant Discharge Elimination System Permit	Minnesota Pollution Control Agency
Federal Approvals	
Section 404 Permit	US Army Corps of Engineers
Endangered Species Consultation	United States Fish and Wildlife Service
Other Approvals	
Crossing Permit	Other Utilities such as Pipelines

2.4.2 State of Minnesota Approvals

Endangered Species Consultation

The DNR Natural Heritage and Nongame Research Program collects, manages, and interprets information about nongame species. Consultation was requested from the DNR for the Project regarding rare and unique species. The DNR responded on August 9, 2018 (**Appendix D**) that no known occurrences of rare features will be negatively impacted by the proposed route.

Utility Permit

A permit from Lake Eunice Township may be required if a crossing of St. Marys of the Lake road is necessary. If necessary, Great River Energy will file for this permit once the design of the transmission line is complete and will acquire the permit prior to construction.

Wetland Conservation Act

The Minnesota Board of Water and Soil Resources administers the state Wetland Conservation Act, under Minnesota Rules Chapter 8420. There are no wetlands in the proposed route (**Appendix B**).

NPDES Permit

A National Pollutant Discharge Elimination System (NPDES) permit from the Minnesota Pollution Control Agency (MPCA) is required for stormwater discharges associated with construction activities disturbing equal to or greater than one acre. A requirement of the permit is to develop and implement a stormwater pollution prevention plan (SWPPP), which includes Best Management Practices (BMPs) to minimize discharge of pollutants from the site. This permit will be acquired if construction of the transmission line will cause a disturbance of greater than one acre.

2.4.3 Federal Approvals

Section 404 Permit

A permit is not required to do this work (**Appendix D**). The work proposed at the location stated is not within the regulatory jurisdiction of the US Army Corps of Engineers (USACE).

United States Fish and Wildlife Service (USFWS)

Great River Energy requested USFWS review of the Project regarding federally-listed species or critical habitat. The USFWS indicated (**Appendix D**) no significant concerns or comments to provide, regarding the project. No USFWS permits are expected for the project.

2.4.4 Other Approvals

Great River Energy will ensure that any necessary permits are secured prior to construction.

2.5 Certificate of Need Not Required

Minn. Stat. § 216B.243, Subd. 2 (2007), states that "[n]o large energy facility shall be sited or constructed in Minnesota without the issuance of a certificate of need by the Public Utilities Commission..." A large energy facility is defined as "any high-voltage transmission line with a capacity of 100 kilovolts or more with more than ten miles of its length in Minnesota or that crosses a state line."[1] The proposed Lake Eunice 115 kV Transmission Conversion Project is less than ten miles in length and does not cross a state line; therefore a certificate of need is not required.

[1] Minn. Stat. § 216B.2421, subdiv. 2(3) (2006).

3 APPLICANT INFORMATION

3.1 Proposed Ownership

Great River Energy currently owns the existing LR-LET 41.6 kV transmission line. After the conversion, Great River Energy will own the proposed 115 kV transmission line between the existing Lake Eunice Substation and Great River Energy's existing LR-CF 115 kV transmission line. Lake Region Electric Cooperative will continue to own the Lake Eunice Substation and the remaining 6.59 miles of 41.6 kV line for distribution purposes.

3.2 Organization and System Background

Great River Energy is a not-for-profit generation and transmission cooperative based in Maple Grove, Minnesota. Great River Energy provides electrical energy and related services to 28 member cooperatives, including Lake Region Electric Cooperative, the distribution cooperative serving the area. Great River Energy's distribution cooperatives, in turn, supply electricity and related services to more than 685,000 residential, commercial and industrial customers in Minnesota and Wisconsin. Lake Region Electric Cooperative provides electricity and related services to approximately 27,800 residential, commercial and industrial customers in Minnesota.

Great River Energy and its cooperatives' mission is to provide safe, reliable, competitively priced energy to those they serve.

Great River Energy's generation system includes a mix of baseload and peaking plants, including coal-fired, natural gas and oil plants as well as wind generators (approximately 3,450 MW). Great River Energy owns over 4,500 miles of transmission line (69 kV or higher) in Minnesota, North Dakota, South Dakota, and Wisconsin.

Figure 1-1 shows Great River Energy's service territory and highlights the service area of Lake Region Electric Cooperative. Great River Energy's electric system is interconnected directly with neighboring suppliers. Great River Energy is a member of the Midwest Reliability Organization (MRO) and the Midcontinent Independent System Operator (MISO).

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4 PROPOSED PROJECT

4.1 Project Description

The proposed Project is located entirely in Becker County, Minnesota (**Figure 1-2),** and approximately 5.5 miles southwest of the City of Detroit Lakes.

Great River Energy proposes to construct approximately 0.8 mile of new overhead 115 kV transmission line between the existing Lake Eunice Substation to Great River Energy's existing LR-CF 115 kV transmission line (**Figure 4-1**).

4.2 Transmission Line

Great River Energy is requesting approval of a 200-foot route width for the transmission line and a wider route width (400 feet) in the vicinity of the Lake Eunice Substation to accommodate routing the line into the substation. The proposed route is described below and detailed route maps (on aerial photo background) are provided in **Appendix B.**

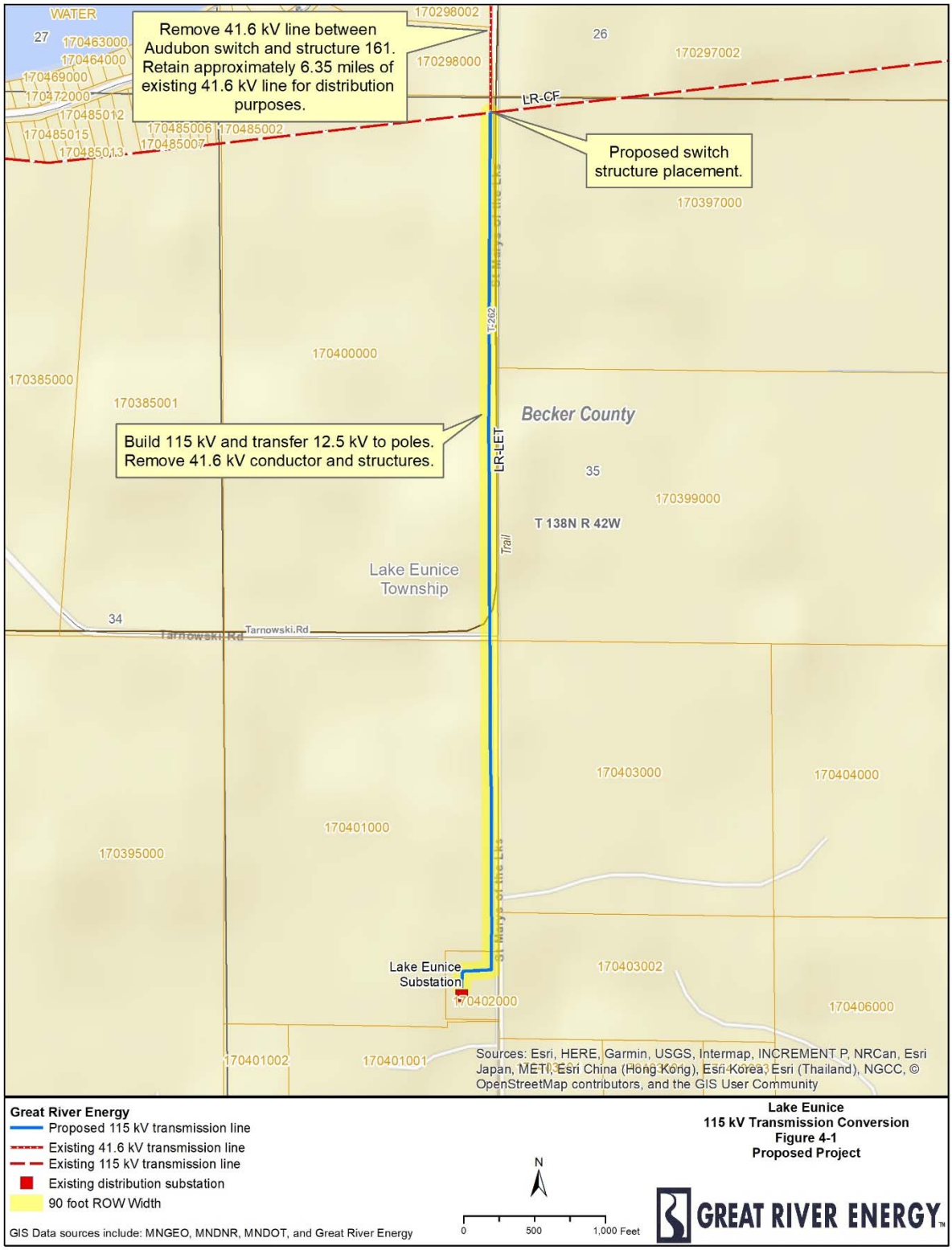
Proposed Route

The proposed HVTL will interconnect with the converted Lake Eunice Substation and then head north along St. Marys of the Lake road for about 0.80 mile to a proposed 3-way switch on the existing LR-CF 115 kV transmission line owned by Great River Energy (**Figure 4-1**). A 90-foot ROW will be centered on the proposed 115 kV line to maintain clearance of vegetation and other structures for safety purposes. It is requested that a 200-foot route width centered on the existing 41.6 kV line and 400-foot width around the existing Lake Eunice Substation is granted to provide flexibility in placing the 90-foot ROW (**Figure 1-4**).

Distribution

The existing 41.5 kV LR-LET line has 12.5 kV distribution underbuilt. The proposed project will be a 115 kV HVTL with the existing 12.5 kV distribution line transferred to the new structures. Great River Energy will lean the existing 41.6 kV with the distribution underbuild circuit while constructing the new 115 kV to minimize outage times. Great River Energy will also need to temporarily move the 41.6 kV tap on Lake Region Electric Cooperative's property to make room for substation construction. After the conversion to 115 kV, the south 0.80 mile and north 2.85 miles of the 41.6 kV conductor will be removed. Lake Region Electric Cooperative will own the remaining 6.59 miles of 41.6 kV line for distribution purposes and retain all distribution lines in the area (**Figures 1-3 and 1-4**).

Figure 4-1. Proposed Project



Right-of-Way

Great River Energy has worked closely with the local, state and federal agencies and has attempted to communicate with landowners regarding the Project. A 90-foot wide permanent ROW for the new transmission line (45 feet on each side of the transmission line centerline) will be acquired by Great River Energy. The easement may be slightly wider than 90 feet in some areas to accommodate guy wires and anchors (**Figure 4-1**).

The 90-foot wide ROW for a 115 kV transmission line is to maintain proper clearances to objects within the ROW. The 90-foot width ROW will ensure that the conductor will not blow outside of the ROW during high wind events and provide sufficient clearance of vegetation, to safely operate and maintain the line.

Structures and Design Considerations

The existing 41.5 kV LR-LET line has 12.5 kV distribution underbuilt. The proposed project will be a 115 kV HVTL with the existing 12.5 kV distribution line transferred to the new structures (**Figures 4-2 and 4-3**). Great River Energy will lean the existing 41.6 kV with the distribution underbuild circuit while constructing the new 115 kV to minimize outage times.

The new 115 kV line will consist of single circuit with 12.5 kV distribution underbuild, single pole wood structures spaced approximately 200 to 300 feet apart. Transmission structures will typically range in height from 70 to 80 feet above ground, depending upon the terrain and environmental constraints (such as required angle structures). The average diameter of the wood structures at ground level is 20 inches.

