GREAT RIVER ENERGY

APPLICATION TO THE
MINNESOTA PUBLIC UTILITIES COMMISSION
FOR A ROUTE PERMIT

PALISADE 115 KV PROJECT

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Appendix D List of Landowners within Proposed Route

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LIST OF ACRONYMS

ACRONYMS	
AC	Alternating Current
ACSR	Aluminum Conductor Steel Reinforced
ACSS	Aluminum Conductor Steel Supported
ALJ	Administrative Law Judge
BMPs	Best Management Practices
BPA	Bonneville Power Administration
Commission	Minnesota Public Utilities Commission
Corps	United States Army Corps of Engineers
CR	County Road
CSAH	County State Aid Highway
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
Enbridge	Enbridge Energy
EPA	United States Environmental Protection Agency
EQB	Minnesota Environmental Quality Board
G	Gauss
HVDC	High Voltage Direct Current
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
LGUs	Local Governmental Units
mA rms	MilliAmperes Root Mean Square
MF	Magnetic Fields
mG	Milligauss
MHS	Minnesota Historical Society
MISO	Midcontinent Independent System Operator
MLEC	Mille Lacs Energy Cooperative
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MRO	Midwest Reliability Organization
MVAR	Mega Volt Ampere Reactive
MW	Megawatt
MWh	Megawatt hours

ACRONYMS	
NAC	Noise Area Classifications
NERC	North American Electric Reliability Council
NESC	National Electrical Safety Code
NHIS	Natural Heritage Information System
NIEHS	National Institute of Environmental Health Sciences
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
Project	Palisade 115 kV Project
PWI	Public Waters Inventory
ROW	Right-of-Way
SHPO	State Historic Preservation Office
SWPPP	Stormwater Pollution Prevention Plan
TH	Trunk Highway
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WHO	World Health Organization
WMA	Wildlife Management Area

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 construct a new Rice River Breaker Station and approximately 13 miles of new overhead 115 kilovolt (kV) transmission line in Aitkin County, Minnesota (Project) to serve the proposed Enbridge Energy (Enbridge) Palisade Pump Station.

The Palisade Pump Station is located at the north end of the Project, and it is proposed to be constructed east of U.S. Highway 169 and south of 510th Lane. The Rice River Breaker Station is located at the south end of the Project, and it proposed to be constructed west of U.S. Highway 169 and south of 390th Street. The breaker station will connect to the existing Minnesota Power Cromwell to Riverton (the "13 Line") 115 kV transmission line. The 13 miles of new 115 kV transmission line will connect the breaker station to the pump station.

Great River Energy anticipates starting construction in late 2016 or early 2017 and energizing the line in late fall 2017.

1.2 Great River Energy

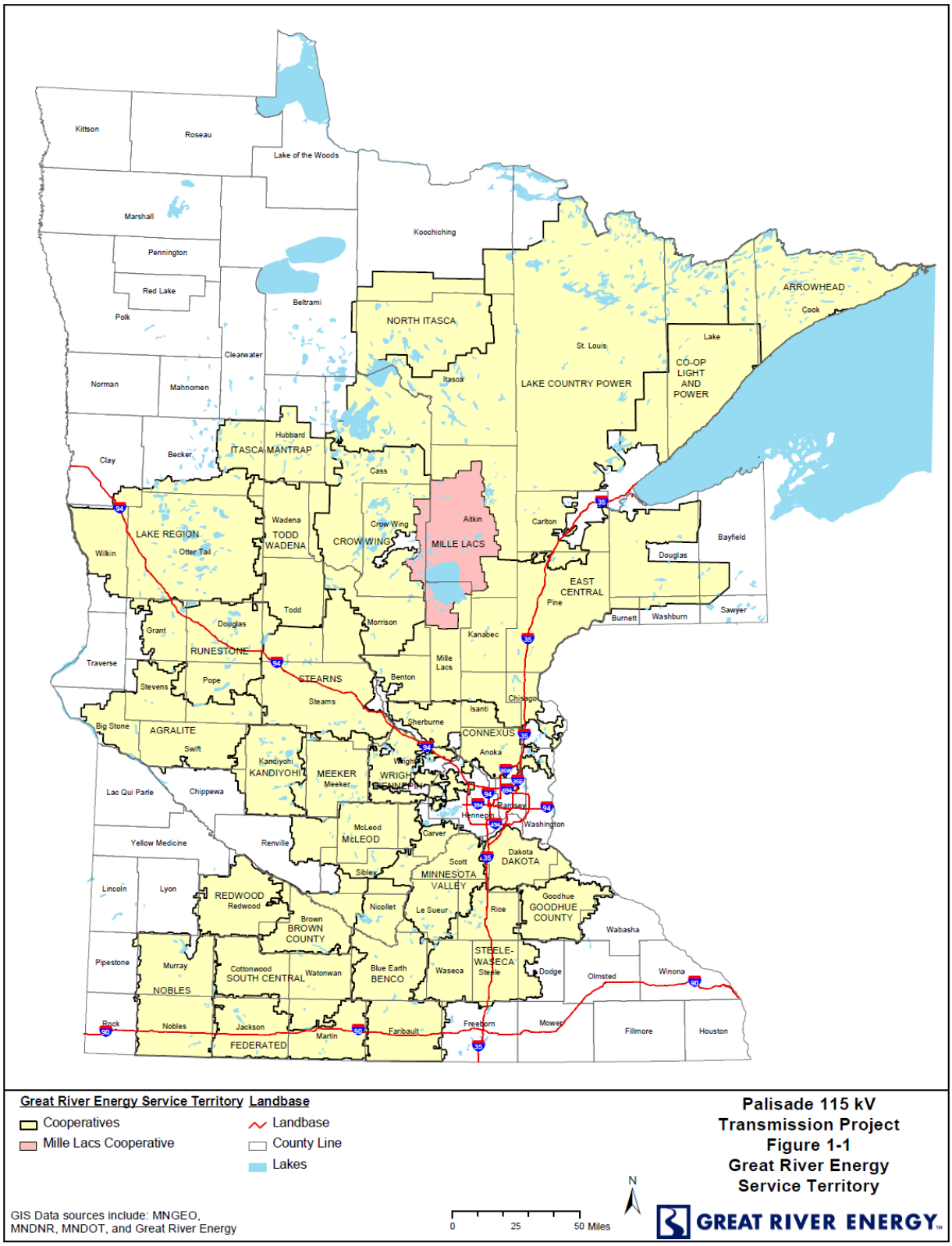
Great River Energy is a not-for-profit generation and transmission cooperative based in Maple Grove, Minnesota. Great River Energy provides electrical energy and related services to 28 member cooperatives, including Mille Lacs Energy Cooperative (MLEC), the distribution cooperative serving the area proposed to be supplied by the new transmission line (**Figure 1-1**). Great River Energy's distribution cooperatives, in turn, supply electricity and related services to more than 650,000 residential, commercial, and industrial customers in Minnesota and Wisconsin.

MLEC provides electricity and related services to approximately 14,800 residential, commercial and industrial customers in Minnesota. The Palisade Pump Station would be a new customer load for MLEC.

Great River Energy's generation system includes a mix of baseload and peaking plants totaling approximately 3,400 megawatts (MW) of capacity, including coal-fired, refuse-derived fuel, natural gas and oil plants, as well as wind generators and solar photovoltaics. Great River Energy owns approximately 4,600 miles of transmission line (69 kV – 500 kV) 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 permitting contact for the Palisade 115 kV Project is:

Mark Strohfus
Great River Energy
Environmental Project Lead
12300 Elm Creek Blvd.
Maple Grove, MN 55369
763-445-5210
mstrohfus@grenergy.com

1.4 Proposed Project

Great River Energy proposes to construct a new Rice River Breaker Station and approximately 13 miles of new 115 kV transmission line between the breaker station and Enbridge Energy's proposed Palisade Pump Station. The Palisade Pump Station is proposed to be constructed east of U.S. Highway 169 and south of 510th Lane. The Rice River Breaker Station is proposed to be constructed west of U.S. Highway 169 and south of 390th Street, and will connect to the existing Minnesota Power Cromwell to Riverton (the "13 Line") 115 kV transmission line.

The Project is needed to provide electric service to the proposed Enbridge Palisade Pump Station, which is part of the Enbridge Line 3 Replacement (L3R) Project. Enbridge submitted a Certificate of Need application to the Commission for the L3R Project on April 24, 2015 (Docket No. PL-5/CN-14-916).

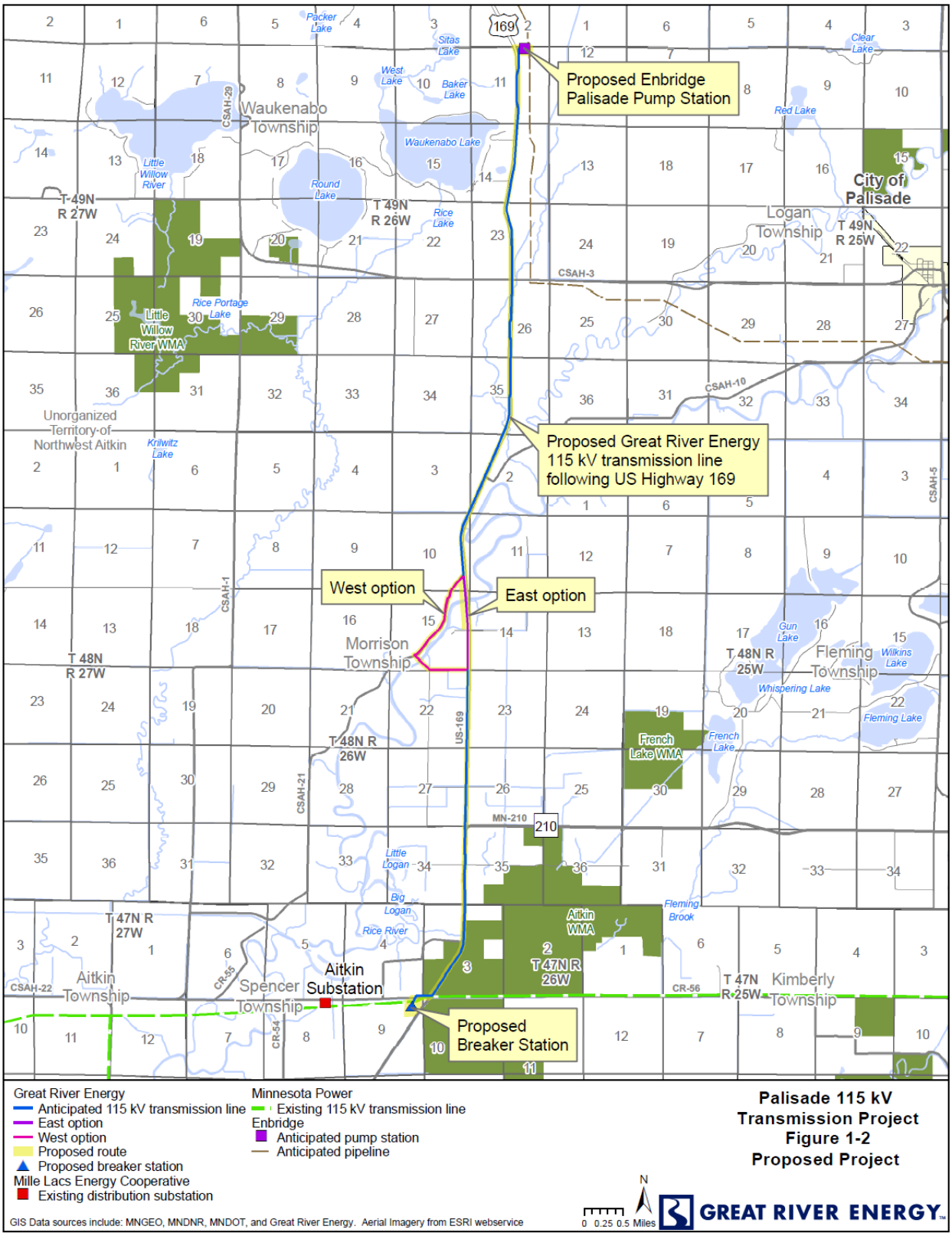
Great River Energy proposes to construct approximately 13 miles of new 115 kV transmission line. The proposed route for the transmission line is shown on **Figure 1-2**. Great River Energy is requesting approval of a general route width of 400-foot route width (200 feet either side of the transmission line). Wider route widths (to a maximum of 400 feet) are requested in some areas where alignment options are limited due to the proximity of homes and other features. Larger route areas are also requested where the pump station and breaker station will be located to accommodate design flexibility.

The proposed transmission line is located in Aitkin County, Minnesota. Single-pole wood structures with horizontal post insulators will be used for most of the transmission line. Single-pole ductile iron structures with horizontal post insulators, H-frame, laminated wood poles or steel poles may be required in some locations (e.g., to cross over a river, to cross under an existing line, for angles poles, or in areas where soil conditions are poor and guying is not practical). Typical pole heights will range from 60 to 90 feet above ground and spans between poles will range from 275 to 450 feet. Some segments of the transmission line will carry distribution line underbuild.