The switch structure will be installed on the same alignment as the existing LR-CF transmission line structures (**Figure 4-1**). Existing structures on the LR-CF line may also need to be changed out to grade the existing line into the new switch site, as the new switch structure will be taller than the existing LR-CF line structures. Great River Energy will attempt to locate the switch structure such that the number of LR-CF line structures that need to be replaced is minimized. A typical switch structure ranges in height from 80 to 100 feet above ground; however, height will depend upon terrain as well as design and pole height on the existing 115 kV transmission line (LR-CF line). An outage on the LR-CF line will be required to install the new switch structure.

The new 115 kV line switch structure would most likely be a monopole steel structure set on a concrete pier foundation. If it is determined that the LR-CF line needs to be raised (**Figure 4-1**), one or more outages would be necessary to install the new 115 kV line switch structure. One outage would be taken to install the concrete foundations and a second outage to raise the steel structure and finish construction. Additional information needs to be gathered and an engineering survey of the existing terrain and adjacent transmission lines must be completed before a determination can be made regarding precisely what will be required at the intersection of the line.

All necessary outages will be coordinated through MISO business practices that are established and followed by all MISO members to meet personnel safety and North American Electric Reliability Corporation (NERC) transmission grid reliability requirements. Coordination is accomplished through well-defined outage scheduling procedures that utilize web-based tools, allow for study affirmation and ultimately approval of the submitted outage. Once approved,

Figure 4-2. Typical Transmission Structure Types

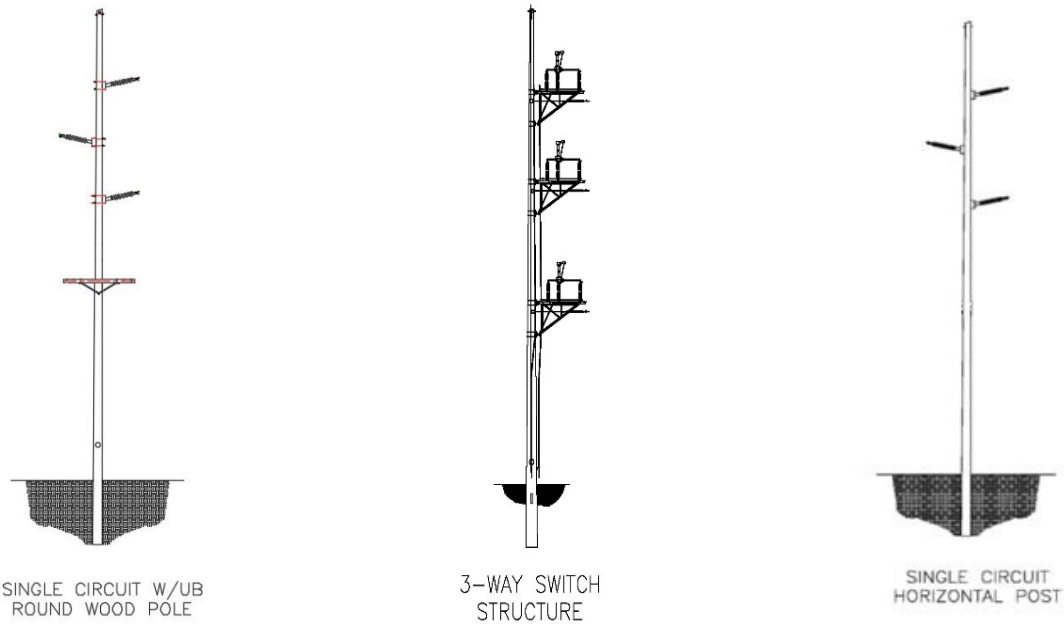


Figure 4-3. Photos of Typical 115 kV Transmission Structures

Single Circuit with Underbuild **3-Way Switch** **Single Circuit**

detailed switching orders are developed and shared with all parties involved using well-defined processes to ensure safety of personnel performing the work and transmission grid reliability.

The converted Lake Eunice Substation will be on Lake Region Electric Cooperative's property, PID 170402000 (**Appendix B**). It will be equipped with breakers and relays located where the transmission line will connect to the substation. The protective equipment is designed to de-energize the transmission line should such an event occur.

Conductors

The single circuit structures will have three single conductor phase wires and one shield wire. It is anticipated that the phase wires will be 477 thousand circular mil aluminum conductor steel-reinforced (ACSR) with seven steel core strands and 26 outer aluminum strands. The shield wire will be 0.528 optical ground wire.

Service Life

The service life of a transmission line is approximately 40 years, although based on experience, it is quite possible that the line and structures will last longer than 40 years.

Annual Availability

An average new 115 kV transmission line is expected to be available approximately 99.9 percent of the year. Great River Energy expects that this line should not be out of service for any extended period of time other than the rare times when scheduled maintenance is required or when a natural event, such as a tornado, thunderstorm, or ice storm causes an outage.

4.3 Estimated Costs

Estimated costs for the proposed Project are divided into five phases. The tasks associated with each phase are outlined below and estimated costs for each phase are summarized in **Table 4-1**.

Planning
Siting and routing preliminary activities
Project presentation to the public
Route permit application development/state permitting process
Establishing centerline for survey

Land Acquisition/Miscellaneous Permits
Easements, ROW and environmental permits

Design
Line and structure design, survey and probes/soil borings

Procurement
Cost of all construction materials, i.e. poles, conductor and hardware

Construction
Staking for clearing and construction
ROW clearing and restoration
All construction labor and heavy equipment

Close Out
Remaining ROW restoration activities
Field verification surveys
Financial, engineering, and environmental close out activities

Table 4-1. Estimated Great River Energy Project Costs (2020 Dollars)

Project	Planning/ State Permitting	Land Acquisition/ Permits	Design	Procurement	Construction	Close Out	Total
Transmission Line	$68,382	$140,180	$60,574	$167,075	$358,813	$22,976	**$818,000**
Switches	$13,725	$11,475	$51,750	$164,250	$198,695	$10,125	**$450,020**
Meters	0	0	$18,600	$145,000	$54,600	$1,800	**$220,000**
Total	**$82,107**	**$151,655**	**$130,924**	**$476,325**	**$612,108**	**$34,901**	**$1,488,020**

All capital costs for the proposed 115 kV transmission line will be borne by Great River Energy.

4.3.1 Transmission Line Construction Costs

Single pole construction costs are approximately $448,500 per mile.

4.3.2 Operation and Maintenance Costs

The estimated annual cost of ROW maintenance and operation and maintenance of Great River Energy's transmission lines (69 kV to 500 kV) in Minnesota currently average about $2,000 per mile. Storm restoration, annual inspections and ordinary replacement costs are included in these annual operating and maintenance costs.

4.4 Project Schedule

Great River Energy plans to commence construction of the Project in fall 2020. Great River Energy anticipates that construction will take approximately two months and that the entire Project will be energized in spring 2021.

4.5 Construction Practices

Great River Energy intends to employ normal practices in construction of the 115 kV transmission line. Construction practices to be followed are described in more detail in **Section 6.5**.

4.6 Operation and Maintenance Practices

Great River Energy will periodically use its transmission line ROW to perform inspections, maintain equipment, and repair damage. Regular maintenance and inspections will be performed over the life of the facility to ensure a reliable system. Annual inspections will be done by foot, snowmobile, All-Terrain Vehicle, pickup truck, or by aerial means. These inspections will be limited to the acquired ROW and areas where obstructions or terrain require access outside of the transmission line ROW but within the terms of the easement. If problems with the transmission line are found during inspection, repairs will be performed and landowners will be compensated for any losses incurred to their property.

Great River Energy's Transmission Construction & Maintenance Department will conduct vegetation surveys and remove vegetation that will interfere with the safe operation of the transmission line. A three to seven year cycle of vegetation maintenance is desirable. ROW practices include a combination of mechanical and hand clearing, along with an application of herbicides where allowed.

4.7 Work Force Required

It is estimated that 15 to 20 workers at a time will be employed during construction of the Project.

5 ALTERNATIVE ROUTES

5.1 Alternative Requirement

Minnesota Statutes Section 216E.04, subdivision 3 and Minnesota Rule 7850.3100 require an applicant to identify any alternative routes that were considered and rejected for the Project. Great River Energy did not evaluate any alternative routes for the proposed transmission line.

6 ENGINEERING, OPERATIONAL DESIGN, CONSTRUCTION AND RIGHT-OF-WAY ACQUISITION

6.1 Transmission Structure Design and Right-of-Way Requirements

Transmission structure design and the ROW requirements are discussed in **Section 4.2**. A schematic of typical structures is provided in **Figure 4-2**.

6.2 Design Options to Accommodate Future Expansion

The existing Lake Eunice Substation has a compact feeder design. This substation has been upgraded in the past and cannot accommodate any future transformer upgrades as that would require other larger equipment and material within the substation that would no longer meet electrical safety standards for clearance and operation. The newly rebuilt substation design would allow for future expansion if and when deemed necessary.

6.3 Identification of Existing Utility and Public Rights-of-Way

The existing transmission line ROW and easements are located in Becker County, generally along the east 80 feet of a portion of the west half of Section 35, Township 138, Range 42, adjacent to the west edge of St Mary's of the Lakes road ROW. Specifically, on properties owned by Robert Lindblad, PID 170400000 and Joseph Thurman, PID 170401000 (**Figure 4-1**). The proposed transmission line alignment will run approximately 10 – 15 feet west of, and parallel to, the existing 41.6 kV line ROW for the majority of its length (**Figure 4-2**). This minor modification of the easement centerline is necessary to allow for the safe construction of the new line with the existing line remaining energized because the co-op does not have the ability to back feed at the substation. Without the ability to back feed, taking an outage on the existing line would result in loss of power to co-op members served by the substation. The new line needs to be placed to the west of the existing line because there is insufficient space between the existing line and St. Mary's of the Lakes Road, east of the line.

6.4 Transmission Line Right-of-Way Acquisition Procedures

To account for the additional area taken up by the new alignment, Great River Energy will work with land owners to acquire the additional easements needed. Great River Energy will then use the existing easements, together with those to be acquired, for the entire length of the Project.

It is possible that preliminary discussions with landowners will occur and easement options may be acquired prior to issuance of a route permit.

Land rights acquisition includes acquisition of a permanent easement for the transmission line. As a general practice, landowners will be contacted with a request to meet in-person. A request to

meet to discuss and provide information on the easements and share the Project details with the property owner(s) has been sent by U.S. mail but, to date, no response has been received.

During the acquisition phase of the Project, landowners are given a copy of the route permit (or a copy will be provided once available), the transmission line easement, offer of compensation, and information on the Project schedule, construction practices, vegetation removal, and damage settlement. Additional information may also be given to each landowner that shows preliminary pole placement (if available at that time), structure design or photos, and power line safety.

In addition to permanent easements necessary for the construction of the line, marshalling yard agreements may be obtained from certain landowners for temporary construction or staging areas for temporary storage of poles, vehicles, or other related items. Landowners will be notified in the event site access for soil boring is required to determine soil suitability in areas where certain soil characteristics may require special transmission structure design.

If a negotiated agreement to an easement cannot be reached, Great River Energy has the power of eminent domain to obtain the necessary easement by Minnesota Statutes Chapter 117. In eminent domain, the landowner has the authority to have compensation for the easement determined by impartial commissioners through a court process that is initiated by Great River Energy.

6.5 Construction Procedures

Procedures to be used for construction of the transmission line are discussed below. Equipment used in the construction process includes backhoes, cranes, boom trucks and assorted small vehicles.

After land rights have been secured, landowners will be notified prior to the start of the construction phase of the Project, including an update on the Project schedule and other related construction activities.

The first phase of construction activities will involve survey staking of the transmission line centerline and/or pole locations, followed by removal of trees and other vegetation from the ROW. As a general practice, low-growing brush or tree species are allowable at the outer limits of the easement area. Taller tree species that endanger the safe and reliable operation of the transmission facility will be removed. In developed areas and 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 easement area, as agreed to during easement negotiations.

The National Electrical Safety Code (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 (“danger trees”) will be removed or trimmed to eliminate the hazard as shown in **Figure 6-1**, as allowed by the terms in the easement that is acquired. Danger trees generally are those that are dead, diseased, weak or leaning towards the energized conductors. In special circumstances, tree trimming agreements may be possible to minimize tree removal based on negotiations with individual landowners.

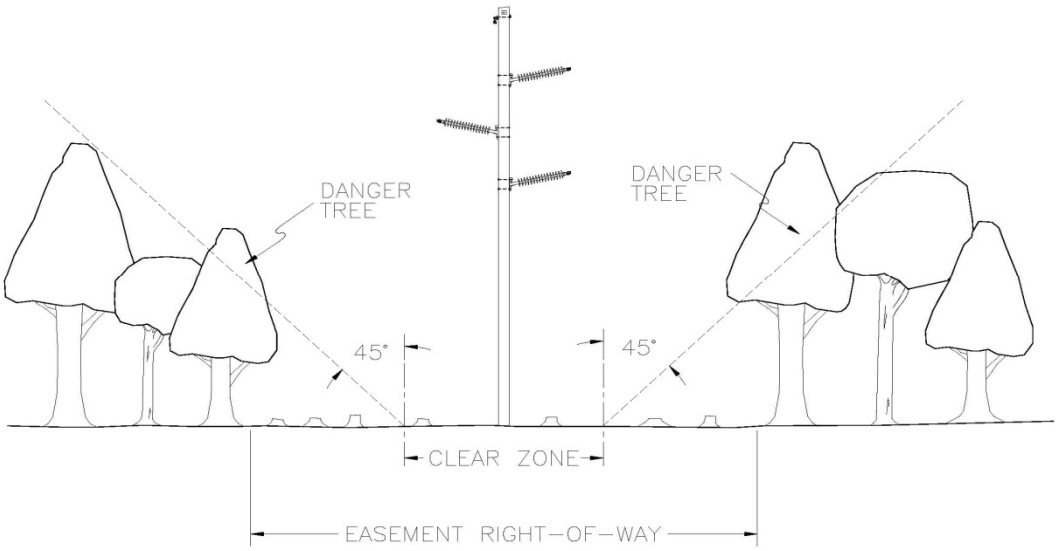
All materials resulting from clearing operations will either be chipped on site and spread on the ROW, stacked in the ROW for use by the property owner, or removed and disposed of otherwise as agreed to with the property owner during easement negotiations.

The final survey staking of pole locations may again occur after the vegetation has been removed and just prior to structure installation.

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

If temporary removal or relocation of fences is necessary, installation of temporary or permanent gates would be coordinated with the landowner. Depending on the timing of construction, the ROW agent may work with the property owner for early harvest of crops, where possible, with compensation to be paid for any actual crop losses. During the construction process, it may be necessary for the property owner to remove or relocate equipment and livestock from the ROW. Compensation related to these activities will be discussed with the landowner during easement negotiations.

Figure 6-1. Standard Tree Removal Practices



Transmission line structures are generally designed for installation at existing grades. Therefore, structure sites will not be graded or leveled unless it is necessary to provide a reasonably level area for construction access and activities. For example, if vehicle or installation equipment cannot safely access or perform construction operations properly near the structure, minor grading of the immediate terrain may be necessary.

Great River Energy will employ standard construction and mitigation practices that were developed from experience with past projects as well as industry-specific Best Management Practices (BMPs). BMPs address ROW clearing, erecting transmission line structures and stringing transmission lines. BMPs for each specific project are based on the proposed schedules for activities, prohibitions, maintenance guidelines, inspection procedures and other practices. In some cases these activities, such as schedules, are modified to incorporate BMP installation that will assist in minimizing impacts to sensitive environments. Any contractors involved in construction of the transmission line will adhere to these BMP requirements.

New structures, including the interconnecting switch structure, will be installed directly in the ground, by augering or excavating a hole typically 8 to 15 feet deep and 2 to 5 feet in diameter for each pole. Any 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.

The new structures will then be set and the holes back-filled with the excavated material, native soil, or crushed rock. Based on typical soil types in Minnesota, it is anticipated that the average structure depth of a standard 70-foot long pole would be approximately 9 feet deep. In poor soil conditions (peat, marl, soft clay or loose sand), and on structures requiring increased foundation strength (such as laminated wood switch structures), a galvanized steel culvert is sometimes installed vertically with the structure set inside. Concrete foundations may be necessary in special cases. Drilled pier foundations may vary from 4 to 8 feet in diameter. Concrete trucks are normally used to bring the concrete in from a local concrete batch plant.

After a number of new structures have been erected, Great River Energy will begin to install the new static wire by establishing stringing setup areas within the ROW. These stringing setup areas are usually located every two miles along a project route and occupy approximately 15,000 square feet of land. 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 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.

The proposed transmission line will not cross wetlands or waters.

6.6 Restoration Procedures

During construction, limited ground disturbance at the structure sites will occur. Marshalling yard agreements will be obtained from property owner(s) or agency (ies) for temporary storage of materials and equipment. Typically, a previously-disturbed or developed area is used, and includes sufficient space to lay down material and pre-assemble some structural components or hardware and store construction equipment. Portions of the ROW or property immediately adjacent to the ROW may be used for structure laydown and framing prior to structure installation. Additionally, stringing setup areas are used to store conductors and equipment necessary for stringing operations. Disturbed areas are restored to their original condition to the maximum extent practicable, or as negotiated with the landowner.

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. In cases where soil compaction has occurred, the construction crew or a restoration contractor uses various methods to alleviate the compaction, or as negotiated with landowners.

The ROW agent will contact landowners after construction is complete to determine if the clean-up measures have been to their satisfaction and if any other damage may have occurred. If damage has occurred to crops, fences or the property, Great River Energy will compensate the landowner. In some cases, an outside contractor may be hired to restore the damaged property as near as possible to its original condition.

6.7 Operation and Maintenance

Access to the ROW 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. Generally, Great River Energy will inspect the transmission line once per year. Inspections will be limited to the ROW and to areas where off-ROW access is required due to ROW obstructions or terrain impediments. If problems are found during inspection, repairs will be performed and property restoration will occur or the landowner will be provided reasonable compensation for any damage to the property.

The ROW will be managed to remove vegetation that interferes with the operation and maintenance of the transmission line. Native shrubs that will not interfere with the safe operation or accessing and traversing the ROW of the transmission line will be allowed to reestablish in the ROW. Great River Energy's practice generally provides for the inspection of 115 kV transmission lines every three years to determine if clearing is required. ROW clearing practices include a combination of mechanical and hand clearing, along with herbicide application (where allowed), to remove or control vegetation growth.

The estimated annual cost of ROW maintenance and operation and maintenance of Great River Energy's transmission lines (69 kV to 500 kV) in Minnesota currently average about $2,000 per mile. Actual transmission line specific maintenance costs will depend on the environmental setting, the amount of vegetation management necessary, storm damage occurrences, structure types, age of the line, etc.

6.8 Electric and Magnetic Fields (EMF)

As it pertains to the Project, the term "EMF" refers to the extremely low frequency (ELF) decoupled electric and magnetic fields that are present around any electrical device or conductor and can occur indoors or outdoors. Electric fields are the result of electric charge, or voltage, on a conductor. The intensity of an electric field is related to the magnitude of the voltage on the conductor. Magnetic fields are the result of the flow of electricity, or current, traveling through a conductor. The intensity of a magnetic field is related to magnitude of the current flow through the conductor. Electric and magnetic fields can be found in association with transmission lines, local

distribution lines, substation transformers, household electrical wiring, and common household appliances.

6.8.1 Electric Fields

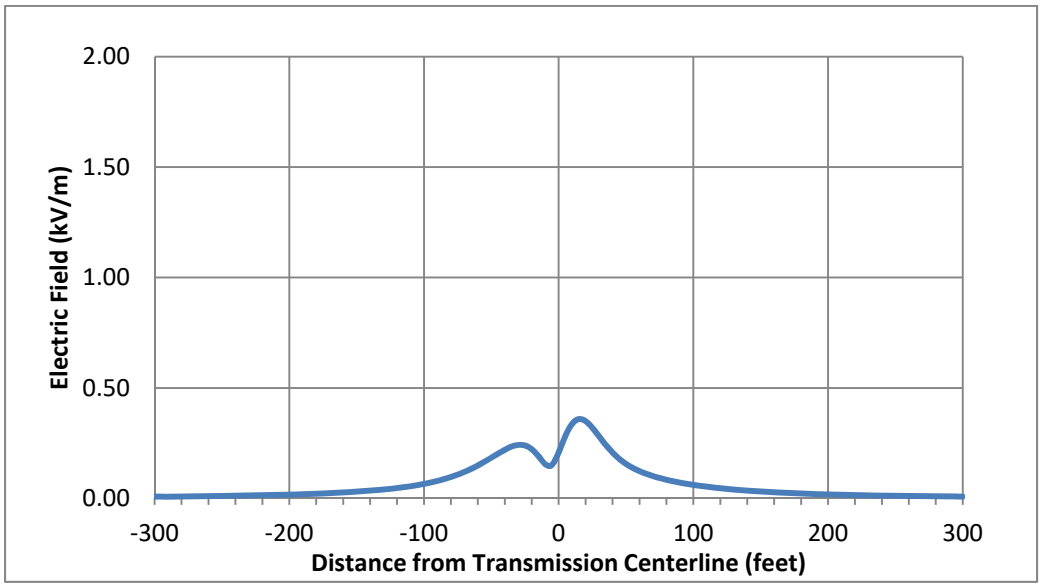
Voltage on a wire produces an electric field in the area surrounding the wire. The voltage on the conductors of a transmission line generates an electric field extending from the energized conductors. The intensity of transmission line electric fields is measured in kilovolts per meter (kV/m), and the magnitude of the electric field rapidly decreases with distance from the transmission line conductors. The presence of trees, buildings, or other solid structures in the path of the field can also significantly reduce the magnitude of the electric field. Because the magnitude of the voltage on a transmission line is near-constant (ideally within ±5 percent of nominal), the magnitude of the electric field will be near-constant regardless of the power flowing on the line.

Although there is no state or federal standard for transmission line electric field exposures, the Environmental Quality Board (EQB) developed a standard of a maximum electric field limit of 8 kV/m at one meter above ground. This standard has been adopted by the Commission. Great River Energy has calculated the approximate electric field for the Project's transmission configuration and estimates the peak magnitude of electric field density to be well below the EQB standard at approximately 0.36 kV/m underneath the conductors, one meter (3.28 feet) above ground. **Table 6-1** summarizes the electric fields calculated for the proposed single circuit transmission line with distribution underbuild. These electric field calculations are also shown graphically in **Figure 6-2**.