Great River Energy will acquire easements for the new 115 kV transmission line from each impacted landowner.

The Project will cost approximately $13 million dollars.

Figure 1-2. Proposed Project

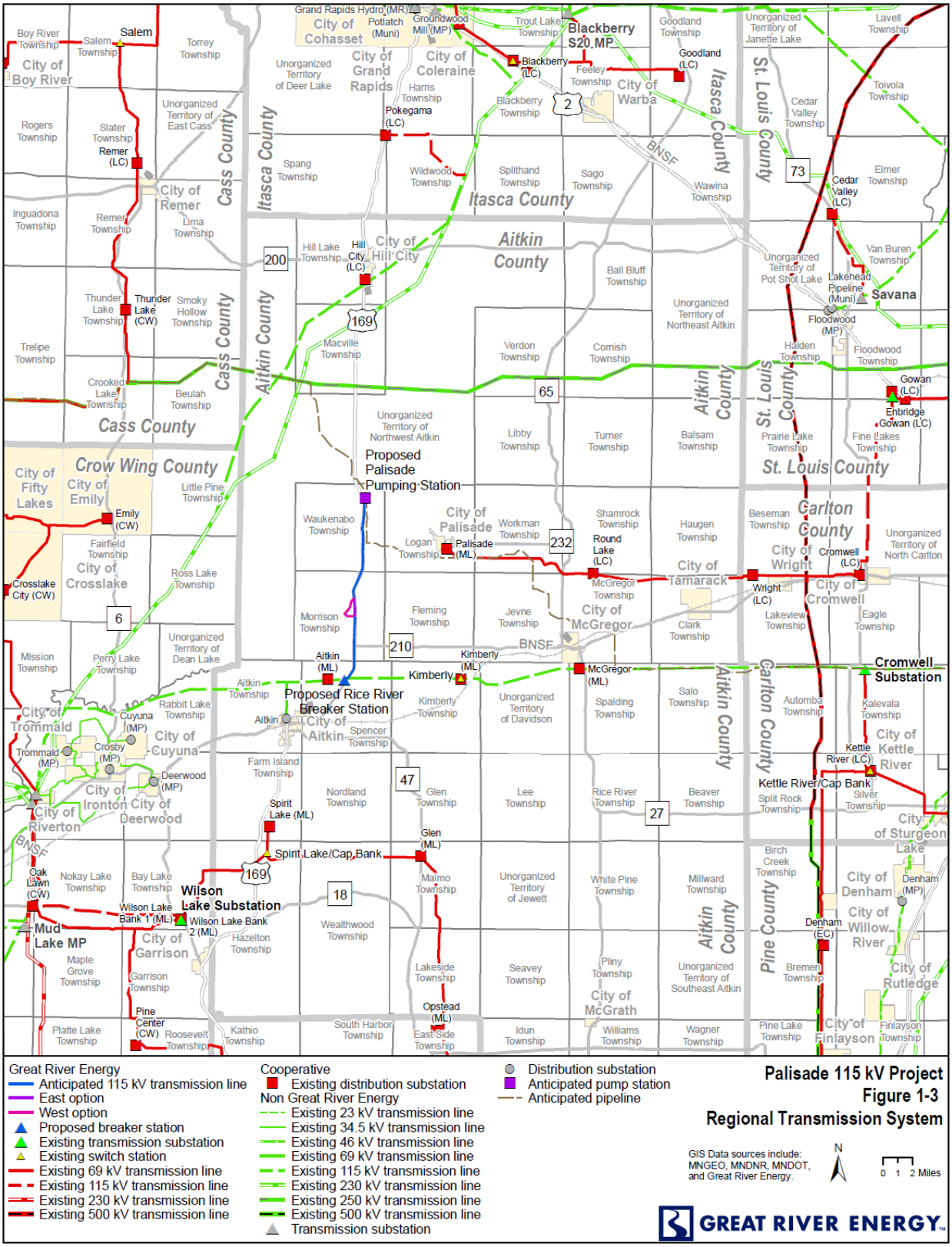


1.5 Project Need and Purpose

The Palisade Project is needed to provide electric service to the proposed Enbridge Palisade Pump Station that is part of the Enbridge L3R Project. **Figure 1-3** shows the electric transmission system in the Project area.

On April 24, 2015, Enbridge filed its Certificate of Need and Route Permit Application (Docket No. CN-14-916) for the Line 3 Replacement (L3R) Project, which is a maintenance and integrity driven pipeline project designed to replace the Enbridge's existing Line 3 pipeline in Minnesota. As proposed by Enbridge, the replacement pipeline would follow the Enbridge Mainline System from the North Dakota/Minnesota border in Kittson County to Enbridge's expanded Clearbrook Station in Clearwater County, Minnesota. The proposed replacement pipeline will then turn south and east to follow existing third-party pipelines, utilities and transportation corridors from Clearbrook to Wrenshall, Minnesota. From that point, the replacement project rejoins the Enbridge Mainline corridor to follow its Mainline System to the Wisconsin/Minnesota border in Carlton County, Minnesota. As part of the L3R Project, eight pump stations will be built. Four of the eight pump stations will be located west of Clearbrook at existing pump station sites, which Enbridge plans to expand to accommodate the installation of these facilities. The remaining four pump stations will be located east of Clearbrook at new station sites. The Palisade Pump Station is one of the new stations east of Clearbrook.

Figure 1-3. Regional Transmission System



1.6 Proposed Route

The Palisade project is being submitted with two route options, the East and the West Option. A general description of the proposed routes is provided below. See **Section 4.1.1** for a more detailed description of the route.

The proposed East Option transmission line (**Figure 1-2)** would begin at the proposed Rice River Breaker Station just west of U.S. Highway 169 and south of 390th Street. From there the route would follow U.S. Highway 169 north for approximately 13 miles, crossing the Mississippi River adjacent to U.S. Highway 169 and terminating at the proposed pump station location on the east side of the highway and south of 510th Lane.

The proposed West Option provides an alternative to the East Option's U.S. Highway 169 Mississippi River crossing. The transmission line would follow the highway from the proposed Rice River Breaker Station for approximately four miles to 430th Street where the route would turn west. The route would continue for approximately one-half mile to the termination of 430th Street. From there the route would follow a property line northwest across the Mississippi River to County Road 21. The route would follow County Road 21 for approximately 1.2 miles back to U.S. Highway 169 and then follow the highway north to the pump station.

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 new 115 kV transmission line.

The Project route allows for the construction of the transmission line without displacing any homeowners. 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 will be protected during construction. The electric fields associated with the new line will be significantly less than the maximum levels permitted by state regulators. No stray voltage issues are anticipated to affect farm animals along the routes. After the Route Permit is issued, Great River Energy will coordinate with state and federal agencies to ensure the project complies with all laws/regulations and minimizes impacts to the natural environment to the best extent practicable.

The Department of Commerce, Energy Environmental Review and Analysis (EERA) is responsible for environmental review of the Project. The Department of Commerce will prepare an Environmental Assessment (EA) for the Project that analyzes potential environmental impacts from the Project and meets all statutory and rule requirements of the EA.

1.8 Public Involvement

Great River Energy held a public open house informational meeting on May 7, 2015, at the Waukenabo Town Hall in Palisade, Minnesota to provide information about the Project to the public. Great River Energy sent open house invitations to 204 landowners within a 400-foot notice corridor and published newspaper advertisement announcing the open house meeting.

Subsequent to the open house mailing, Great River Energy received approximately 10-15 telephone calls requesting information on the Project and the proposed line location.

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 (www.mn.gov/puc), on the Department of Commerce Project website (http://mn.gov/commerce/energyfacilities) and on the Great River Energy webpage at www.greatriverenergy.com. Additionally, a copy of this application will be available at the Aitkin Public Library, the McGregor Public Library and the Palisade City Hall for the public to review.

A public information scoping meeting will be held in the area within 60 days of acceptance of this application as complete to answer questions about the Project and to solicit public comments and suggestions for matters to examine during its environmental review. Following the public meeting and comment period, EERA will prepare an environmental review document called an Environmental Assessment (EA). In a few months, a public hearing will be held in the Project area after the EA is complete. At this hearing, members of the public will be given an opportunity to ask questions and submit comments. Great River Energy will also present further evidence to support their need and route for the Project.

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 the box *Subscribe to a Docket*
    3. Type your e-mail address
    4. For *Type of Subscription*, select *Docket Number*
    5. For *Docket Number*, select *15* in the first box, type *423* in the second box
    6. Select *Add to List*
    7. 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 Commission staff to sign up). Contact docketing.puc@state.mn.us or 651-201-2234 with the docket number (*15-423*), your name, mailing address and email address.

State staff contact information is provided below.

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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 a 115 kV 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 4, 2015, 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 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. In **Section 2.3** below, the procedures described are those required for the lower voltage lines under the Alternative Review Process.

The Route Permit application content requirements are provided in **Appendix B** with cross references indicating where information can be found in this Application.

2.2 Regulatory Process

The Commission has jurisdiction over Route Permits. 2005 Minn. Laws ch. 97, art. 3, § 17. Minnesota Statutes § 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 Route Permit rules. Minn. R. 7850.

In accordance with Minnesota Statute Section 216E.04, subdivision 4, upon 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. Minn. Stat. § 216E.04, subd. 4; Minn. R. 7850.2100. In addition, Great River Energy will publish notice in a number of local newspapers announcing the filing of this Application.

An electronic version of the Application is available on eDockets in docket number 15-423. The Application is also available on Great River Energy's transmission projects webpage (http://www.greatriverenergy.com/deliveringelectricity/currentprojects/) with a link to the Palisade Project by clicking on Aitkin County on the map.

Upon submission of an application for a Route Permit, the Department of Commerce, EERA has the obligation to conduct environmental review of the Project. Minn. R. 7850.3700. The environmental review will consider issues related to the proposed route, such as construction impacts, environmental features, and impacts on homeowners.

The process EERA must follow in preparing the Environmental Assessment (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 and to solicit public input into the scope of the environmental review. Great River Energy, the Commission and EERA will 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 by the Commission.

Once the public meeting has been held, EERA will issue a scoping decision describing the issues and any 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 in the *EQB Monitor*, a bi-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 1.9)**. A copy of the EA will be available electronically through eDockets and the EERA webpage, and in print at local libraries.

After the EA is completed, the Commission will hold a public hearing 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 in issuing a route permit. 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, the ALJ will prepare a report based on the record and briefs filed by parties to the proceeding. After the ALJ issues the report, 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 Permitting 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 2016.

2.3 Public Participation

Great River Energy held a public open house informational meeting on the Project on May 7th, 2015, at the Waukenabo Town Hall in Palisade, Minnesota. Approximately 25 members of the public attended the open house.

The meeting was publicized in several local papers approximately one week prior to the open house, and landowners potentially impacted received an invitation. Local government officials and resource agencies were also invited by letter. Large aerial maps of the proposed Project, photos of proposed transmission structures, fact sheets, information on the permitting process and need for the Project, right-of-way (ROW) information, and a post card for questions or comments were available at the open house.

Inquiries/concerns from the public included whether the transmission line will go through their property, proximity of the proposed line to houses, tree removal, Project schedule, compensation for easements, electric and magnetic fields (EMF) and stray voltage, and possible impacts to center pivot irrigation systems.

2.4 Other Permits/Approvals

In addition to the Route Permit sought in this Application, several other permits may be required for the Project depending on the actual route authorized by the Commission and the conditions encountered during construction. A list of the local, state and federal permits that might 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.

<u>Road Crossing/Right-of-Way Permits</u>
These permits may be required to cross or occupy State, county, and township road ROW.

Over width/Loads Permits

These permits may be required to move over width or heavy loads on State, county, and township roads.

Driveway/Access Permits

These permits may be required to construct access roads or driveways from State, county, and township roadways to the breaker station and the Palisade Pump Station.

Table 2-1. List of Possible Permits and Approvals

Permit or Approval	Jurisdiction
Local Approvals	
Road Crossing/ROW Permits	State, County, Township
Lands Permits, Building Permits	State, County, Township
Over width/Heavy Loads Permits	State, County, Township
Driveway/Access Permits	State, County, Township
Minnesota State Approvals	
State-listed 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
Utility Permit	Minnesota Department of Transportation
Wetland Conservation Act	Board of Water and Soil Resources
National Pollutant Discharge Elimination System Permit Stormwater Construction Permit	Minnesota Pollution Control Agency
Federal Approvals	
Clean Water Act Section 10 Permit	US Army Corps of Engineers
Clean Water Act Section 404 Permit	US Army Corps of Engineers
Permit to Cross Federal Aid Highway	Federal Highway Administration
Federal-listed Endangered Species Consultation	United States Fish and Wildlife Service
Other Approvals	
Other Utility Crossing (e.g., pipelines) Approvals	Utility Owner

2.4.2 **State of Minnesota Approvals**

Endangered Species Consultation

The Minnesota Department of Natural Resources (DNR) Natural Heritage and Nongame Research Program collects, manages, and interprets information about nongame species. Great River Energy has initiated consultation with the DNR for the Project regarding rare and unique species. Great River Energy will continue to work with the DNR to identify any areas that may require mitigative measures to protect rare and unique species, including but not limit to, marking transmission line shield wires and/or to use alternate structures to reduce the likelihood of avian collisions.

License to Cross Public Lands and Waters

The proposed Project will require a license for the four Public Waters crossed by the new transmission line. The DNR Division of Lands and Minerals regulates utility crossings over, under, or across any State land or public water identified on the Public Waters and Wetlands Maps. A license to cross Public Waters is required under Minnesota Statutes Section 84.415 and Minnesota Rules Chapter 6135. Great River Energy will file the license application once the design of the transmission line is complete and will acquire the license prior to construction.

Utility Permit

A proposed Project will require a permit from the Minnesota Department of Transportation (MnDOT). MnDOT requires a permit for construction, placement, or maintenance of utility lines that are adjacent to or cross the U.S. Highway 169 ROW. The application for this permit requires specific location and design information that is not available until after the Route Permit has been issued. 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

Aitkin County administers the state Wetland Conservation Act, under Minnesota Rules Chapter 8420. The proposed Project may require a permit under these rules if permanent impacts to wetlands are anticipated to result from construction. The application for this permit requires specific location and design information that is not available until after the Route Permit has been issued. Great River Energy will apply for this permit (which is a joint application with the Section 404 permit) or for an exemption if applicable once the design of the transmission line is complete.

NPDES Permit

The proposed Project will likely require a stormwater permit for construction activities from the Minnesota Pollution Control Agency (MPCA). The MPCA requires a National Pollutant Discharge Elimination System (NPDES) permit to be issued for stormwater discharges associated with construction activities disturbing one or more acres of soil. 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 potentially

associated with construction activities. The application for this permit requires specific location and design information that is not available until after the Route Permit has been issued. Great River Energy will file for this permit with the MPCA once the design of the transmission line is complete and will acquire the permit prior to construction if the project will disturb more than one acre of soil.

2.4.3 **Federal Approvals**

Section 10 Permit

The proposed Project will require a Section 10 Permit from the US Army Corps of Engineers (Corps). The Corps regulates impacts to waters of the United States that have been defined as navigable waters under Section 10 of the Clean Water Act. The Project will cross the Mississippi River, which is a listed Section 10 water. The application for this permit requires specific location and design information that is not available until after the Route Permit has been issued. Great River Energy will file for this permit (which is a joint application with the Section 404 permit) once the design of the transmission line is complete and will acquire the permit prior to construction.

Section 404 Permit

A Section 404 Permit may be required for the Project. A Section 404 permit is required from the Corps for discharges of dredged or fill material into waters of the United States. The application for this permit requires specific location and design information that is not available until after the Route Permit has been issued. Great River Energy will file for this permit (which is a joint application with the Section 10 and Minnesota Wetland Conservation Act permit) once the design of the transmission line is complete and will acquire the permit prior to construction. The Corps will determine if a permit is necessary depending on the magnitude of wetland impacts.

United States Fish and Wildlife Service (USFWS)

The proposed Project may require the Corps to consult with the United States Fish and Wildlife (USFWS). The Corps' issuance of a Section 10 permit is a federal action, and all federal actions require the acting agency (i.e., Corps) to coordinate with the USFWS service if federally listed threatened or endangered species could be impacted by the Project. The Corps makes the initial determination if their action could impact threatened or endangered species.

Great River Energy requested the USFWS to review the Project regarding federally-listed species or critical habitat. Great River Energy will continue to work with the USFWS to identify and implement any mitigative measures to protect federally-listed species, including but not limited to, marking transmission line shield wires and/or to use alternate structures to reduce the likelihood of avian collisions. Any eagle or other migratory bird nests discovered during survey of the line or in the land acquisition process will be reported to the USFWS and Great River Energy will adhere to guidance provided by the USFWS.

2.5 Certificate of Need Not Required

Minn. Stat. § 216B.243, Subd. 2, states that "[n]o large energy facility shall be sited or constructed in Minnesota without the issuance of a certificate of need by the 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."

Although the Palisade Project is greater than ten miles in length, this transmission line is a radial line to provide electricity to serve the demand of a single customer (Enbridge) at a single location (Palisade Pump Station). The proposed transmission line will not interconnect with any other load, transmission or distribution system other than the interconnection to the Minnesota Power "13 line" as the power source. The Project therefore meets the criteria under Minn. Stat. § 216B.243 Subd.8 (2) that exempts it from obtaining a certificate of need.

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3 APPLICANT INFORMATION

3.1 Proposed Ownership

Great River Energy will own Rice River Breaker Station and the 13-mile 115 kV transmission line between the Palisade Pump Station and the Rice River Breaker Station.

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 Mille Lacs Energy Cooperative (MLEC), the distribution cooperative serving the areas that will benefit from the proposed Project. Great River Energy's distribution cooperatives, in turn, supply electricity and related services to more than 650,000 residential, commercial and industrial customers in Minnesota and Wisconsin.

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

Great River Energy's generation system includes a mix of baseload and peaking plants totaling approximately 3,400 megawatts (MW) of capacity, including coal-fired, refuse-derived fuel, natural gas and oil plants, as well as wind generators and solar photovoltaics. Great River Energy owns approximately 4,600 miles of transmission line in Minnesota, North Dakota, South Dakota, and Wisconsin.

MLEC provides electricity and related services to approximately 14,800 residential, commercial and industrial customers in Minnesota. The Palisade Pump Station would be a new load for MLEC.

Figure 1-1 shows Great River Energy's service territory and highlights the service area of MLEC.

Great River Energy's electric system is interconnected directly with neighboring suppliers. Great River Energy is a member of the MRO and MISO. The regional transmission system is depicted in **Figure 1-3.**

3.3 Project Contact

The permitting contact for the Palisade Project is:

Mark Strohfus
Great River Energy
Environmental Project Lead
12300 Elm Creek Blvd.
Maple Grove, MN 55369
763-445-5210
mstrohfus@grenergy.com

4 PROPOSED PROJECT

4.1 Project Description

The proposed Project is located entirely in Minnesota, in Aitkin County and is shown in **Figure 4-1.**

Great River Energy proposes to construct the Rice River Breaker station and approximately 13 miles of new 115 kV transmission line. The transmission line would connect the proposed Enbridge Palisade Pump Station to the proposed Rice River Breaker Station.

4.1.1 Transmission Line

Proposed Route

The proposed route is described below and depicted in detailed route maps (on aerial photo background) included in **Appendix C.**

The Palisade Project is being submitted with two route options, the East Route Option and the West Route Option (East Option and West Option).

The proposed East Option transmission line (**Figures 4-1A and 4-1B)** would begin at the proposed Rice River Breaker Station just west of U.S. Highway 169 and south of 390th Street. From there the route would follow U.S. Highway 169 north for approximately 13 miles, crossing the Mississippi River adjacent to U.S. Highway 169 and terminating at the proposed pump station location on the east side of the Highway and south of 510th Lane.

The proposed West Option provides an alternative to the East Route Option's U.S. Highway 169 Mississippi River crossing. The transmission line would follow the highway from the proposed Rice River Breaker Station for approximately four miles to 430th Street where the route would turn west. The route would continue for one-half mile to the termination of 430th Street. From there the route would follow a property line northwest across the Mississippi River to County Road 21. The route would follow County Road 21 for approximately 1.2 miles back to U.S. Highway 169 and then follow the highway north to the pump station.

Route Width

Great River Energy is requesting approval of a general route width of 400 feet. Where the proposed route follows a road, the route extends 200 feet from each side of the road centerline. Where the proposed route does not follow a road, the route extends 200 feet from each side of the proposed alignment. Wider route widths are requested in some areas where alignment options are limited due to the proximity of homes and other features. For example, a. 400-foot route is requested south of the Mississippi River where it crosses U.S. Highway 169. Larger route areas

Figure 4-1A. Proposed Project - North

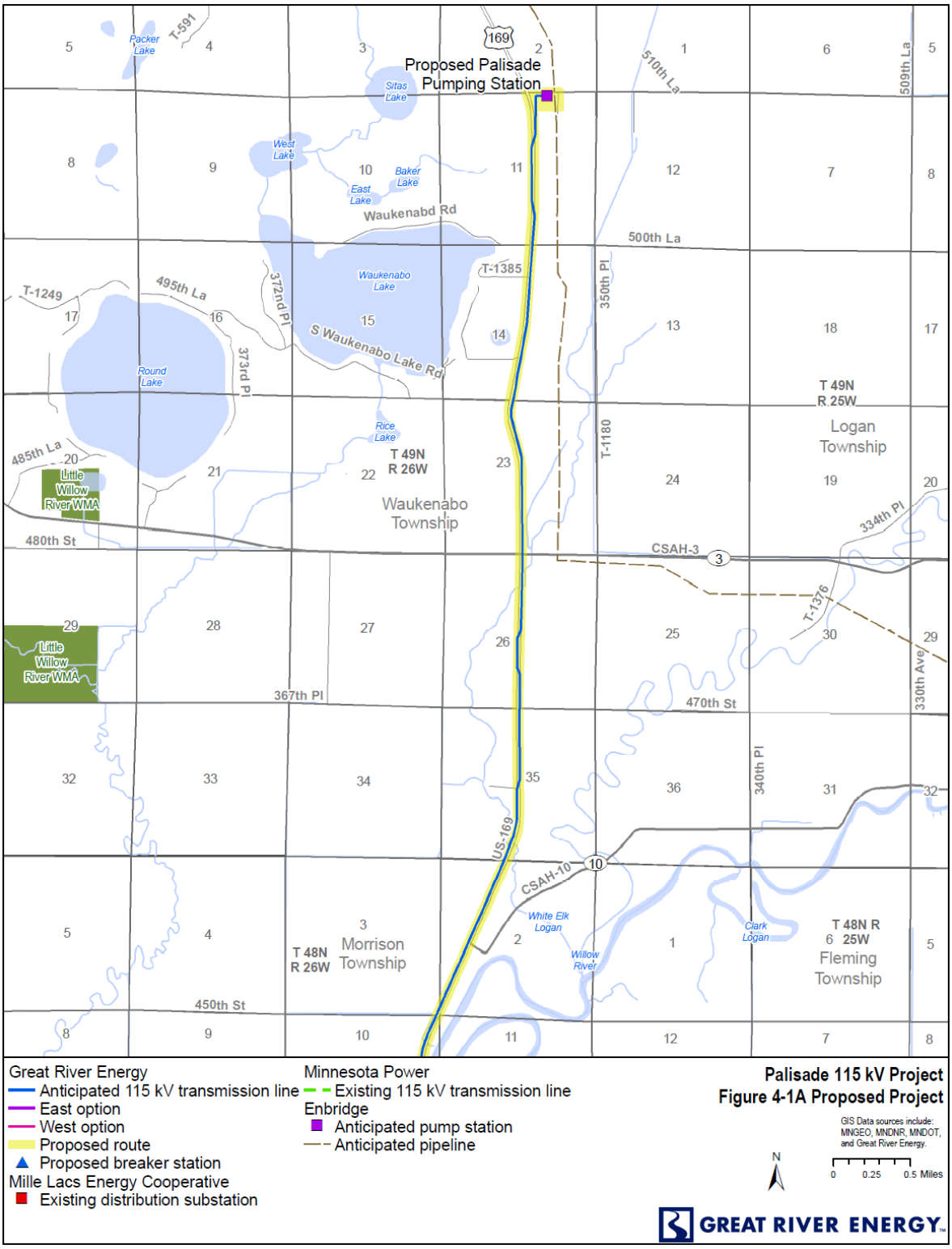
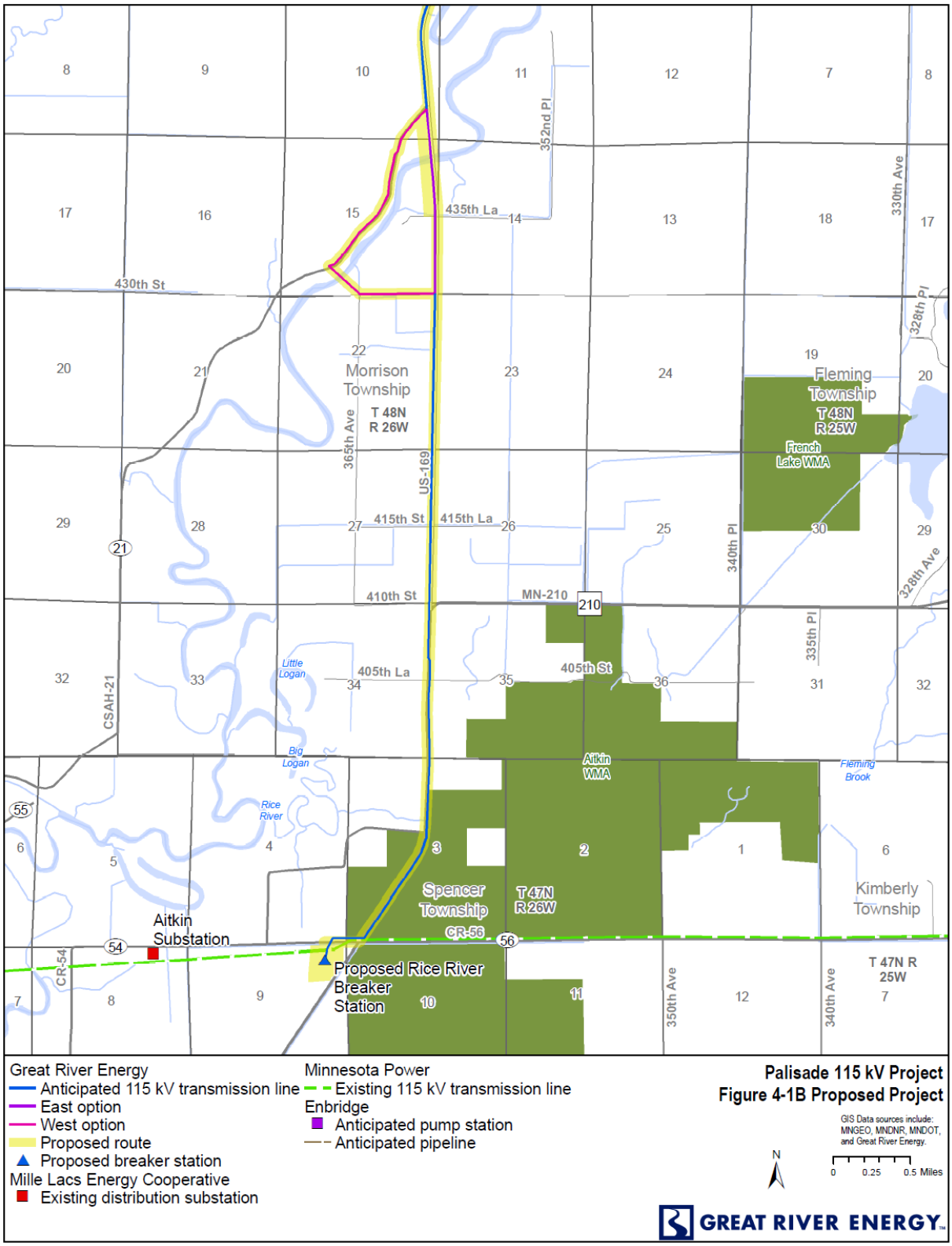