Table 6-1. Calculated Electric Fields (kV/M) for Proposed Transmission Line Design (One meter (3.28 feet) above ground)

Scenario	Max. Operating Voltage (kV)	Distance to Proposed Centerline										
		-300'	-200'	-100'	-50'	-25'	0' Max.	25'	50'	100'	200'	300'
115 kV Single Circuit, with Distribution Underbuild (**Figure 6-2**)	121	0.01	0.02	0.07	0.19	0.24	0.36	.32	.16	.06	0.02	0.01

Figure 6-2. Proposed Transmission Line Design Electric Field Profile



Induced Voltage

When an electric field reaches a nearby conductive object, such as a vehicle or a metal fence, it can induce a voltage on the object. Typically lines 200 kV and above are at greater risk for induction than 115 kV transmission lines. The presence of the distribution line immediately under the transmission line will act as a collector of any induced voltage and will be designed with grounding and insulation to account for any induced voltage from the transmission line. 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. If the 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. To ensure the safety of persons in the proximity of high voltage transmission lines, the NESC requires that any discharge be less than five (5) milliAmperes root mean square (mA rms). Great River Energy 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 5 mA rms NESC limit.

Implantable Medical Devices

High intensity EMF can have adverse impacts on the operation of implantable medical devices (IMDs) such as pacemakers and defibrillators. While research has shown that the magnetic fields associated with high voltage transmission lines do not reach levels at which they could cause interference with such devices, it is possible that the electric fields associated with some high

voltage transmission lines could reach levels high enough to induce sufficient body currents to cause interference.

Modern "bipolar" cardiac devices are much less susceptible to interactions with electric fields. Medtronic and Guidant, manufacturers of pacemakers and other IMDs, have indicated that electric fields below 6 kV/m are unlikely to cause interactions affecting operation of most of their devices. **Table 6-1** and **Figure 6-2** show that the electric fields for the Project are well below levels at which modern bipolar devices are susceptible to interaction with the fields.

The older "unipolar" designs of cardiac devices are more susceptible to interference from electric fields. Research from the early 1990s indicates that the earliest evidence of interference with these types of IMDs could occur in electric fields ranging from 1.2 to 1.7 kV/meter. (The Project is calculated at 0.36 kV/m.) For older style unipolar designs, the electric fields usually exceed levels that research from the 1990s has indicated may produce interference. However, recent research conducted in 2005 concluded that the risk of interference to unipolar cardiac devices from high voltage power lines in everyday life is small. In 2007, Minnesota Power and Xcel Energy conducted studies with Medtronic, Inc. under 115 kV, 230 kV, 345 kV, and 500 kV transmission lines to confirm these 2005 findings. The analysis was based on real life public exposure levels under actual transmission lines in Minnesota and found no adverse interaction with pacemakers or IMDs. The analysis concluded that although interference may be possible in unique situations, device interference as a result of typical public exposure would be rare.[2]

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 would return to its normal operation when the person moves away from the source of the interference.

6.8.2 Magnetic Fields

Current passing through any conductor, including a wire, produces a magnetic field in the area around the wire. The current flowing through the conductors of a transmission line generates a magnetic field that, in similar fashion to the electric field, extends outward from the energized conductors. The intensity of the magnetic field associated with a transmission line is proportional to the amount of current flowing through the line's conductors, and the magnitude of the magnetic field rapidly decreases with the distance from the conductors. Unlike electric fields, magnetic fields are not significantly affected by the presence of trees, buildings, or other solid structures nearby. The value of the magnetic field density is expressed in the unit of gauss (G) or milligauss (mG).

There are no federal or Minnesota exposure standards for magnetic fields. The EQB and the Commission 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. Recent studies of the

[2] 2007 Minnesota Power Systems Conference Proceedings (University of Minnesota), *Electromagnetic Compatibility of Active Implantable Medical Devices (AIMD) and Their Interaction with High Voltage Power Lines*, at 23.

health effects from magnetic fields conclude that the evidence of health risk is weak.[3] The general standard is one of prudent avoidance.

Magnetic field levels associated with some common electric appliances provided in **Table 6-2.**

Table 6-2. Magnetic Fields of Common Electric Appliances (mG) [4]

Appliance	Distance from Source		
	6 inches	1 foot	2 feet
Hair Dryer	300	1	--
Electric Shaver	100	20	--
Can Opener	600	150	20
Electric Stove	30	8	2
Television	NA	7	2
Portable Heater	100	20	4
Vacuum Cleaner	300	60	10
Copy Machine	90	20	7
Computer	14	5	2

Table 6-3 summarizes the magnetic fields calculated for the proposed transmission line configuration with power flow at peak loading and at average loading. The magnetic field calculations are also shown graphically in **Figure 6-3.** The maximum magnetic field under expected peak demand conditions is 12.97 mG, which is below most of the levels shown in **Table 6-2**.

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.

[3] Minnesota Department of Health. *EMF White Paper on Electric and Magnetic Field* (EMF) Policy and Mitigation Options. 2002; National Research Council. *Possible Health Effects of Exposure to Residential Electric and Magnetic Fields*. 1997; www.niehs.nih.gov/health/topics/agents/emf/.

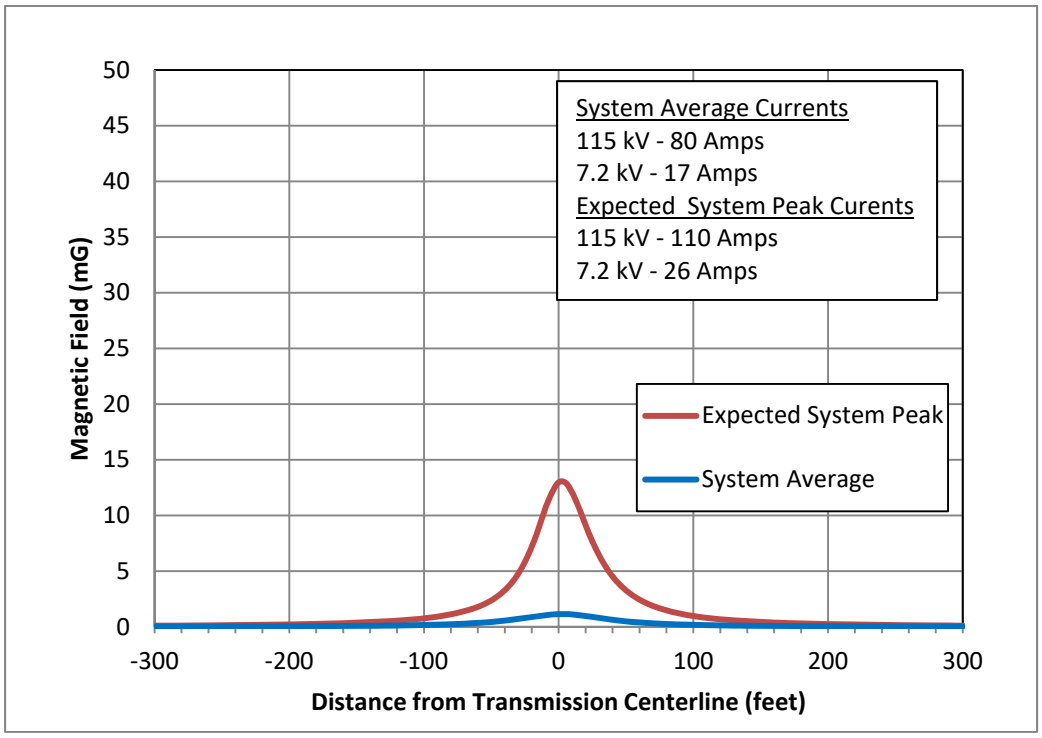
[4] *EMF In Your Environment* (EPA 1992)

Table 6-3. Calculated Magnetic Fields (mG) for Proposed Transmission Line Design

(One meter (3.28 feet) above ground)

Scenario	Max. Operating Voltage (kV)	Line Current (Amps)	Distance to Proposed Centerline									
			-300'	-200'	-100'	-50'	-25'	0' Max.	25'	50'	100'	200'	300'
115 kV Single Circuit Line with Distribution Underbuild Peak Load (**Figure 6-3**)	121	46	.10	0.22	0.76	2.37	5.84	12.97	7.68	3.27	0.97	0.25	0.11
115 kV Single Circuit Line with Distribution Underbuild Average Load (**Figure 6-3**)	121	18	0.02	0.05	0.16	.44	0.79	1.15	0.89	0.49	0.18	0.05	0.02

Figure 6-3. Proposed Transmission Line Design Magnetic Field Profile



6.9 Stray Voltage

"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.

Transmission lines 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. Typically lines 200 kV and above are at greater risk for induction than 115 kV transmission lines. The presence of the distribution line immediately under the transmission line will act as a collector of any induced voltage and will be designed with grounding and insulation to account for any induced voltage from the transmission line. If a landowner has stray voltage concerns on their property, Great River Energy suggests they contact their electric service provider to discuss the situation with technical staff, including the possibility of an on-site investigation.

6.10 Corona

Under certain conditions, the localized electric fields near an energized transmission line conductor can produce small electric discharges, ionizing nearby air. This is commonly referred to as the "corona" effect. Most often, corona formation is related to some sort of irregularities on the conductor, such as scratches or nicks, dust buildup, or water droplets. The air ionization caused by corona discharges can result in the formation of audible noise and radio frequency noise. If the discharges are excessive, the audible noise can reach annoyance levels and the radio frequency discharges can cause interference with radio and television reception. The potential for radio and television signal interference; however, is largely dependent on the magnitude of the corona-induced radio frequency noise *relative to* the strength of the broadcast signals.

Corona formation is a function of the conductor radius, surface condition, line geometry, weather condition, and most importantly, the line's operating voltage. Corona-induced audible noise and radio and television interference are typically not a concern for power lines with operating voltages below 161 kV, because the electric field intensity is too low to produce significant corona. The expected electric field intensity due to the proposed transmission line is provided in **Section 6.8.1**.

6.10.1 Radio and Television Interference

Because the likelihood of significant corona formation on the proposed 115 kV line is minimal, the likelihood of radio and television interference due to corona discharges associated with the Project is also minimal. Great River Energy is unaware of any complaints related to radio or television interference resulting from the operation of its existing 115 kV facilities and does not expect radio and television interference to be an issue along the proposed route.

6.10.2 Audible Noise

Transmission lines can cause audible noise due to corona discharges from the conductors. This noise, which resembles a crackling sound, is typically only within the threshold of human hearing during rainy or foggy conditions, and even then is largely imperceptible due to background noise.

The impacts and mitigation of audible noise due to the Project are discussed further in **Section 7.2.3**.

6.10.3 Ozone and Nitrogen Oxide Emissions

In addition to potentially causing audible and radio frequency noise, corona can also produce ozone and oxides of nitrogen in the air surrounding the conductor. Ozone is a very reactive form of oxygen molecule that combines readily with other elements and compounds in the atmosphere, making it relatively short lived. Ozone forms naturally in the lower atmosphere from lightning discharges and from reactions between solar ultraviolet radiation and air pollutants such as hydrocarbons from auto emissions. The natural production rate of ozone is directly proportional to temperature and sunlight, and inversely proportional to humidity. Thus the conditions that are most likely to cause corona formation on a transmission line – humid, rainy, or foggy conditions – actually inhibit the production of ozone.

Like audible and radio frequency noise, corona-induced ozone and nitrogen oxides are typically not a concern for power lines with operating voltages below 161 kV, because the electric field intensity is too low to produce significant corona. Therefore, Great River Energy expects ozone and nitrogen oxide concentrations associated with the Project to be negligible, and well below all federal standards (nitrogen dioxide – 100 parts per billion as one hour average, 53 parts per billion as annual average; ozone 75 parts per billion as 8-hour average).

7 ENVIRONMENTAL ANALYSIS OF ROUTE

This portion of the Application provides a description of the land use and environmental resources in the Project area, potential impacts, and proposed mitigative measures.

The name of each owner whose property is within the proposed route is provided in **Appendix C.**

The Project has been reviewed by a number of state and federal agencies. All environmental review correspondence related to the proposed Project is provided in **Appendix D.**

7.1 Environmental Setting

The Project lies in the Hardwood Hills Subsection of the Eastern Broadleaf Forest Province, according to the DNR Ecological Classification System.

The Eastern Broadleaf Forest Province serves as a transition, or ecotone, between semi-arid portions of the state that were historically prairie and semi-humid mixed conifer-deciduous forests to the northeast. The landscape consists of rugged to hummocky moraines deposited along the eastern margin of the Des Moines ice lobe during the last glaciation. Another quarter of the area consists of rolling till or basal till deposited as drumlins. Small sand plains occur locally within the moraines.

The Hardwood Hills Subsection has ice stagnation moraines, end moraines, ground moraines, and outwash plains as major landforms. Kettle lakes are numerous, both on moraine and outwash deposits. Parent material is primarily calcareous glacial till and outwash sediments. The glacial till is calcareous loamy sediment deposited by the last major glaciation.

The environmental setting of the Project area (within a couple miles of the proposed route) includes hydrologic features such as rivers, creeks, lakes, wetlands and riparian areas. The physiographic features (topography, soils, geology and farmland) are typical of this area and do not preclude development of this Project.

Land use along the proposed route is primarily a low voltage transmission line and substation on agricultural land/grassland, with two small bands of forest and shrub land. One residence is within 350 feet of the Project (PID 170401001). There are also five residences (PID 170403000, 170403001, 170403002, 171075000, 170298002), a church compound with a parsonage (PID 177019000), and one machine shed (PID 170397000) within 1,000 feet of the proposed Project (**Appendix B**). The closest communities to the Project include the cities of Detroit Lakes, Audubon, Frazee and Pelican Rapids (**Figure 1-3**).

There are two existing transmission lines within the Project area. The line to the north is the LR-CF 115 kV Transmission Line (**Figure 1-4**), with an average height above ground of 70 feet and an average span length of 700 feet. The only anticipated modifications to this line are the switch and grading structures result of the proposed Project. The other line is the LR-LET 41.6 kV line

on the proposed ROW has an average height above ground of 45 feet and an average span length of 260 feet. The poles will be leaned and kept in service during construction. Once the proposed 115 kV line is operational, approximately 3.65 miles of the 41.6 kV line will be removed. Approximately, 6.59 miles will be retained by Lake Region Electrical Cooperative for distribution purposes.

7.2 Human Settlement

7.2.1 Public Health and Safety

Proper safeguards would be implemented for construction and operation of the transmission facilities. The Project will be designed in compliance with local, state, NESC, and Great River Energy standards regarding clearance to the ground, clearance to crossing utilities, strength of materials and ROW widths. Construction crews and/or contract crews will comply with local, state, and NESC standards regarding installation of facilities and standard construction practices. Great River Energy's established safety procedures, as well as industry safety procedures, will be followed during and after installation of the transmission line, including clear signage during all construction. Lake Eunice Substation will be equipped with breakers and relays located where the transmission line will connect to the substation. The protective equipment is designed to de-energize the transmission line should such an event occur.

Electric and Magnetic Fields

Considerable research has been conducted since the 1970s to determine whether exposure to power-frequency, commonly referred to as "extremely-low frequency" or "ELF" (60 hertz), electric fields (EF) and magnetic fields (MF) can cause biological responses and adverse health effects. The multitude of epidemiological and toxicological studies has shown, at most, a weak association (*i.e.*, no statistically significant association) between ELF-MF exposure and health risks and no association between ELF-EF exposure and health risks.

In 1999, the National Institute of Environmental Health Sciences (NIEHS) issued its final report on "Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields" in response to the Energy Policy Act of 1992. In the report, the NIEHS concluded that the scientific evidence linking EMF exposures with health risks is weak and that this finding does not warrant aggressive regulatory concern. However, in light of the weak scientific evidence supporting some association between EMF and health effects and the fact that exposure to electricity is common in the United States, the NIEHS stated that passive regulatory action, such as providing public education on reducing exposures, is warranted.[5]

The United States Environmental Protection Agency (EPA) seems to have come to a similar conclusion about the link between adverse health effects, specifically childhood leukemia, and power-frequency EMF exposure. On its website, the EPA states:

> Many people are concerned about potential adverse health effects. Much of the research about power lines and potential health effects is inconclusive. Despite

[5] Report is available at http://www.niehs.nih.gov/health/topics/agents/emf/

> more than two decades of research to determine whether elevated EMF exposure, principally to magnetic fields, is related to an increased risk of childhood leukemia, there is still no definitive answer. The general scientific consensus is that, thus far, the evidence available is weak and is not sufficient to establish a definitive cause-effect relationship.[6]

Minnesota, California, and Wisconsin have each conducted their own literature reviews or research to examine this issue. In 2002, Minnesota formed an Interagency Working Group to evaluate the research and develop policy recommendations to protect the public health from any potential problems arising from EMF effects associated with HVTLs. The Minnesota Department of Health published the Working Group's findings in *A White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options*. The Working Group summarized its findings as follows:

> Research on the health effects of EMF has been carried out since the 1970s. Epidemiological studies have mixed results – some have shown no statistically significant association between exposure to EMF and health effects, some have shown a weak association. More recently, laboratory studies have failed to show such an association, or to establish a biological mechanism for how magnetic fields may cause cancer. A number of scientific panels convened by national and international health agencies and the United States Congress have reviewed the research carried out to date. Most researchers concluded that there is insufficient evidence to prove an association between EMF and health effects; however many of them also concluded that there is insufficient evidence to prove that EMF exposure is safe.[7]

In 2007, the World Health Organization (WHO) conducted an intensive review of the health implications of ELF-MFs. WHO concluded that "virtually all of the laboratory evidence and the mechanistic evidence fail to support a relationship between low-level ELF magnetic fields and changes in biological function or disease status."[8] Based on its review, WHO did not recommend exposure limits but provided that "[t]he best source of guidance for both exposure levels and the principles of scientific review are international guidelines."[9] The guidelines referred to by WHO are those of the International Commission on Non-Ionizing Radiation Protection (ICNIRP)[10] and the Institute of Electrical and Electronic Engineers (IEEE) exposure limit guidelines.[11] At the time WHO completed its review, the ICNIRP continuous general public exposure guideline was 833 mG and the IEEE continuous general public exposure guideline was 9,040 mG. In 2010, ICNIRP

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[6] http://www.epa.gov/radtown/power-lines.html

[7] Minnesota Department of Health. 2002. *A White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options*

[8] World Health Organization. 2007. *Environmental Health Criteria Volume No. 238 on Extremely Low Frequency Fields* at 12.

[9] *Id.* at 12-13.

[10] ICNIRP is a non-governmental organization in formal relations with WHO.

[11] *Id.*

revised its continuous general public exposure guideline to 2,000 mG. The WHO has not provided any analysis of the 2010 ICNIRP continuous general public exposure guideline to date.

Based on findings like those of the Working Group and NIEHS, the Commission has consistently found that "there is insufficient evidence to demonstrate a causal relationship between EMF exposure and any adverse human health effects."[12] This conclusion was further justified in the Route Permit proceedings for the Brookings County – Hampton 345 kV Project ("Brookings Project"). In the Brookings Project Route Permit proceedings, the Applicants (Great River Energy and Xcel Energy) and one of the intervening parties both provided expert evidence on the potential impacts of ELF-EF and ELF-MF, including the WHO findings. The ALJ in that proceeding evaluated written submissions and a day-and-a-half of testimony from the two expert witnesses. The ALJ concluded: "there is no demonstrated impact on human health and safety that is not adequately addressed by the existing State standards for [EF and MF] exposure."[13] The Commission adopted this finding on July 15, 2010.[14]

Impacts and Mitigation

No impacts to public health and safety are anticipated as a result of the Project. The Project will be designed in compliance with local, state, NESC, and Great River Energy standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials, and right-of-way widths. The converted Lake Eunice Substation will be equipped with breakers and relays located where the transmission line will connect to the substation. The protective equipment is designed to de-energize the transmission line should such an event occur.

Great River Energy will ensure that safety requirements are met during construction and operation of the facilities. Additionally, when crossing roads or railroads during stringing operations, guard structures will be utilized to eliminate traffic delays and provide safeguards for the public. With implementation of these safeguards and protective measures, no additional mitigation is proposed.

7.2.2 Displacement/Proximity of Project to Businesses and Residences

No displacement of residential homes, structures or businesses will occur as a result of this Project. The NESC and Great River Energy standards require certain clearances between transmission line structures and buildings or structures within the ROW for safe operation of the proposed transmission line. Displacement of residential homes, structures or businesses in the ROW would occur only if a transmission line alignment and design could not accomplish these necessary

[12] See, for example, *In the Matter of the Application for a HVTL Route Permit for the Tower Transmission Line Project*, Docket No. ET-2, E015/TL-06-1624, Findings of Fact, Conclusions of Law and Order Issuing a Route Permit to Minnesota Power and Great River Energy for the Tower Transmission Line Project and Associated Facilities (August 1, 2007)

[13] *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, ALJ Findings of Fact, Conclusions and Recommendation at Finding 216 (April 22, 2010 and amended April 30, 2010)

[14] *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)

clearances. Great River Energy believes the proposed Project route provides sufficient design flexibility and distances from existing homes and structures for a transmission line design that achieves the requisite clearances.

One residence and associated agricultural outbuildings (PID 170401001) are within 340 feet southwest of the Lake Eunice Substation and proposed transmission line ROW. There is also one agricultural building (PID 17039700) within 112 feet east of the proposed transmission line ROW. All other buildings are over 500 feet from the project (see detailed route maps in **Appendix B)**.

Impacts and Mitigation

No residences or businesses will be displaced by the Project. The Project will be designed in compliance with local, state, NESC, and Great River Energy standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials, and right-of-way widths.

Great River Energy will work with landowners to address alignment adjustments or pole placement, as necessary.

7.2.3 Noise

There will be some noise associated with the construction phase of the Project. In regards to the operation of the transmission line, the noise after construction should be comparable to the operation of the facilities that currently exist. The replacement transformer is proposed to be farther north of the existing transformer; however, the change may not be perceptible to residences in the area.

Because human hearing is not equally sensitive to all frequencies of sound, the most noticeable frequencies of sound are given more "weight" in most measurement schemes. The A-weighted scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA, which is the A-weighted sound level recorded in units of decibels.

A noise level change of 3 dBA is barely perceptible to human hearing. A 5 dBA change in noise level, however, is clearly noticeable. A 10 dBA change in noise level is perceived as a doubling of noise loudness, while a 20 dBA change is considered a dramatic change in loudness.