Figure 4-1B. Proposed Project - South



are also requested where the pump station and breaker station will be located to accommodate design flexibility. Detailed maps in **Appendix C** depict the requested route.

Right-of-Way

Great River Energy has worked closely with the local, state and federal agencies and landowners regarding the Project. A 100-foot wide permanent ROW for the new transmission line (50 feet on each side of the transmission line centerline) will be acquired by Great River Energy. The easement may be slightly wider than 100 feet in some areas to accommodate guy wires and anchors. In special circumstances where clearance is unavoidably limited (e.g., where a building is located close to existing road ROW), the transmission line ROW may be reduced to 35 feet on one or both sides of the transmission centerline.

A portion of the transmission line ROW may overlap with existing road ROW where the line parallels a road. Great River Energy has initiated discussions with the Minnesota Department of Transportation (MnDOT) regarding their requirements. Great River Energy will continue those discussions as the Project progresses to ensure that MnDOT requirements are being met. Final approval from the MnDOT will be dependent on the final line design, which cannot occur until after the Route Permit is issued.

A 100-foot wide ROW is Great River Energy's standard for a 115 kV transmission line to maintain proper and safe operation of the transmission lines. The National Electric Safety Code (NESC) establishes clearance requirement from the transmission to objects and vegetation within the ROW. The clearance requirements ensure that the conductor will not blowout past the ROW during high wind events and connect with the objects or vegetation.

Structures

Typical 115 kV structure types that may be used on the Project (e.g., single circuit, single circuit with distribution underbuild, H-Frame) are shown in **Figure 4-2** and **Figure 4-3**.

The majority of the new 115 kV line will consist of single 115-kV circuit, single pole wood, steel, or ductile iron structures spaced approximately 275 to 450 feet apart. Transmission structures will typically range in height from 60 to 90 feet above ground. Taller structures may be necessary due to terrain, agency requirements, and environmental constraints. (e.g., highway crossings, river and stream crossings, and required angle structures). The average diameter of the single pole structures at ground level will be 20 inches. In areas where the permitted alignment overtakes existing distribution circuits, those circuits may be buried or attached to the Project structures as underbuild.

H-Frame design structures may be used in areas with rugged topography and where longer spans are required to avoid or minimize impacts to wetlands or waterways. Span lengths average 600 to 800 feet, with 1,000-foot spans possible with certain topography. Structure heights typically range from 60 to 90 feet above ground with taller structures required for exceptionally long spans and in circumstances requiring additional vertical clearance exceeding the NESC and other agency requirements.

Figure 4-2. Typical Transmission Structure Types

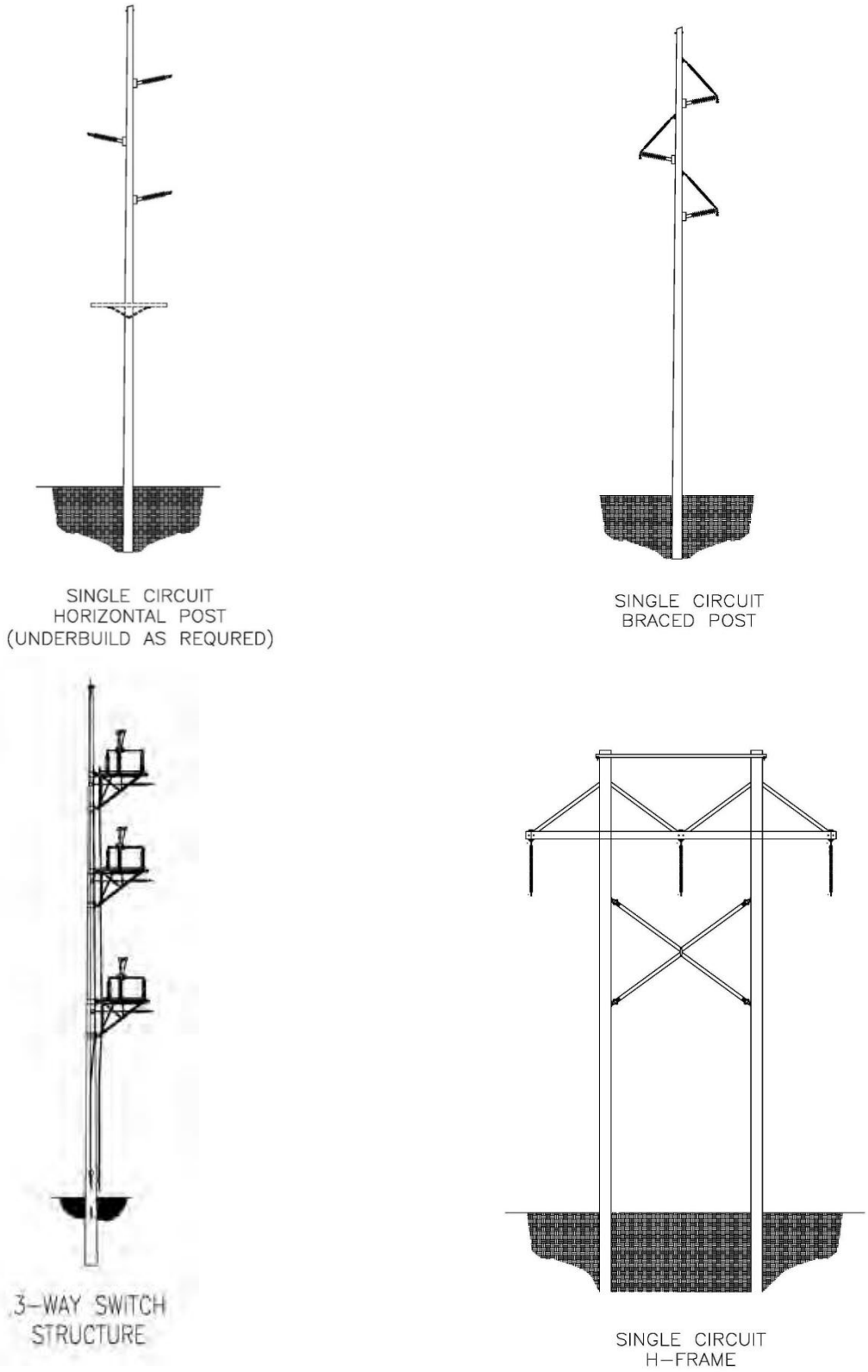


Figure 4-3. Photos of Typical 115 kV Transmission Structures

Typical Single Circuit with Underbuild

Typical Braced Post Structure

Typical Switch Structure

Typical H-Frame Structure

Conductors

Great River Energy's single high voltage circuit will be composed of three conductor phase wires (i.e., not bundled conductors), and the transmission line will also be equipped with a shield wire(s). The Project will primarily use monopole structures, which will have the three conductor phase wires with each conductor mounted on one of the insulator arms (**Figures 4-2 and 4-3**) and a single shield wire mounted on top of the pole. In special circumstances were an H-frame structure is used, the structure will have three conductor phase wires with each conductor mounted on one of the insulators (**Figures 4-3 and 4-4**) and a single shield wire mounted on top of each of the two poles, for a total of two shield wires per H-frame structure. Great River Energy anticipates 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.

Where the Project overtakes existing distribution lines, the existing circuits may be mounted on the Project structure below the proposed new transmission circuit. This is commonly referred to as underbuild (**Figures 4-2 and 4-3**).

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

A 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.

4.2 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 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, e.g., 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 (2014 Dollars)

EAST ROUTE OPTION							
Project	**Planning/ State Permitting**	**Land Acquisition / Permits**	**Design**	**Procurement**	**Construction**	**Close Out**	**Total**
Transmission Line	$413,832	$937,890	$438,971	$3,471,160	$4,261,115	$146,001	**$9,668,969**
Breaker Station	$177,630	$ 56,795	$214,900	$1,634,775	$1,092,920	$ 42,980	**$3,220,000**
Meters	0	0	$ 20,825	$ 34,425	$ 28,475	$ 1,275	**$ 85,000**
Total	**$591,462**	**$994,685**	**$674,696**	**$5,140,360**	**$5,382,510**	**$190,256**	**$12,973,969**

WEST ROUTE OPTION							
Project	**Planning/ State Permitting**	**Land Acquisition / Permits**	**Design**	**Procurement**	**Construction**	**Close Out**	**Total**
Transmission Line	$429,640	$973,717	$455,740	$3,603,757	$4,423,888	$151,579	**$10,038,320**
Breaker Station	$177,630	$ 56,795	$214,900	$1,634,775	$1,092,920	$ 42,980	**$3,220,000**
Meters	0	0	$ 20,825	$ 34,425	$ 28,475	$ 1,275	**$ 85,000**
Total	**$607,270**	**$1,030,512**	**$691,465**	**$5,272,957**	**$5,545,283**	**$195,834**	**$13,343,320**

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

4.2.1 Transmission Line Construction Costs

Single pole construction costs are approximately $498,000 per mile. H-Frame construction costs are approximately $550,000 per mile.

There may be areas where construction is more difficult (e.g., where there are access issues or where greater span lengths must be employed to avoid sensitive features). In these areas the use of wooden mats, the Dura-Base Composite Mat System, or specialized construction vehicles to minimize environmental impacts during line construction may be required and could increase costs by $50,000 or more per mile.

4.2.2 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.

4.3 Project Schedule

Provided Great River Energy obtains a Route Permit by early 2016 and Enbridge has secured the Public Utilities Commission (Commission) Permits for the L3R Project, Great River Energy plans to route clearing in late 2016 or early 2017 and commence construction of the Project second quarter 2017. Great River Energy anticipates that physical construction will take approximately six months and that the entire Project will be energized in fourth quarter 2017.

4.4 Construction Practices

Great River Energy intends to employ normal practices in construction of the new transmission line. Based on Great River Energy's preliminary survey of the proposed route, no unusual or difficult features are expected along the route. Construction practices to be followed are described in more detail in **Section 6.4**.

4.5 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 off the easement. If problems are found during inspection, repairs will be performed and the landowners will be compensated if any losses are incurred.

Great River Energy's Transmission Construction & Maintenance Department will conduct vegetation surveys and remove undesired vegetation that would 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 application of herbicides where allowed.

4.6 Work Force Required

During construction, there will be positive impacts to community services, hotels and restaurants to support the utility personnel and contractors. Great River Energy estimates that at any time over the 8 month construction phase 15 to 20 workers will be actively working on site to complete construction of the Project.

It is not expected that additional permanent jobs will be created by this Project. The construction activities will provide seasonal influx of additional revenue into the communities during the construction phase, and some materials may be purchased locally.