Table 7-1 shows noise levels associated with common, everyday sources.

Table 7-1. Common Noise Sources and Levels

Sound Pressure Level (dBA)	Noise Source
140	Jet Engine (at 25 meters)
130	Jet Aircraft (at 100 meters)
120	Rock and Roll Concert
110	Pneumatic Chipper
100	Jointer/Planer
90	Chainsaw
80	Heavy Truck Traffic
70	Business Office
60	Conversational Speech
50	Library
40	Bedroom
30	Secluded Woods
20	Whisper

Source: Minnesota Pollution Control Agency (2008)

The MPCA established daytime and nighttime noise standards by Noise Area Classifications (NAC) are provided in **Table 7-2**. The standards are expressed as a range of permissible dBA within a one hour period; L_{50} is the dBA that may be exceeded 50 percent of the time (30 minutes) within an hour, while L_{10} is the dBA that may be exceeded 10 percent of the time (6 minutes) within the hour.

Table 7-2. MPCA Noise Limits by Noise Area Classification (dBA)

Noise Area Classification	Daytime		Nighttime	
	L_{50}	L_{10}	L_{50}	L_{10}
1 Residential-type Land Use Activities	60	65	50	55
2 Commercial-type Land Use Activities	65	70	65	70
3 Industrial-type Land Use Activities	75	80	75	80

Land areas, such as picnic areas, churches, or commercial spaces, are assigned a NAC based on the type of activities or use occurring in the area and the sensitivity of the activities to noises. The NAC is listed in the MPCA noise regulations to distinguish the categories. Residential areas, churches, and similar type land use activities are included in NAC 1; commercial-type land use activities are included in NAC 2; and industrial-type land use activities are included in NAC 3.

Typically the most noise-sensitive receptors along transmission line routes include residences, businesses, churches, and schools. Current average noise levels in these areas are typically in the 30 to 40 dBA range and are considered acceptable for residential land use activities. Ambient noise in rural areas is commonly made up of rustling vegetation and infrequent vehicle pass-bys. Higher ambient noise levels, typically 50 to 60 dBA, will be expected near roadways, urban areas and commercial and industrial properties.

Noise Related to Construction

Construction noise is expected to occur during daytime hours as the result of heavy equipment operation and increased vehicle traffic associated with the transport of construction personnel and materials to and from the work area.

Noise Related to Substations

The substation is subject to Minnesota Noise Standards (Minnesota Rules Chapter 7030) that establishes the most stringent standard at 50 dBA. The upgraded substation would meet this limit at approximately 75 feet from the 115 kV transformer. The nearest residences is approximately 350 feet from the proposed location of the 115 kV transformer. At 350 feet, noise from the transformer would attenuate to approximately 27 dBA, which the Minnesota Pollution Control Agency describes as the level of noise in a bedroom at night ("A Guide to Noise Control in Minnesota - Acoustical Properties, Measurement, Analysis, and Regulation", MPCA, November 2015).

Noise Related to Transmission Lines

Operational noise levels produced by a 115 kV transmission line are generally less than outdoor background levels and are therefore not usually perceivable. Proper design and construction of the transmission line in accordance with industry standards will help to ensure that noise impacts are not problematic.

Transmission lines can generate a small amount of sound energy during corona activity where a small electrical discharge caused by the localized electric field near energized components and conductors ionizes the surrounding air molecules. Corona is the physical manifestation of energy loss and can transform discharge energy into very small amounts of sound, radio noise, heat, and chemical reactions of the air components. Several factors, including conductor voltage, shape and diameter, and surface irregularities such as scratches, nicks, dust, or water drops can affect a conductor's electrical surface gradient and its corona performance.

Noise emission from a transmission line occurs during certain weather conditions. In foggy, damp, or rainy weather, power lines can create a crackling sound due to the small amount of electricity ionizing the moist air near the wires. During heavy rain, the background noise level of the rain is usually greater than the noise from the transmission line. As a result, people do not normally hear noise from a transmission line during heavy rain.

The industry standard for utilities is calculated based on L_{50} and L_5 for audible noise emissions. The worst-case scenario is when the transmission line is exposed to heavy rain conditions (one

inch per hour). Anticipated noise levels for heavy rain conditions for a typical 115 kV line based on the results from the Bonneville Power Administration Corona and Field Effects Program version 3 (U.S. Department of Energy, Bonneville Power Administration (BPA), Undated) are listed in **Table 7-3**.

Table 7-3. Anticipated Transmission Line Noise Levels with Heavy Rain

L_5	L_{50}	Location
17.7 dBA	14.2 dBA	edge of right-of-way
18.8 dBA	15.3 dBA	directly under line

Impacts and Mitigation

Noise associated with construction of the Project will be temporary in nature. To mitigate noise impacts associated with construction activities, work will be limited to daytime hours between 7 a.m. and 10 p.m. weekdays. Occasionally there may be construction outside of those hours mentioned or on a weekend if Great River Energy has to work around customer schedules, line outages, or if the schedule has been significantly impacted due to permitting delays or other factors. Heavy equipment will also be equipped with sound attenuation devices such as mufflers to minimize the daytime noise levels.

Operational noise levels are expected to be well below the state noise limits, therefore no mitigation is proposed.

7.2.4 Aesthetics

Approximately 2.85 miles of the most northern portion of the existing 41.6 kV line (LR-LET Structure 161 to County Road 144 east of the city of Audubon) will be permanently removed. The first 6.59 miles of the LR-LET line north of the LR-CF line (Structures 19 through 162) will remain for distribution purposes.

The 0.80 mile of 41.6 kV line south of the LR-CF line (Structures 1 through 18) will be removed and replaced with 115 kV structures. The majority of the structures will be wood poles approximately 70 to 80 feet above ground with spans between poles ranging from 200 to 300 feet. A maximum span will be used between the structures as necessary while still keeping the conductor within the ROW under maximum blowout conditions. The ROW required for this 115 kV transmission line is 90 feet wide.

The new infrastructure will be visible in the general area of the Project. The landscape in the Project area is a mix of agricultural land, open space, rural residential, woods and utility infrastructure. The visual effect will depend largely on the perceptions of the observers across these various landscapes. The visual contrast added by the taller transmission structures (approximately 25 feet) and lines may be perceived as a visual disruption or as points of visual interest. The transmission lines that already exist in the vicinity of the proposed Project will limit the extent to which the new infrastructure is viewed as a disruption to the area's scenic integrity.

Impacts and Mitigation

To minimize impacts to the aesthetics and visual character of the Project area, Great River Energy identified a proposed route that is immediately adjacent to and overlapping an existing transmission line ROW and avoids residences and businesses.

Great River Energy will work with landowners to identify concerns related to the transmission line and aesthetics. In general, mitigation includes enhancing positive effects as well as minimizing or eliminating negative effects. Potential mitigation measures include:

- Location of structures, ROW, and other disturbed areas will be determined by considering input from landowners or land management agencies to minimize visual impacts.
- Care shall be used to preserve the natural landscape. Construction and operation shall be conducted to prevent any unnecessary destruction, scarring, or defacing of the natural surroundings in the vicinity of the work.
- Landowners will be compensated for the removal of trees and vegetation during easement negotiations.
- Structures will be placed at the maximum feasible distance from road, trail, and driveways, within limits of structure design.

7.2.5 Socioeconomic

The Project is located in Becker County in west central Minnesota.

The socioeconomic setting of the proposed Project area was evaluated on a regional basis, comparing data for the City of Detroit Lakes with average data for Becker County and the State of Minnesota. Data compiled from the 2010 and estimated 2017 U.S. Census are summarized in **Table 7-4**.

Table 7-4. Socioeconomic Characteristics within the Project Area

LOCATION	POPULATION 2010	POPULATION 2017 EST	CHANGE (%)	MEDIAN HOUSEHOLD INCOME	POPULATION BELOW POVERTY LEVEL (%)
State of Minnesota	5,303,925	5,576,606	5.8%	$65,699 (2013-2017)	9.5 (2013-2017)
Becker County	32,504	34,098	4.9%	$55,884 (2013-2017)	11.7 (2013-2017)
City of Detroit Lakes	8,702	9,216	5.5%	$38,197 (2013-2017)	19.8 (2013-2017)

Impacts and Mitigation

Impacts to social services would be unlikely because of the short-term nature of the construction project. During construction, there will be short-term positive impacts to the nearby communities. Revenue will likely increase for some local businesses, such as hotels, grocery stores, gas stations and restaurants to support utility personnel and contractors. Some materials may be purchased locally.

Long term benefits of the Project will result from the new utility infrastructure, which supports local economies and the proposed Lake Eunice Substation conversion. Because impacts to socioeconomics will be generally short-term and beneficial, no mitigation is proposed.

7.2.6 Cultural Values

Cultural values include those perceived community beliefs or attitudes in a given area, which provide a framework for community unity. The county population has a portion of the White Earth Indian Reservation; although, the majority (63.4 percent) of the reported ethnic backgrounds are European origin (German, Norwegian, and Swedish).

In 1926, Becker County's seat was renamed from Detroit to Detroit Lakes to eliminate postal mix-ups with Detroit, Michigan. The Becker County website states that recreation is very popular due to abundant lakes, streams, forest, trails, and top-notch facilities.

Cultural representation in community events appears to be more closely tied to geographic features, seasonal events, national holidays, and municipal events than to those based in ethnic heritage. Becker County is home of the WE Fest Country Music Festival, Antique Boat Show, Water Carnival, Ice Fest, Polar Fest, and numerous other events throughout the year.