5 ROUTE ANALYSIS AND SELECTION

5.1 Routing Criteria

In developing a route, Great River Energy relies on the following criteria established in Minnesota Rules 7850.4100:

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

B. effects on public health and safety;

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

D. effects on archaeological and historic resources;

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

F. effects on rare and unique natural resources;

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

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

I. use of existing large electric power generating plant sites;

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

K. electrical system reliability;

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

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

N. irreversible and irretrievable commitments of resources.

The criteria can generally be met by selecting the shortest route and picking a route near existing ROW. Costs are directly proportional to the route length. The potential for impacting landowners and the environment are also often proportional to route length. Thus, the shortest route is often the least costly and creates the fewest environmental impacts. Rare and unique natural features are more likely to be located in undisturbed environments. In some instances, the Project can share ROW with existing utility or transportation ROWs. Thus, by relying on existing ROW, the

route can avoid disturbing previously undisturbed environments and can reduce the width of the necessary ROW, which will minimize impacts to landowners and the environment.

The first step in selecting a route is to screen viable interconnection points (i.e., the source of power) for the new transmission line. To meet the Project needs, Great River Energy identified four potential interconnection points that were within close proximity to the proposed Palisade Pump Station (see **Figure 5-1**):

- The Minnesota Power 115 kV "11 Line", which runs southwest to northeast approximately 12 miles north of the proposed pump station or approximately nine miles west of the proposed pump station.

- The Minnesota Power 230 kV "92 Line", which runs almost parallel to the "11 Line" approximately 12 miles north of the proposed pump station or approximately nine miles west of the proposed pump station.

- The 69 kV Palisade Substation, which is accessible via an 8-mile transmission that would follow along U.S. Highway 169 and 480th Street.

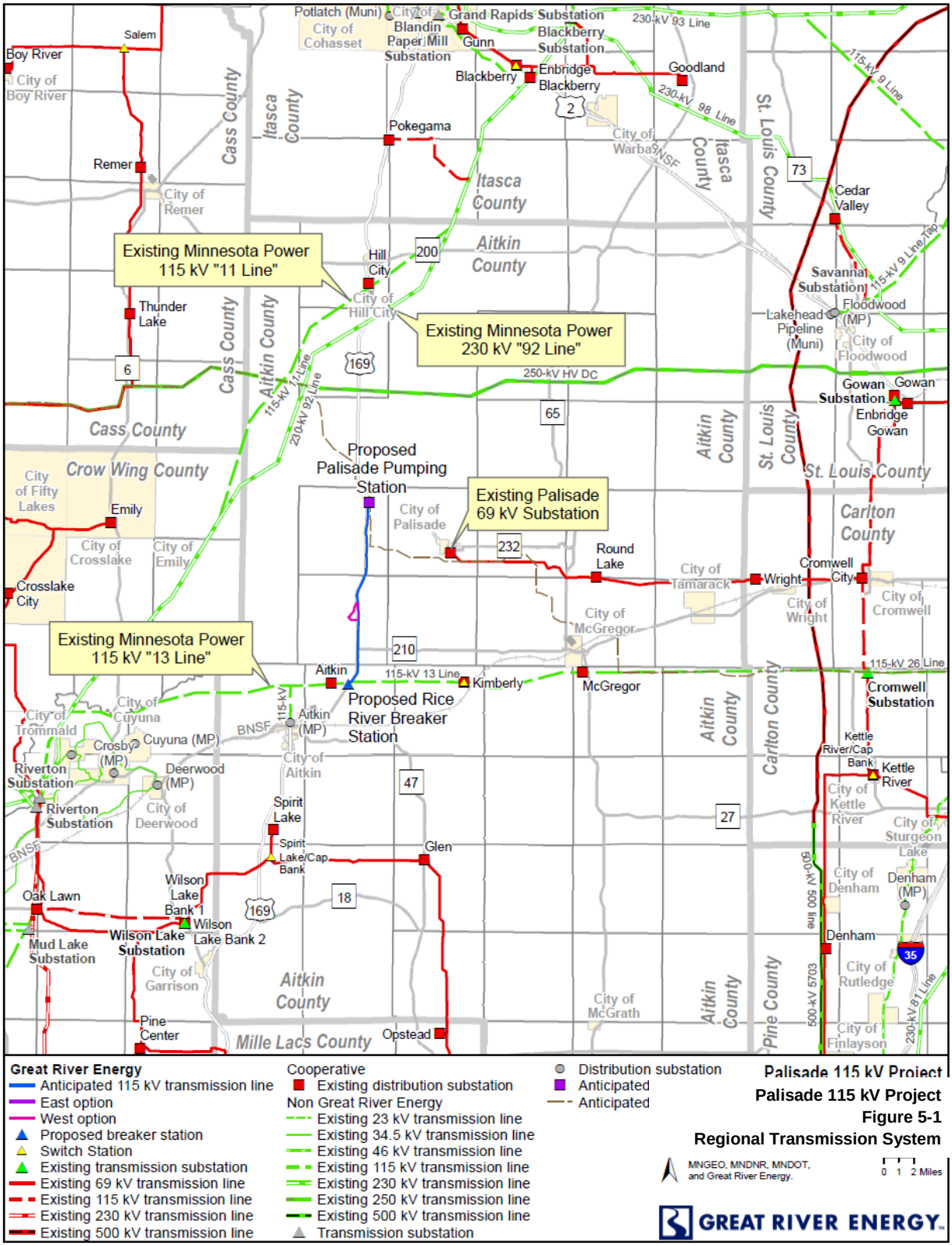
- The Minnesota Power 115 kV "13 Line", the proposed Project interconnect, which runs west to east approximately 13 miles south of the proposed pump station.

The Palisade Pump Station will be equipped with three 7000-horse power motors that will create an electrical demand of 15.66 MW at full output. When a motor is started, it requires six to seven times it full load current for a short duration (commonly called the locked rotor current). During a motor start, there is a large increase in current that will result in a large voltage drop on the transmission system. If the transmission system does not have a sufficient voltage source, the motor may not start, and other customers on the system would see suppressed voltages.

The 115 kV "11 Line" was eliminated as a viable option due to its lack of capacity and costs. Additionally, the "11 Line" system is not a sufficiently robust to start the electric motors. If the motors were started via the "11 Line", the voltage drops caused from the motors violates Great River Energy's criteria. The 67.7-mile "11 Line" could be rebuilt to make it more robust. Two portions of the line, totaling 50.0 miles, have already been rebuilt. Rebuilding the remaining 17.7 miles of line would cost approximately $7.5M. In addition to the rebuild costs, an additional 9 to 12 miles of new 115 kV transmission line would need to be built. Given the proposed Project's estimated $13M cost for the breaker station and 13 miles of new 115 kV transmission line, the "11 Line" is not a viable economic interconnection point based on the cost to upgrade the line and construct an additional nine to 12 miles of new 115 kV transmission line.

The 230 kV interconnection was eliminated as a viable option based on cost. The 230 kV system would have sufficient voltage to support the pump station's 15.66 MW load. However, interconnecting with the 230 kV transmission systems would require the construction of 230 kV to 115 kV step down substation, which would cost approximately $10M, plus nine to 12 miles of new 115 kV transmission line. Given the proposed Project's estimated $13M cost for the breaker station and 13 miles of new 115 kV transmission line, the 230 kV interconnection was eliminated as a viable option based on cost.

Figure 5-1. Potential Interconnection Options



The Palisade 69 kV substation would not provide sufficient voltage to support the needs of the pump station. Because it cannot meet the needs of the Project, this interconnection was not considered a viable option.

Because of the higher costs for connecting to the 115 kV "11 Line" or the 230 kV transmission line and the insufficient voltage support from the 69 kV Palisade Substation, Great River Energy selected connection to the existing Minnesota Power 115 kV "13 Line" as the only viable and cost-effective option.

Once the interconnection options are identified, the next step is to establish a route. In developing a route, Great River Energy typically focuses on minimizing the distances and maximizing the utilization of existing ROW. For the Project, this process identified U.S. Highway 169 as the most direct and shortest route that maximizes existing ROW in connecting the proposed pump station with the 115 kV transmission line.

The next step involves assessing known environmental rare features available to Great River Energy through DNR mapping data and to assess impacts to homes and business. A review of available natural resources data did not identify any environmental features that precluded the route. Also, the distances of homes and business from the route were generally far enough to allow the transmission line to be constructed in accordance with NESC clearance requirements. However, clearances at the Mississippi River are tight because of residential developments on the south side of the river. Because of these tight clearances, Great River developed the West Option to move the route further from existing homes. Great River Energy also requests a wider route width where the East Route Option crosses the Mississippi River

Finally, the route and the alignment of the transmission line within the route will be further developed and refined through the Route Permit processes as additional landowner discussions take place and state and federal agencies become more involved.

5.2 Alternate Routes Considered and Rejected

Under the alternative review process, under which this Application is submitted, an applicant for a Route Permit is not required to identify any alternative routes. However, 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.

The existing Minnesota Power "13 Line" is the only viable regional interconnection point to provide the source of energy for the project. U.S. Highway 169 provides the only existing utility or road right-of-way (ROW) between the "13 Line" and the proposed Palisade Pump Station. There were no readily apparent environmental or socioeconomic issues that would immediately preclude use of the proposed route options. Accordingly, no other viable route options were identified or rejected.

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

6.1 Transmission Line Engineering and Operation Design

6.1.1 Transmission Structure Design and Right-of-Way Requirements

Transmission structure design and the ROW requirements are discussed in **Section 4.1.1**. Typical structures are depicted in **Figure 4-2** and **Figure 4-3**.

6.1.2 Design Options to Accommodate Future Expansion

The Project is being constructed to primarily serve the proposed Enbridge Palisade Pump Station. The transmission line is being sized to meet the expected load at the pump station. No further future expansions have been contemplated for the Project.

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

The proposed transmission line alignment will parallel MnDOT road ROW for the majority of its length.

6.3 Transmission Line Right-of-Way Acquisition Procedures

Great River Energy will obtain new easements for the entire length of the Project.

Preliminary discussions with landowners have occurred during the project open house meeting on May 7, 2015 and through subsequent inquiries from potentially impacted landowners. After the route permit is issued by the Commission, more formal easement discussions will begin. Land rights acquisition includes acquisition of a permanent easement for the transmission line. As a general practice, landowners will be contacted in-person or by U.S. mail with a request to meet to discuss and provide information on the easement and share the Project details with the property owner(s).

During the formal easement acquisition phase of the Project, landowners are given a copy of the route permit, 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, Great River Energy will seek to obtain voluntary short-term marshalling yard agreements from certain landowners for temporary construction or staging areas for temporary storage of poles, vehicles,

or other related items during the construction phase of the Project. Landowners will be notified if 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. Minn. Statutes Chpt. 117. Under the eminent domain process, the landowner has the right to have compensation for the easement determined by impartial commissioners through a court process that is initiated by Great River Energy.

6.4 Construction Procedures

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 involves surveying and ROW clearing. Surveying activities will involve survey staking to establish the ROW boundaries and to locate the transmission line centerline and/or pole locations.

After surveying, trees and other tall growing vegetation will be removed from within the ROW to enable construction activities and to ensure the safe and reliable operation of the line after it is energized. 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 landscaped 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; such situations would be discussed during the easement negotiations.

Sometimes trees located outside of the ROW may need to be trimmed or removed. The National Electric Safety Code (NESC) states that "vegetation that may damage ungrounded supply conductors should be pruned or removed." Trees rooted 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.** Danger trees generally are those that are dead, diseased, weak or leaning towards the energized conductors. In special circumstances, tree trimming may be possible in lieu of tree removal based on negotiations with individual landowners. Easements obtained for the ROW will include terms for danger tree trimming and removal.

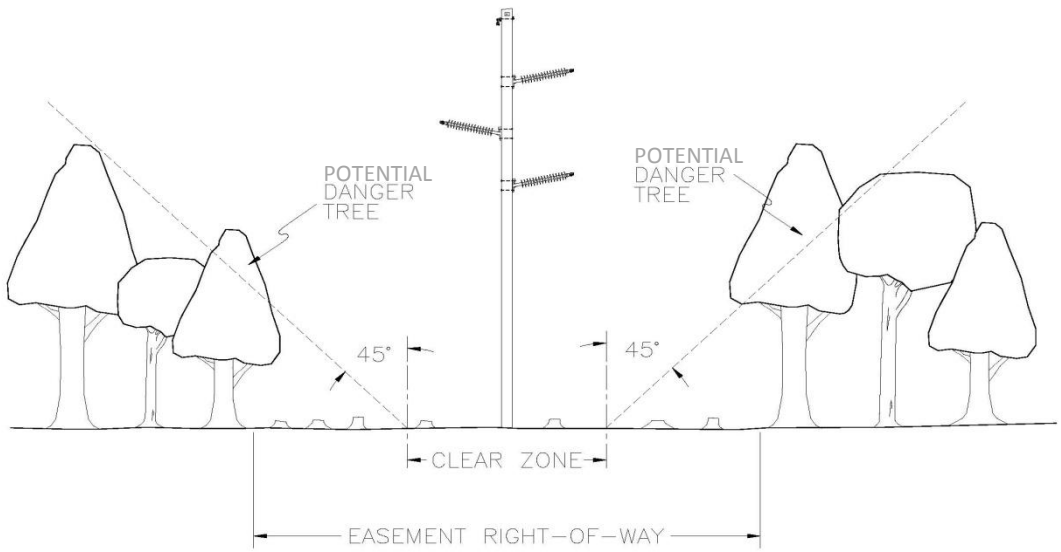
All materials resulting from the clearing operations will either be chipped on site and spread on the ROW, stacked in the ROW for use by the property owner, or removed and disposed of otherwise as agreed to with the property owner during easement negotiations.