Impacts and Mitigation

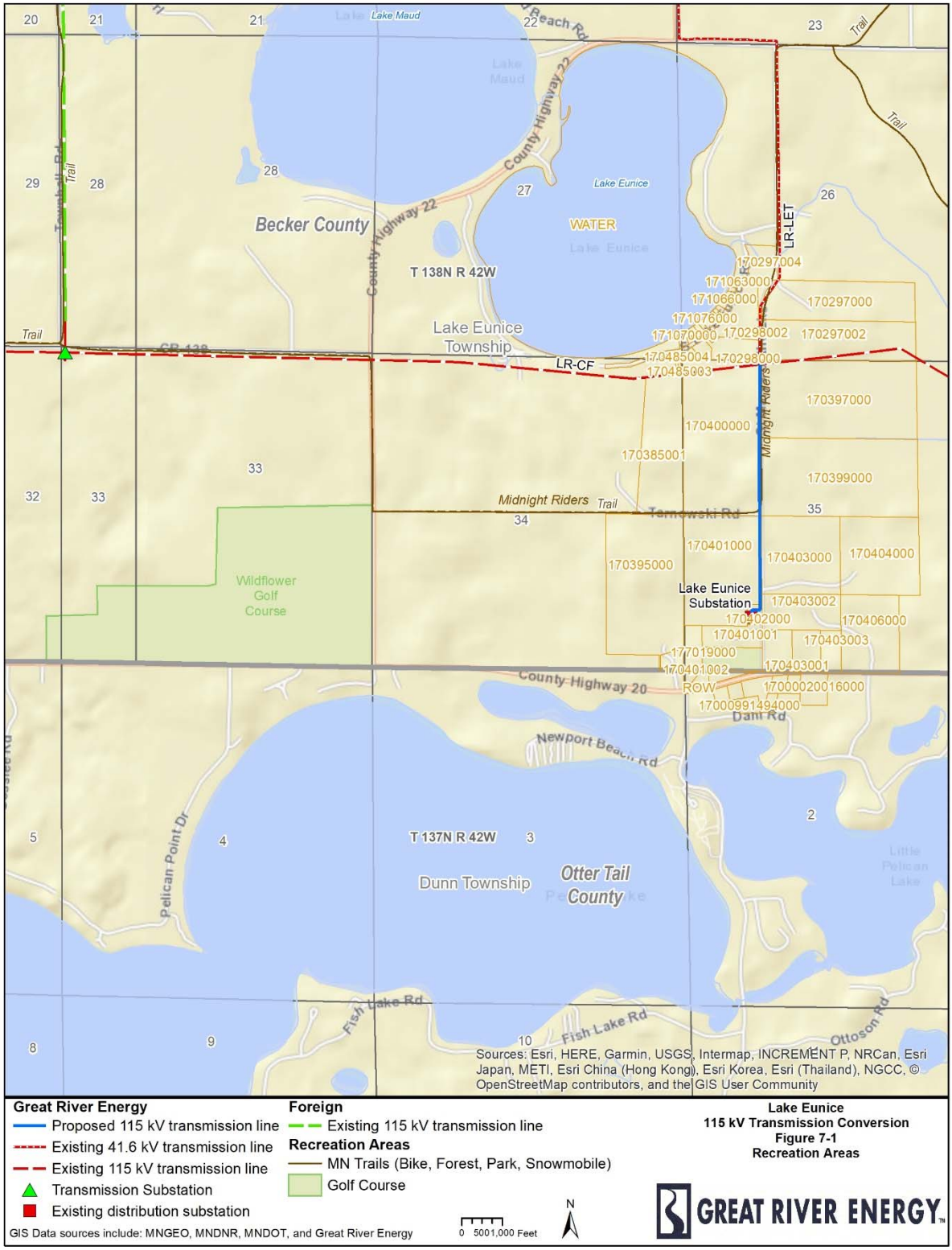
Construction of the proposed Project is not expected to conflict with the cultural values of the area, therefore no mitigation is proposed.

7.2.7 Recreation

There are a number of existing recreational resources within a couple miles of the proposed route, including trails, rivers, and lakes. Popular activities in Becker County include camping, fishing, hunting, bird watching, canoeing/kayaking, boating, swimming, biking, hiking, downhill and cross country skiing, and riding ATVs and snowmobiles.

Recreational resources near the proposed route are shown on **Figure 7-1.** The primary recreational resources in the Project area are the handful of lakes over 1,000 feet from the project; the Wildflower Golf Course approximately a mile west from the project; and the Midnite Riders Snowmobile trail on the St Marys of the Lake road ROW.

Figure 7-1. Recreation Areas



Impacts and Mitigation

No permanent impacts to local recreational activities are expected. Because no impacts to recreation are anticipated, no mitigation is proposed. The Midnite Riders Snowmobile trail is discussed in more detail in Section 7.4.3.

7.2.8 Public Services and Transportation

The Project is located in a rural area with typical public services (police, fire protection, waste collection, natural gas, wells, septic systems, cable television, electricity, telephone, etc.).

Other existing utilities, such as gas/oil pipelines and electric distribution lines, and site improvements, such as septic systems and wells, will be identified during survey activities.

The proposed route parallels (adjacent to) and overlaps the ROW of an existing transmission line and road for nearly the entire route. The majority of the proposed transmission line and poles will be located inside existing electric utility easements for the LR-LET line.

The proposed Project is over six miles southwest of the Detroit Lakes-Wething Field Airport and over seven miles southeast of the Kaiser's Airstrip Airport (**Figure 1-2**). The Pelican Rapids Municpal Report is over eight miles southwest of the project.

The Minnesota Department of Transportation (MnDOT) Office of Aeronautics was contacted[15] requesting information on the possible effects of the proposed Project on airports or airstrips in the Project area. In an email[16] dated April 23, 2019 (**Appendix D**), MnDOT indicated "[t]his project will not have any adverse impacts to Minnesota Airports."

Impacts and Mitigation

Based on the location of other existing utilities and site improvements that are identified during survey activities, the transmission line will be designed to meet or exceed required clearances and pole locations will be designed to be inside and adjacent to the existing electric utility easement. Because the route parallels and overlaps an existing electric utility ROW, no impacts to public services are anticipated and therefore no mitigation is proposed.

Temporary access for construction of the transmission line would be along the transmission line ROW. If necessary, temporary guard structures would be used to string conductor over the existing road. The structures typically consist of directly-imbedded poles with a horizontal cross piece to support the conductor at sufficient height above traffic. Temporary traffic impacts associated with equipment are material delivery and worker transportation.

Short-term localized traffic delays are anticipated. Impacts resulting from construction and operation of the proposed transmission line would be minimal for transportation.

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[15] Letter from Marsha Parlow, Great River Energy to Dan Boerner, MnDOT. March 13, 2019. *See* Appendix D.
[16] Email from Dan Boerner-MnDOT Aeronautics, to Marsha Parlow, Great River Energy. April 23, 2019. *See* Appendix D.

When appropriate, pilot vehicles will accompany the movement of heavy equipment. Traffic control barriers and warning devices will be used when appropriate. All necessary provisions will be made to conform to safety requirements for maintaining the flow of public traffic. Construction operations will be conducted to offer the least possible obstruction and inconvenience to the traveling public. The construction contractor would be required to plan and execute delivery of heavy equipment in such a manner that would avoid traffic congestion and reduce likelihood of dangerous situations along local roadways.

7.3 Land Use/Zoning

The Project area consists of a variety of land use patterns in a rural environment. Land use along the proposed route is mainly agricultural/grassland with small slivers of forestland (**Figure 7-2**).

Zoning information for the Project area is provided in **Figure 7-3**. The Project is located in the Cultivated and Deciduous Forest zoning classifications in Becker County.

Impacts and Mitigation

Impacts to land use as a result of the Project are expected to be minimal, and construction of the line would not change the possible land uses for any area. The proposed transmission line ROW will overtake the existing 41.6 kV line ROW; the major land use impacts will be tree clearing and minor agricultural impacts. No impacts to residential or commercial/industrial land uses are anticipated; therefore no mitigation is proposed.

7.4 Land-based Economies

7.4.1 Agriculture

According to the 2017 United States Department of Agriculture (USDA) Census of Agriculture, Becker County has 943 individual farms with an average farm size of 390 acres, and farmland covers 255,999 acres in the county. Over $174 million was generated from both crop and livestock sales in 2017.

Agricultural lands within the proposed route consist primarily of tilled land (2,200 linear feet) with pastureland/grassland (1,000 linear feet) (**Figure 7-2**). In total, the transmission line would cross about 3,200 feet of agricultural land (approximately 3.3 acres or half of the 90-foot ROW).

Impacts and Mitigation

Some agricultural land may be temporarily removed from production during transmission line construction, but permanent agricultural land conversion associated with the transmission line poles will be minimal.

Figure 7-2. Land Use

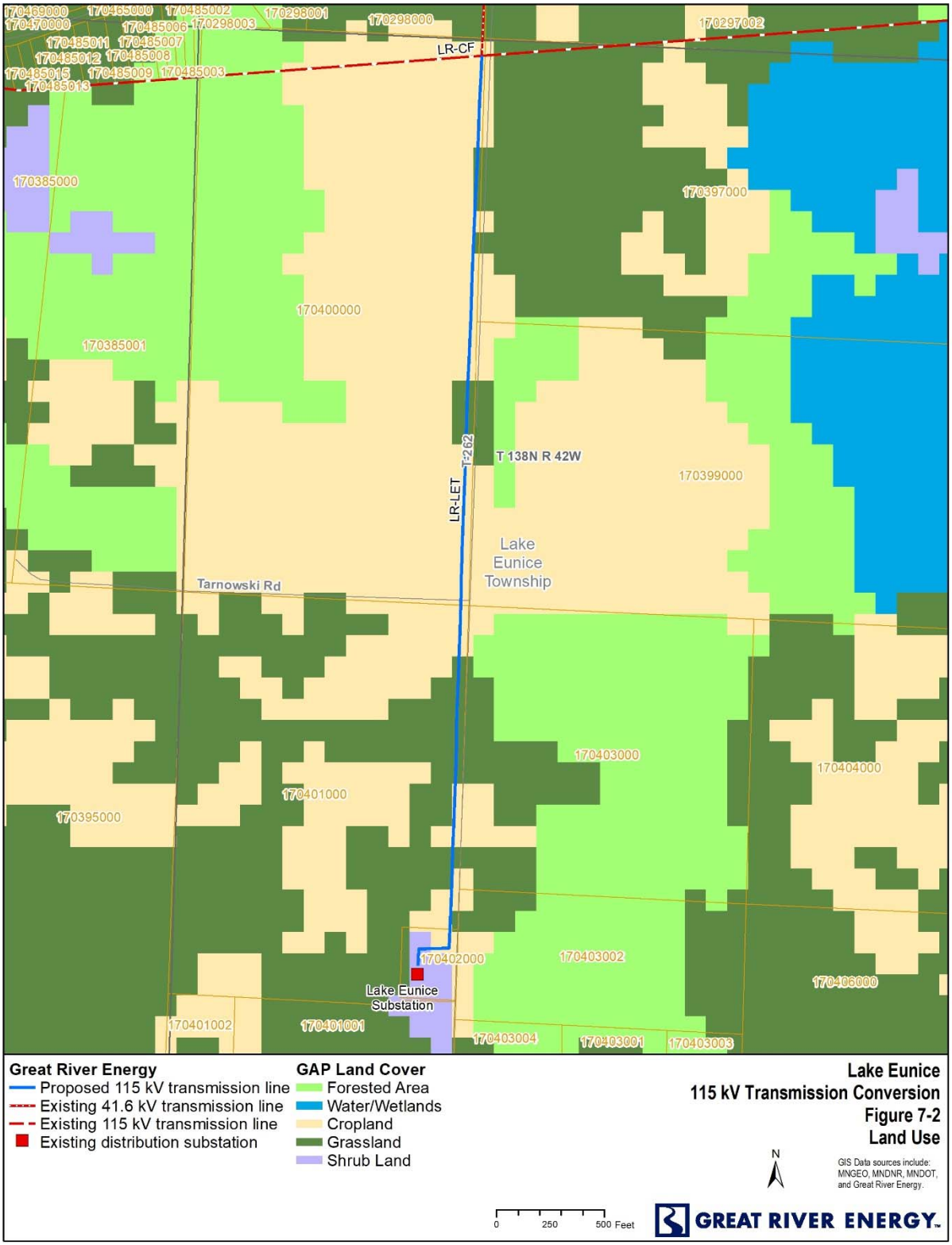
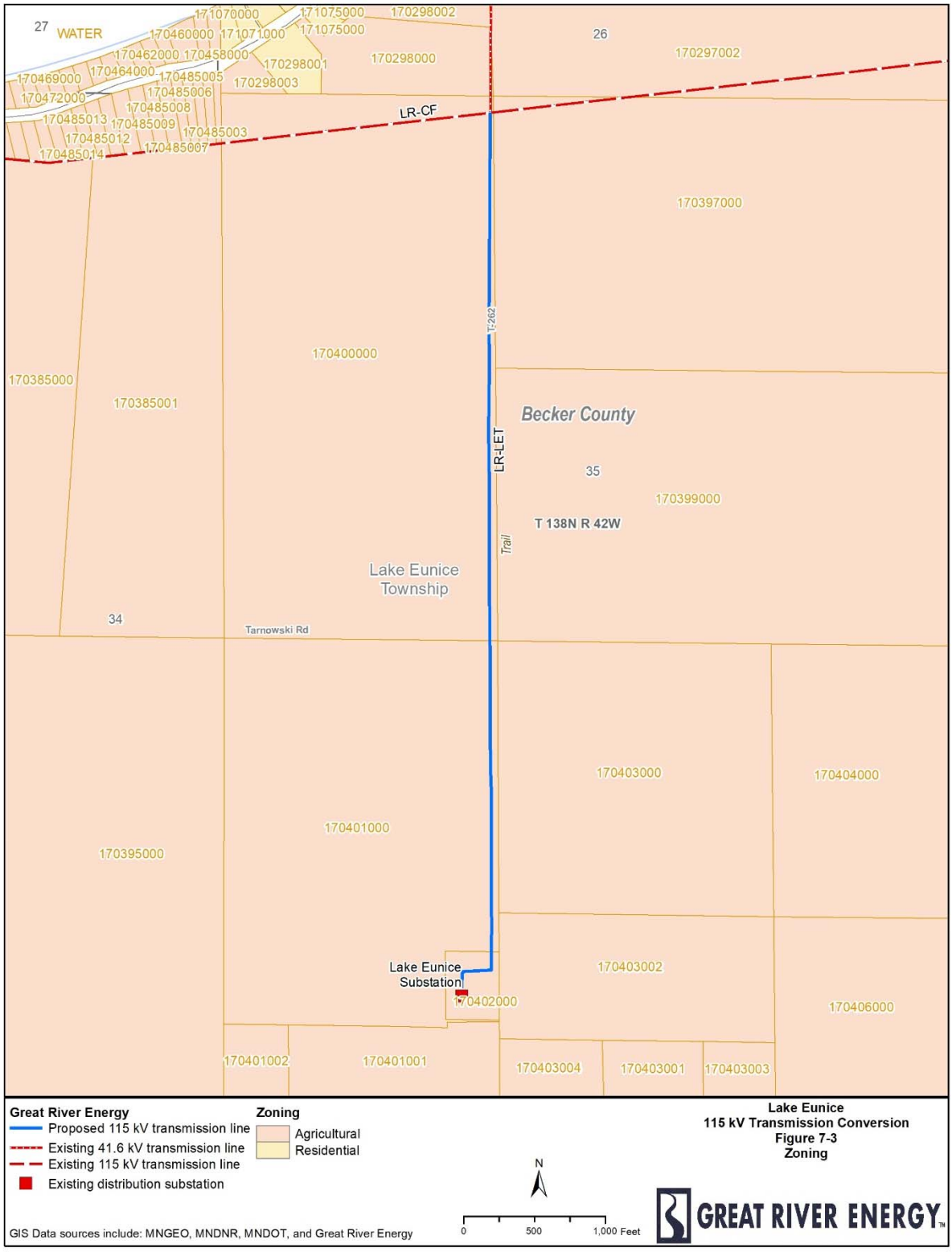