Another round of surveying to stake the final pole locations may 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, underground utilities are identified through the required One Call process to minimize conflicts with existing utilities along the routes.

If temporary removal or relocation of fences is necessary for vehicle and equipment access, installation of temporary or permanent gates will be coordinated with the landowner. The ROW agent will coordinate with the property owner for early harvest of crops, where possible, and will negotiate financial compensation for any actual crop losses due to early harvest or damages from equipment in the field. 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 be advised of Great River Energy's BMP requirements.

New structures are installed directly in the ground by augering or excavating a hole typically eight to 11 feet deep and two to three feet in diameter for each pole. 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 nine feet deep. In poor soil conditions, 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 four to eight feet in diameter. Concrete trucks are normally used to bring the concrete in from a local concrete batch plant.

The new structures will then be set and the holes back-filled with the excavated material, native soil, or crushed rock. Any excess soil from the excavation is typically spread and leveled near the structure, or if requested by the property owner or regulatory agency, it would be removed from the site.

After a number of new structures have been erected, Great River Energy will begin to install the new static wire and conductor wires 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.

Crossing of rivers, streams and wetlands require particular attention during construction. The transmission lines will cross a number of wetlands and will span several waterways (Rice River, Mississippi River, White Elk Creek). Great River Energy will not allow construction equipment to be driven across waterways except under special circumstances and only after discussion with the appropriate resource agency. Where waterways must be crossed to pull in the new conductors and shield wires, workers may walk across, use boats, or drive equipment across ice in the winter. In areas where construction occurs close to waterways, BMPs help prevent soil erosion and ensure that equipment fueling and lubricating occur at a distance from waterways.

6.5 Restoration Procedures

During construction, limited ground disturbance at the structure sites will occur. Voluntary 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 completed 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.

6.6 Operation and Maintenance

Periodic access to the ROW of a completed transmission line is required to perform 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 lines 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 two 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. The Project facilities will primarily be routed along road ROW, which will minimize tree maintenance required.

6.7 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.

6.7.1 Electric Fields

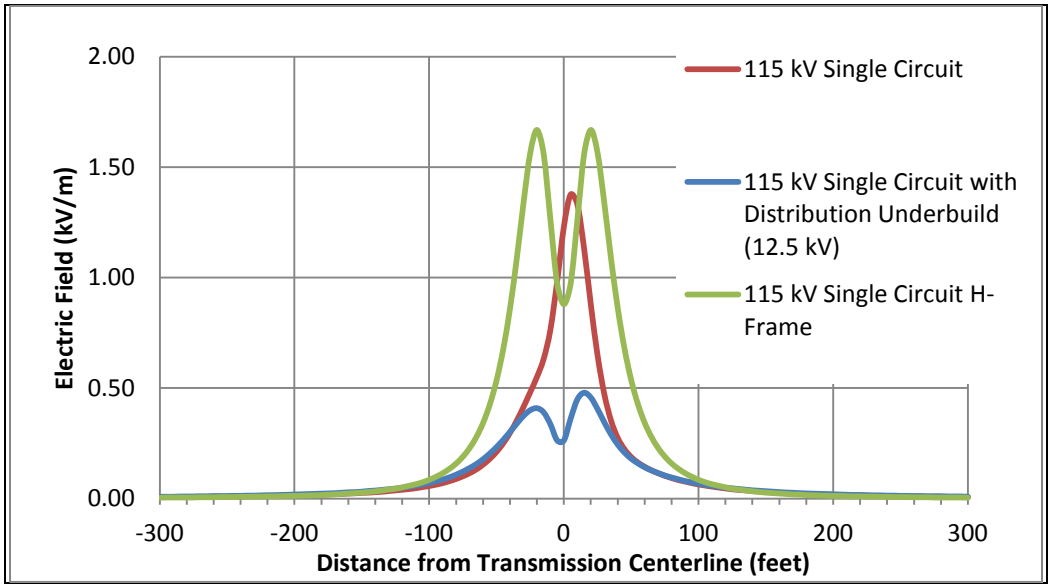
Voltage on a wire produces an electric field in the area surrounding the wire. The voltage on the conductors of a transmission line generates an electric field extending from the energized conductors. The intensity of transmission line electric fields is measured in kilovolts per meter (kV/m), and the 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 for each of the proposed configurations, regardless of the power flowing on the line.

Although there is no state or federal standard for transmission line electric field exposures, the 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 configurations and estimates the peak magnitude of electric field density to be well below the EQB standard; directly below the conductors, the maximum electric field levels are 1.38 kV/m, 0.48 kV/m and 1.759 kv/M for the single circuit 115kV transmission line, the transmission line with 12.5 kV distribution underbuild and the 115kV single circuit H-Frame transmission line, respectively. **Table 6-1** summarizes the electric fields calculated for the proposed transmission line on the Project. These electric field calculations are also shown graphically in **Figure 6-2**.

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

Scenario	Max. Operating Voltage (kV)	Distance to Proposed Centerline										
		-300'	-200'	-100'	-50'	-25'	Max.	25'	50'	100'	200'	300'
115 kV Single Circuit (**Figure 6-2**)	121	0.01	0.02	0.06	0.21	0.48	1.38	0.65	0.19	0.06	0.02	0.01
115 kV Single Circuit With Distribution Underbuild (12.5kV) (**Figure 6-2**)	121/13.1	0.01	0.02	0.07	0.23	0.40	1.76	0.41	0.18	0.07	0.02	0.01
115 kV Single Circuit H-Frame (**Figure 6-2**)	121	0.00	0.01	0.08	0.54	1.57	0.97	1.57	0.54	0.08	0.01	0.00

Figure 6-2. 115 kV Single Circuit Line 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. 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. However, 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. 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.

Table 6-3 and **Figure 6-3** show that the electric fields for the Project are well below levels at which modern bipolar devices are susceptible to interaction with the fields. For older style unipolar designs, the electric fields do 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.[1]

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.

6.7.2 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. 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

[1] 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.[2] The general standard is one of prudent avoidance.

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

Table 6-2. Magnetic Fields of Common Electric Appliances (mG) [3]

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 Project's proposed transmission line configuration with power flow at peak loading and at the average loading. The magnetic field calculations are also shown graphically in **Figure 6-3, Figure 6-4, and Figure 6-5.** The maximum magnetic field under expected peak demand conditions for the 115 kV Single Circuit transmission line with no distribution underbuild is 9.90 mG, for the 115 kV Single Circuit transmission line with 12.5 kV distribution underbuild is 48.72 mG and for the 115 kV Single Circuit H-Frame transmission line is 20.53 mG.

Because the actual power flow on a transmission line could potentially vary widely 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 Project's transmission line is expected to be well below the calculated intensity at the expected peak loading.

[2] 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/.

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

Table 6-3. Calculated Magnetic Fields (mG) for Proposed Transmission Line Designs (One meter (3.28 feet) above ground)

Scenario	Max. Operating Voltage (kV)	Line Current (Amps)	Distance to Proposed Centerline										
			-300’	-200’	-100’	-50’	-25’	Max.	25’	50’	100’	200’	300’
115 kV Single Circuit Line Peak Load (Figure 6-3)	121	70	0.08	0.19	0.69	2.19	4.99	9.90	5.90	2.49	0.75	0.19	0.09
115 kV Single Circuit Line Average Load (Figure 6-3)	121	42	0.05	0.11	0.41	1.31	2.99	5.94	3.54	1.50	0.45	0.12	0.05
115 kV Single Circuit With Distribution Underbuild (12.5kV) Peak Load (Figure 6-4)	121/13.1	70/300	0.27	0.61	2.31	7.92	21.22	48.72	21.55	8.11	2.35	0.61	0.28
115 kV Single Circuit With Distribution Underbuild (12.5kV) Average Load (Figure 6-4)	121/13.1	42/180	0.16	0.37	1.39	4.75	12.73	29.24	12.93	4.87	1.41	0.37	0.17
115 kV Single Circuit Line H-Frame Peak Load (Figure 6-5)	121	70	0.14	0.32	1.25	4.70	12.83	20.53	12.83	4.70	1.25	0.32	0.14
115 kV Single Circuit Line H-Frame Average Load (Figure 6-5)	121	42	0.09	0.19	0.75	2.82	7.70	12.30	7.70	2.82	0.75	0.19	0.09

Figure 6-3. 115 kV Single Circuit Line Magnetic Field Profile

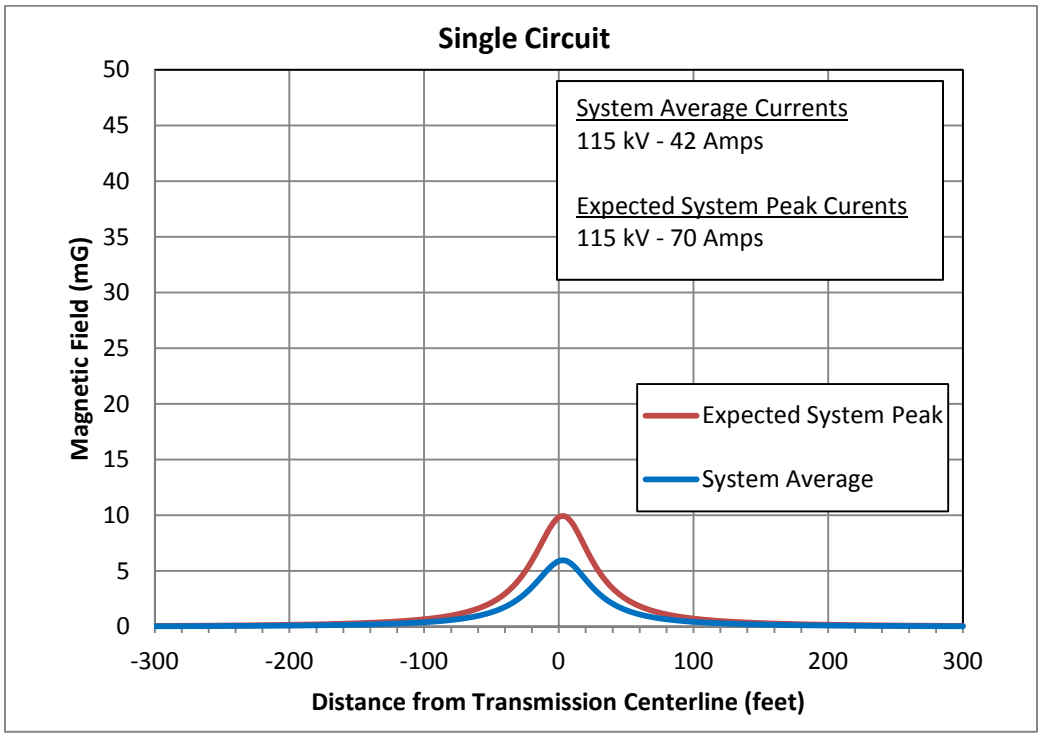


Figure 6-4. 115 kV Single Circuit Line Magnetic Field Profile - Distribution Underbuild

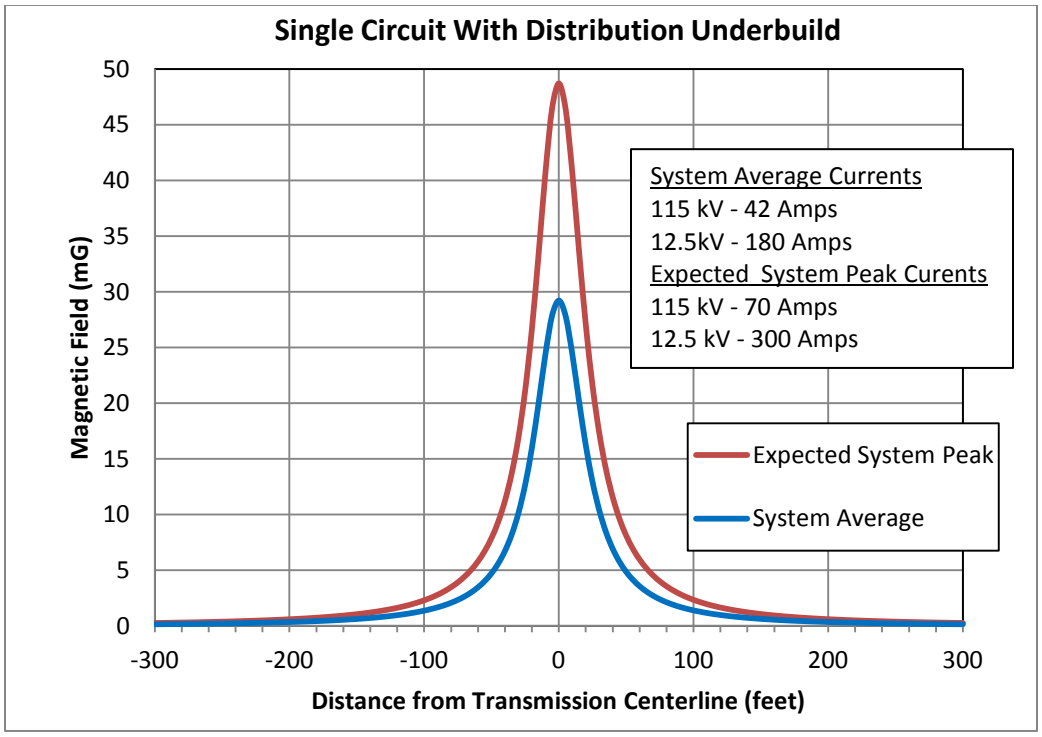
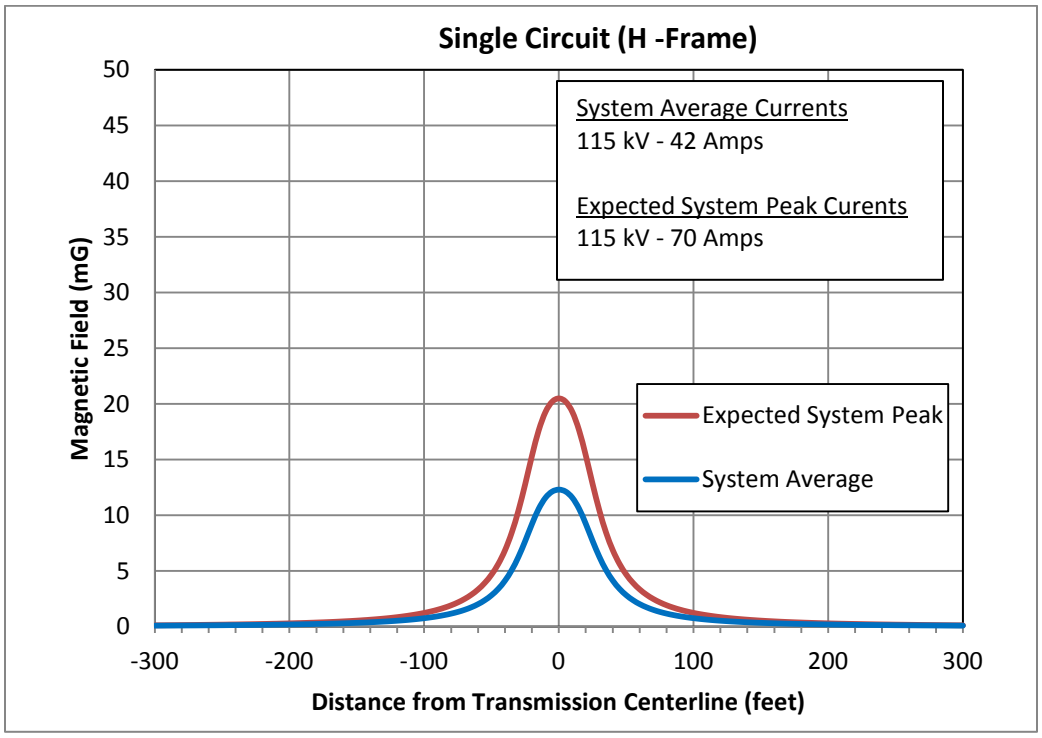


Figure 6-5. 115 kV Single Circuit Line Magnetic Field Profile – H-Frame



6.8 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. Appropriate measures would be taken to mitigate problems associated with induced currents on distribution circuits when the proposed Project parallels or crosses distributions lines.

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.

6.9 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 Project's transmission lines is provided in **Section 6.7.1**.

6.9.1 Radio and Television Interference

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

6.9.2 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**.

6.9.3 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 and state standards.

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7 ENVIRONMENTAL ANALYSIS OF ROUTES

This section 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 D.**

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 E.**

7.1 Environmental Setting

The Project lies in the Tamarack Lowlands (212 Nd) subsection of the Northern Minnesota Drift and Lake Plains Section of the Laurentian Mixed Forest Province, according to the DNR Ecological Classification Systems[4]. This subsection is characterized as gently rolling, with a large lake plain and till plains. Significant peat soils are present throughout, with alluvial soils present along the major rivers. Forestry is the most important land use as most of the area is marginal for agricultural uses.

The geographic area around the Project is dominated by forested land, lakes, and wetlands, with some areas of agricultural land. The closest communities near the Project include the cities of Aitkin and Palisade, and the townships of Waukenabo, Morrison, Flemming and Spencer.

The environmental setting of the Project area includes hydrologic features such as rivers, creeks, ditches, wetlands and riparian areas. A mix of groundcover is present along the proposed routes. The physiographic features (topography, soils, geology and farmland) are typical of this area and do not preclude the development of this Project. Wildlife habitat exists throughout the Project area.

Land use in close proximity to the Project consists primarily of rural residential property and agricultural uses. There are minimal businesses in the vicinity of the Project. The residential areas within the Project area are single-family homes of low density. Open space areas include forested areas, cultivated land, grassland, shrub land, grazing land, and wetlands.

[4] http://www.dnr.state.mn.us/ecs/index.html, Accessed July 12, 2015.

7.2 Human Settlement

7.2.1 Public Health and Safety

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 would 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, would be followed during and after installation of the transmission line, including clear signage during all construction activities.

Proper safeguards would be implemented for construction and operation of the transmission facilities. The surrounding transmission system is already equipped with breakers and relays located where existing transmission lines connect to existing substations to ensure safe operation. The Project will integrate with the existing transmission system and will include additional systems as necessary to de-energize the transmission lines 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 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*

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

> *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 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.

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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.*

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 proposed transmission line will be equipped with protective devices to safeguard the public from the transmission line if an accident occurs, such as a structure or conductor falling to the ground.

Great River Energy will ensure that safety requirements are met during the 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**

The Project route allows for the construction of the transmission line without displacing any homeowners. 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 clearances. The requested route provides sufficient clearances such that there would be no need to displace any homeowners.

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[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)

Proximity of the proposed transmission centerline to commercial/industrial properties and residences (and non-residential buildings) along the route is summarized in **Table 7-1** and shown on the detailed route maps in **Appendix C**. Distances to commercial/industrial properties and residences were measured from the proposed alignment.

Table 7-1. Proximity of Homes and Businesses to Proposed Transmission Line Centerline

Transmission Line Segment	Number of Residences/Buildings Businesses within Various Distances (feet) Either Side of Transmission Line Centerline					
	0-50'	50-100'	100-150'	150-200'	200-250'	Total
East Route Homes	0	1	8	8	15	32
East Route Buildings	2	1	9	13	15	40
East Route Total	**2**	**2**	**17**	**21**	**30**	**72**
West Route Homes	0	0	9	8	13	30
West Route Buildings	2	4	14	13	16	49
West Route Total	**2**	**4**	**23**	**21**	**29**	**79**

Impacts and Mitigation

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 proposed transmission line will be equipped with protective devices to safeguard the public from the transmission line if an accident occurs, such as a structure or conductor falling to the ground.

Great River Energy will work with landowners to address alignment adjustments or pole placement to facility their use of the property while still meeting NESC clearance requirements. It may be possible to install taller transmission line structures to meet clearances to existing structures in the ROW, place all energized conductors on one side of the transmission line structure away from the home, or avoid the home completely by placing the transmission line behind the structure or on the other side of the road if conditions warrant these measures.

7.2.3 **Noise**

There will be some noise associated with the construction phase of the Project, and from operation of the transmission line.

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 7-2** shows noise levels associated with common, everyday sources.

Table 7-2. 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 Minnesota Pollution Control Agency (MPCA) established daytime and nighttime noise standards by Noise Area Classifications (NAC) are provided in **Table 7-3**. 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 7-3. 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 the routes will 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 in the Project area.

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 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 and substations in accordance with industry standards will help to ensure that noise impacts are not problematic. Noise associated with operation of the transmission facilities is discussed further below.

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 7-4**.

Table 7-4. 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

Noise Related to the Breaker Station

There will be minimal and infrequent noise associated with operation of the proposed Rice River Breaker Station. Short duration, low volume noise may occur when the breakers open and close. Opening and closing of the breakers will only occur if maintenance needs to be completed on the line or in the event of an accident that trips the breakers for safety. Breaker stations do not contain cooling fans, which are used in substation transformers and are the most common source of noise in substations.

Impacts and Mitigation

Noise associated 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**

The transmission line will be a new feature visible along the route. The primary structures for the single circuit portion of the Project will be wood poles approximately 60 to 90 feet above ground with spans between poles ranging from 275 to 450 feet. A maximum span will be used between the structures as necessary while still keeping the conductor within the ROW under blowout conditions. The typical ROW required for 115 kV structures is 100 feet wide, which is the general ROW that will be sought for the Project. Additional ROW may be acquired to accommodate guy wires or for other special circumstances.

The proposed Rice River Breaker Station will also be another new visible feature along the route. It will be located near the southwest intersection of U.S. Highway 169 and 390th Street. The station will be enclosed by a security fence approximately 169 feet (west – east) by approximately 90 feet (north – south). There are no residences in close proximity to the breaker station.

The new infrastructure will be visible in the general area of the Project. The landscape in the Project area is a mix of rural residential development, forested land, agricultural land, and open

space. The visual effect will depend largely on the perceptions of the observers across these various landscapes. The visual contrast added by the transmission structures and lines may be perceived as a visual disruption or as points of visual interest. The transmission lines, distribution lines and substations that already exist in the vicinity of the proposed Project will limit the extent to which the new infrastructure will be viewed as a disruption to the area's scenic integrity.

Tree clearing will also change the local viewshed. By locating the Project parallel to existing roadways, the change in viewshed is mitigated as compared to constructing a new corridor.

Impacts and Mitigation

To minimize impacts to the aesthetics and visual character of the Project area, Great River Energy identified a proposed route that predominantly uses existing transmission line corridors and avoids residences and businesses to the greatest extent practicable.

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, and Great River Energy will provide landowners with guidance on selecting new vegetation that can meet their goals including providing visual barriers.
- Structures will be placed at the maximum feasible distance from highway, trail, and water crossings, within limits of structure design.
- To the extent practicable, rivers shall be crossed in the same location as any existing utility or road crossings.

7.2.5 **Socioeconomic**

The Project is located in Aitkin County in north central Minnesota.

The socioeconomic setting of the proposed Project area was evaluated on a regional basis, comparing data for the area along the Project route with average data for Aitkin County and the state of Minnesota. Data were compiled from the 2000 and 2010 U.S. Census. **Table 7-5** summarizes the socioeconomic characteristics within the Project area.

Table 7-5. Socioeconomic Characteristics within the Project Area[15]

LOCATION	POPULATION 2014	POPULATION 2010	CHANGE (%)	MEDIAN HOUSEHOLD INCOME	POPULATION BELOW POVERTY LEVEL (%)
State of Minnesota	5,457,173	5,303,925	2.9%	$59,836 (2009-2013)	11.5% (2009-2013)
Aitkin County	15,771	16,202	-2.7%	$41,617 (2009-2013)	12.5% (2009-2013)

Impacts and Mitigation

Constructing the new transmission line will result in some short and long term economic impacts for the surrounding communities. Long term benefits will include additional tax dollars that would be paid for the Project and the proposed pump station.

Short term impacts will result from the activities associated with construction (e.g., work crews purchasing food or hotel space from local businesses). Impacts to social services would be unlikely because of the short-term nature of the construction project. In the short-term, revenue would likely increase for some local businesses, such as hotels, restaurants, gas stations, and grocery stores, due to workers associated with construction of the Project.

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. Aitkin County is home of the Long Lake Conservation Center, Jaques Art Center, the Depot and Log Museums and numerous resorts.

Impacts and Mitigation

The construction of the proposed transmission facilities will provide energy to the proposed pump station. Tax revenues from the Project and the pump station will support county services.

Construction of the proposed Project is not expected to conflict with the cultural values of the area.

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

[15] http://quickfacts.census.gov/qfd/states/27/27001.html

7.2.7 **Recreation**

There are a number of existing recreational resources within the Project vicinity including state forests, trails, rivers, and lakes. Popular activities include camping, fishing, hunting, bird watching, canoeing/kayaking, boating, swimming, biking, hiking, cross country skiing and riding ATVs and snowmobiles.