Figure 7-3. Zoning



Determination of temporary agricultural impacts that will result from construction is dependent upon final engineering design. The acreage anticipated to be included in temporary construction access points is comprised of primarily cropland in the vicinity of the proposed route. Construction of new transmission structures will require repeated access to structure locations to install the structures and to string conductor. Equipment used in the construction process includes backhoes, cranes, boom trucks and assorted small vehicles. Operation of these vehicles on adjoining farm fields can cause rutting and compaction, particularly during springtime and otherwise wet conditions.

Permanent agricultural impacts will be the footprint of the pole and the area immediately surrounding it. The poles proposed to construct the transmission line are single wood pole with distribution underbuild and single steel pole on a concrete pier. As discussed in **Section 4.2**, the proposed route for the converted 115 kV transmission line follows close to the existing LR-LET ROW and will terminate at the existing LR-CF transmission line. If it is necessary to permanently raise the LR-CF line and install new taller line structures to achieve required NESC clearances at the crossing, the new structures would most likely be monopole steel structures set on concrete pier foundations.

It is estimated that there will be twenty tangent wood structures (approximately 4 square feet of impact per pole), and one steel pole on a concrete pier (about 25 square feet of impact per pole). Total permanent agricultural impacts will vary depending on the structures used, but would be up to 105 square feet (0.002 acre). The structures would all be in the tilled portion; however, should have little impact on cultivation operations. The majority of the ROW easement would be available for agricultural activities.

Great River Energy will work with landowners to minimize impacts to all agricultural activities along the route and will compensate landowners for any crop damage and soil compaction that may occur during construction. Areas disturbed during construction will be repaired and restored to pre-construction contours as required so that all surfaces drain naturally, blend with the natural terrain and are left in a condition that will facilitate natural revegetation, provide for proper drainage and prevent erosion.

Specific mitigation measures to be implemented include:

- Movement of crews and equipment will be limited to the ROW to the greatest extent possible, including access to the route. Contractors employed by Great River Energy will limit movement on the ROW to minimize damage to agricultural land or property. If movement outside of the ROW is necessary during construction, permission will be obtained and any damage will be paid to the landowner.

- Construction will be scheduled during periods when agricultural activities will be minimally affected to the extent possible or the landowner will be compensated accordingly.

- When weather and ground conditions permit, ruts that are hazardous to agricultural operations will be repaired or compensation will be provided as an alternative if the landowner desires. Such ruts will be leveled, filled and graded or otherwise eliminated in

an approved manner. In pasture areas, compacted soils will be loosened and ruts will be leveled by scarifying, harrowing, disking, or by other approved methods. Damage to ditches, terraces, roads, and other features of the land will be corrected using approved methods and indigenous plants where necessary. The land and facilities will be restored as nearly as practicable to their original conditions.

- ROW easements will be purchased through negotiations with each landowner affected by the Project. Restoration or compensation will subsequently be made for reasonable crop damages or other property damage that occurs during construction or maintenance as negotiated.

- Fences, gates and similar improvements that are removed or damaged will be promptly repaired or replaced.

Some temporary construction space will be needed for the Project. For temporary marshalling yards, which will provide space to store material and equipment, Great River Energy will lease the space by agreement with the respective landowner(s), remove and properly dispose of all material and debris, and repair all damages and perform restoration, as necessary. It is anticipated that minimal temporary construction space on property immediately adjacent to the ROW and on private property will be needed, with the exception of limited equipment access.

7.4.2 Forestry

Becker County is about 360,000 acres forested land, much in public control including substantial private woodlands. According to county inventories, the county is composed of approximately 12 percent conifers and 70 percent hardwoods.

Forested areas in the Project area are shown on **Figure 7-2.** The transmission line will cross approximately 480 linear feet of forested land (about 4,800 additional square feet with the expansion to proposed 90-foot ROW). Forests in the Project area have routinely been logged for personal use, such as for firewood for heating, and it is expected that this practice will continue into the future.

Impacts and Mitigation

The entire width of the 90-foot ROW would need to be cleared of vegetation to ensure the safe and reliable operation of the transmission line. Mitigation measures for potential impacts to forest resources would be as follows:

- Compensation for the removal of vegetation in the ROW will be offered to landowners during easement negotiations.

- Landowners will be given the option to keep the timber cut within the easement area.

7.4.3 Tourism

Tourist destinations near the proposed route include many lakes in the area (**Figure 7-1**). The Detroit Lakes area has numerous activities for recreation. Popular activities in the area include

fishing, birding, tubing, scuba diving, boating, swimming, biking, motorcycling, hiking, golfing, skiing, ice skating, hockey, curling, snowshoeing and snowmobiles. Places to visit are resorts, flea markets, amusement parks, winery, syrup production and resorts. Historic areas, like the Lake Agassiz Regional Library provide the chance to learn about the regional and local history.

Impacts and Mitigation

The proposed route has the Midnite Riders Snowmobile Trail in the existing transmission ROW; however, temporarily impacts should be minimal and long-term impacts are not expected. The proposed route avoids all other areas that would be considered tourist destinations, and the Project would not preclude tourism activities or appreciably diminish the use or experience at tourist destinations. Although some tree clearing will be required, it will be adjacent to existing ROWs and should not affect wildlife viewing opportunities.

Great River Energy will work with the snowmobile club to limit the impacts caused by construction. As no impacts on other tourism destinations are anticipated, no mitigation is proposed.

7.4.4 Mining

Figure 7-5 shows gravel pits are west of the Project; however, **Figure 7-4** appears to show they have been abandoned. There are no other gravel pits within a mile of the project. As no impacts on mining are anticipated, no mitigation is proposed.

7.5 Archaeological and Historic Resources

A cultural resource literature review of the proposed transmission line and a one mile buffer was conducted online and at the Minnesota State Historic Preservation Office (SHPO) located at the Minnesota History Center in St. Paul, Minnesota by Merjent. Current topographic maps and aerial photographs, historic maps and documents, original land survey maps and original land patent records were examined. The archaeological and architectural site files were examined to obtain a list of all previously recorded archaeological sites and architectural properties in the Project's study area, defined as a one mile buffer around the route.

There are no previously recorded archaeological sites and no previously recorded standing historic structures within the study area (see Merjent letter in **Appendix D**). Wenck concluded that there will be no adverse impact on known or suspected cultural resources as a result of the Project.

The State Historical Preservation Office (SHPO) was contacted[17] requesting information on the possible effects of the proposed Project on historic properties in the Project area. In a letter dated April 18, 2019[18], SHPO "determined that there are no properties listed in the National or State

[17] Letter from Marsha Parlow, Great River Energy to Sarah Beimers, SHPO. March 14, 2019. Appendix D.

[18] Letter from Sarah Beimers, SHPO to Marsha Parlow, Great River Energy. April 18, 2019. Appendix D.

Registers of Historic Places, and no known or suspected archaeological properties in the area that will be affected by this project" (**Appendix D**).

Impacts and Mitigation

Because no impacts to cultural resources are anticipated, no mitigation is proposed.

If any archaeological sites are identified during placement of the poles along the permitted route, construction work will be stopped and SHPO staff consulted as to how to proceed. If human remains are encountered during construction activities, all ground disturbing activity will cease and local law enforcement will be notified per Minnesota Statute 307.08.

7.6 Natural Environment

7.6.1 Air Quality

The only potential air emissions from a transmission line result from corona, which may produce ozone and oxides of nitrogen. This can occur when the electric field intensity exceeds the breakdown strength of the air. For a 115 kV transmission line, the conductor surface gradient is typically below the air breakdown level. As such, it is unlikely that any measurable emissions would occur from the conductor surface.

Impacts and Mitigation

No impacts to air quality are anticipated due to the operation of the transmission line.

Temporary and localized air quality impacts caused by construction vehicle emissions and fugitive dust from ROW clearing and construction are expected to occur. Exhaust emissions from diesel equipment 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. Appropriate dust control measures will be implemented.

7.6.2 Water Resources

Hydrologic features in the Project area and along the proposed route are shown in **Figure 7-4**. 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 Project lies within the Otter Tail River watershed, in the south portion of the Red River Basin.[19]

[19] http://www.pca.state.mn.us/water/basins/Lake Superior/index.html (2010)

Figure 7-4. Hydrologic Features