Recreational resources in the vicinity of the Project are shown on **Figures 7-1A and 7-1B.**

A geographically large recreational resource in the Project area is the Waukenabo State Forest[16]**,** which is a scattering of lands near the project. There are also water access points for boating on the Mississippi River and Waukenabo Lake in the vicinity of the project, including a launch point near where the East Route Option crosses the Mississippi River. The Aitkin Wildlife Management Area (WMA) is located adjacent to the proposed Rice River Breaker Station and the route crosses through the WMA along U.S. Highway 169 for approximately 1 mile (**Figure 7-1B**).

Impacts and Mitigation

Clearing vegetation underneath the utility line may decrease the wildlife habitat within the immediate vicinity, potentially impacting viewing opportunities for the short term. Permanent disturbance of wildlife habitat will be minimized, to avoid impacts to hunting and wildlife observation.

Great River Energy will coordinate with the DNR, USFWS, and other resource agencies to ensure utility line construction will not impact the surrounding natural resources. Where the route crosses the through the WMA, it will also parallel U.S. Highway 169 minimizing impacts to undisturbed areas of the WMA. Locating the transmission line parallel to the highway will also minimize future impacts associated with maintaining the transmission line because the highway offers close access for maintenance vehicles and inspections.

No impacts to local recreational activities are expected.

Because no impacts to recreation are anticipated, no mitigation is proposed.

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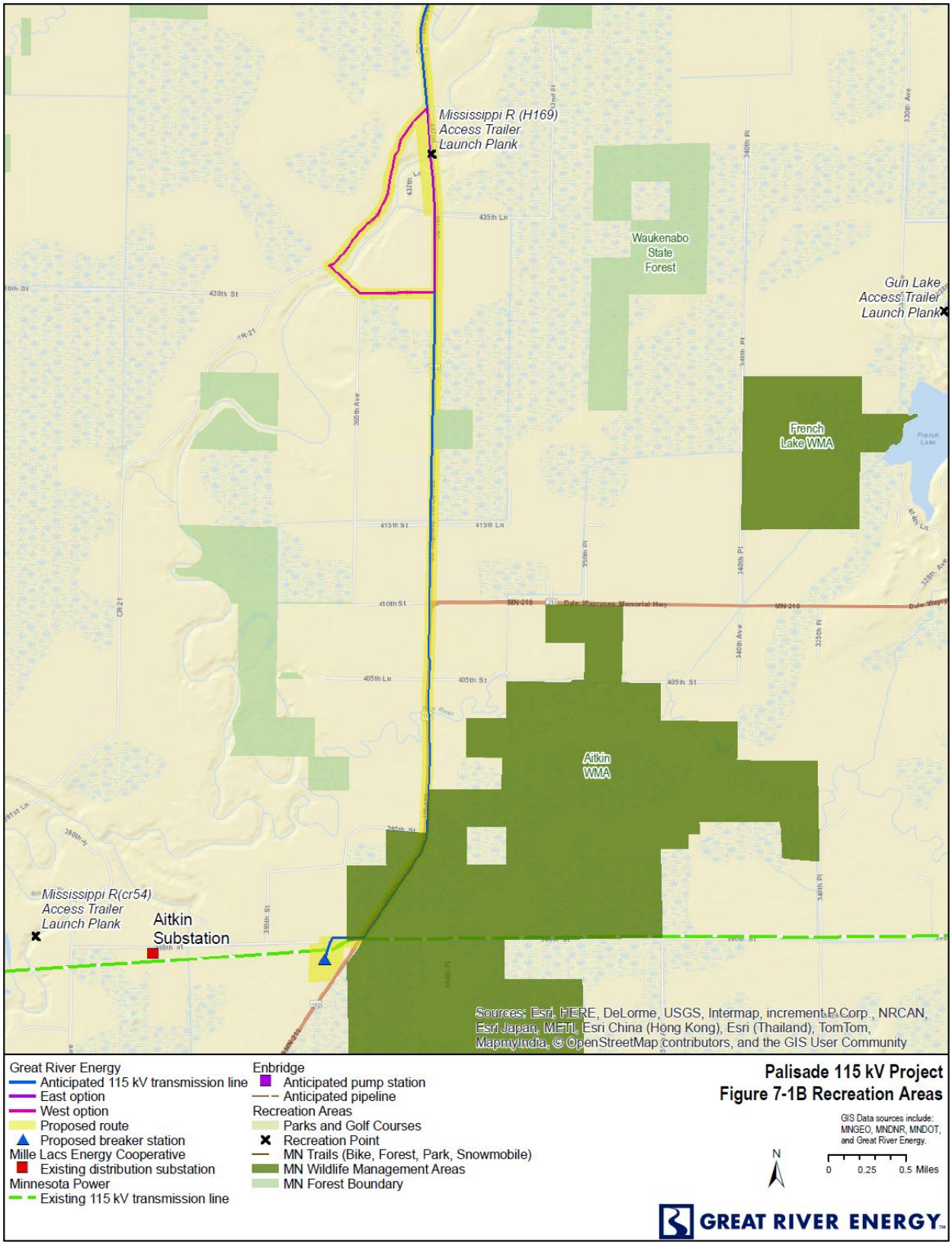
[16] http://www.dnr.state.mn.us/state_forests/sft00018/index.html

Figure 7-1A. Recreational Areas - North

Figure 7-1B. Recreational Areas - South



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 located during survey activities.

The proposed route parallels existing MnDOT Road ROW for nearly the entire route. The majority of the proposed transmission line and poles will be located outside of road and other utility easements.

The proposed Project is over three miles from the Aitkin Municipal Airport, approximately 13 miles from the Hill City Quadna Mountain Airport, and approximately 14 miles from the Isedor Iverson Airport in McGregor, Minnesota.

The MnDOT Office of Aeronautics was contacted[17] requesting information on the possible effects of the proposed Project on airports or airstrips in the Project area. In an August 17, 2015 email[18] (**Appendix E**), MnDOT indicated they have no issues with the Project.

<u>Impacts and Mitigation</u>

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 outside of existing utility easements.

Because the route parallels existing MnDOT road ROW, and the majority of transmission poles will be located outside of existing utility easements, no impacts to public services are anticipated and therefore no mitigation is proposed. For those areas where facilities will be placed within existing road ROW, Great River Energy will work the MnDOT and other agencies to make sure all the appropriate permits are secured.

Temporary access for construction of the transmission line would be along the existing transmission line ROW or by short spur trails from the existing road network to the ROW. Temporary guard structures would be used to string conductor over existing roads and railroads. The structures typically consist of directly-embedded poles with a horizontal cross piece to support the conductor at sufficient height above traffic.

Short-term localized traffic delays are anticipated. Any equipment located on roads or road shoulders will be equipped with appropriate warning lights. Great River Energy will coordinate with the state, county and local governments as appropriate to ensure: 1) construction activities impacting transportation systems are done in accordance with agency procedures, 2) are timed to avoid times of heavier traffic volumes, and 3) are of the shortest duration as possible. Impacts

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[17] Letter from Mark Strohfus, Great River Energy, to Becky Parzyck, June 10, 2015. *See* Appendix E.
[18] Email from Daniel Boerner, MnDOT Aeronautics, to Mark Strohfus, Great River Energy. August 17, 2015. *See* Appendix E.

resulting from construction and operation of the proposed transmission line would be minimal for transportation.

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 covers a variety of land use patterns in rural environments. Land use along the route is a mix of forest, grassland, cropland, shrub land, and wetlands and waters (**Figures 7-2A and 7-2B**). The Project area is dominated by forest and grassland, with lesser areas of croplands, shrublands, and wetlands.

Zoning information for the Project area is provided in **Figures 7-3A and 7-3B**. Zoning requirements are administered by Aitkin County. The Project area is primarily located within agricultural zoning, followed by residential, public lands, and commercial utility zoning designations. The Aitkin County zoning ordinance[19] (Amended April 9, 2013) defines electric utilities as "essential services", which are allowed in all zoning classifications without the County issuing a conditional use permit.

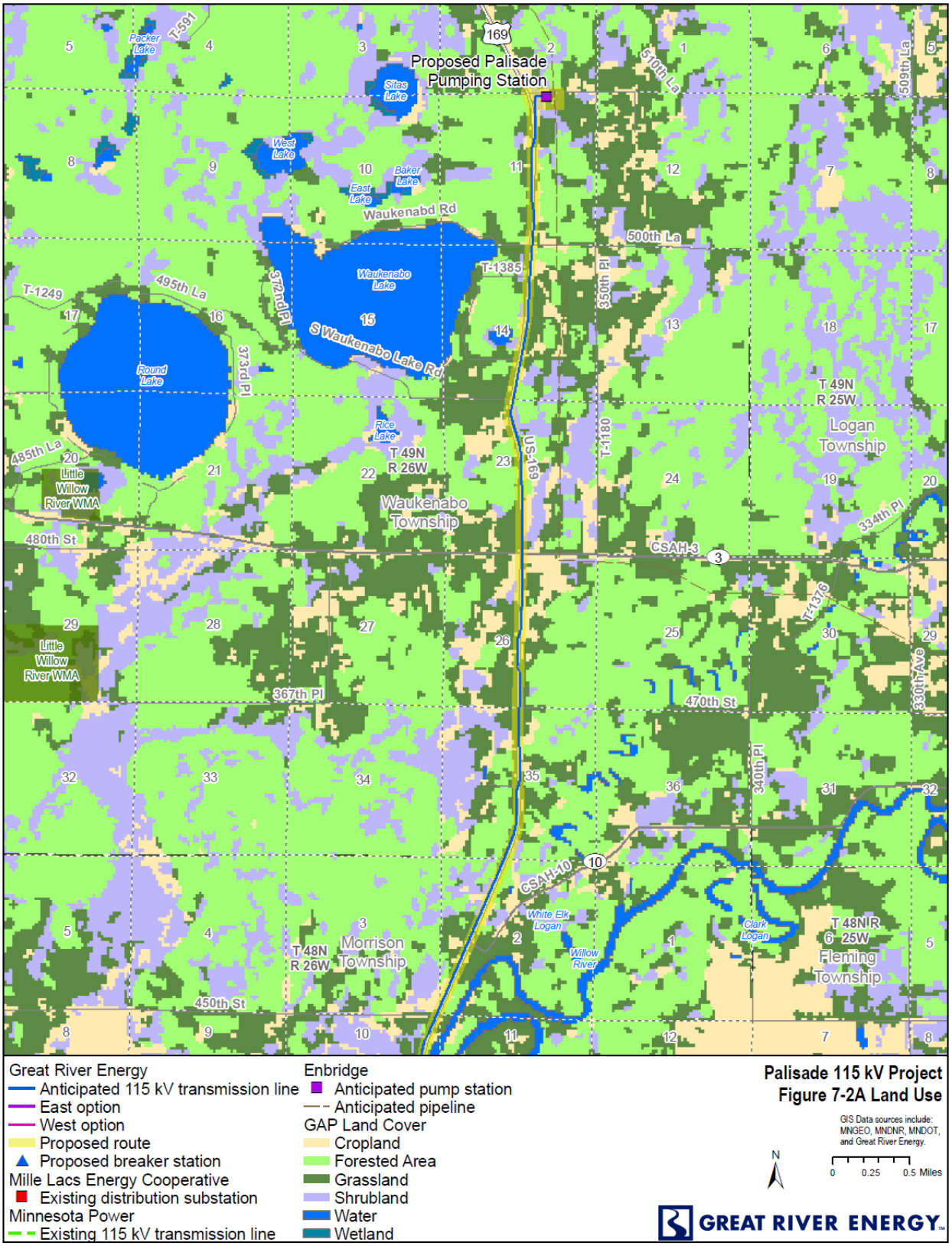
Impacts and Mitigation

Impacts to land use as a result of the Project are expected to be minimal. Construction and operation of the transmission facilities would not change the possible land uses for any area. No impacts to residential or commercial/industrial land uses are anticipated; therefore no mitigation is proposed.

As discussed in more detail in **Section 7.4.1**, some temporary agricultural impacts (rutting, compaction) may occur during construction within the ROW and access points as equipment accesses the ROW to install the structures and to string conductor. Permanent agricultural impacts will be the footprint of the pole and the area immediately surrounding it (about 4 square feet), although the majority of the ROW easement will be available for agricultural cultivation. Great River Energy will work with landowners to minimize impacts to all farming operations along the routes, and will compensate landowners for any crop damage and soil compaction that may occur during construction.

[19] http://www.co.aitkin.mn.us/Ordinances/GenZoningOrd_2013.pdf,

Figure 7-2A. Land Use - North



Great River Energy
- Anticipated 115 kV transmission line
- East option
- West option
- Proposed route
- Proposed breaker station

Mille Lacs Energy Cooperative
- Existing distribution substation

Minnesota Power
- Existing 115 kV transmission line

Enbridge
- Anticipated pump station
- Anticipated pipeline

GAP Land Cover
- Cropland
- Forested Area
- Grassland
- Shrubland
- Water
- Wetland

Palisade 115 kV Project
Figure 7-2A Land Use

GIS Data sources include: MNGEO, MNDNR, MNDOT, and Great River Energy.

N

0 0.25 0.5 Miles

GREAT RIVER ENERGY

Figure 7-2B. Land Use - South

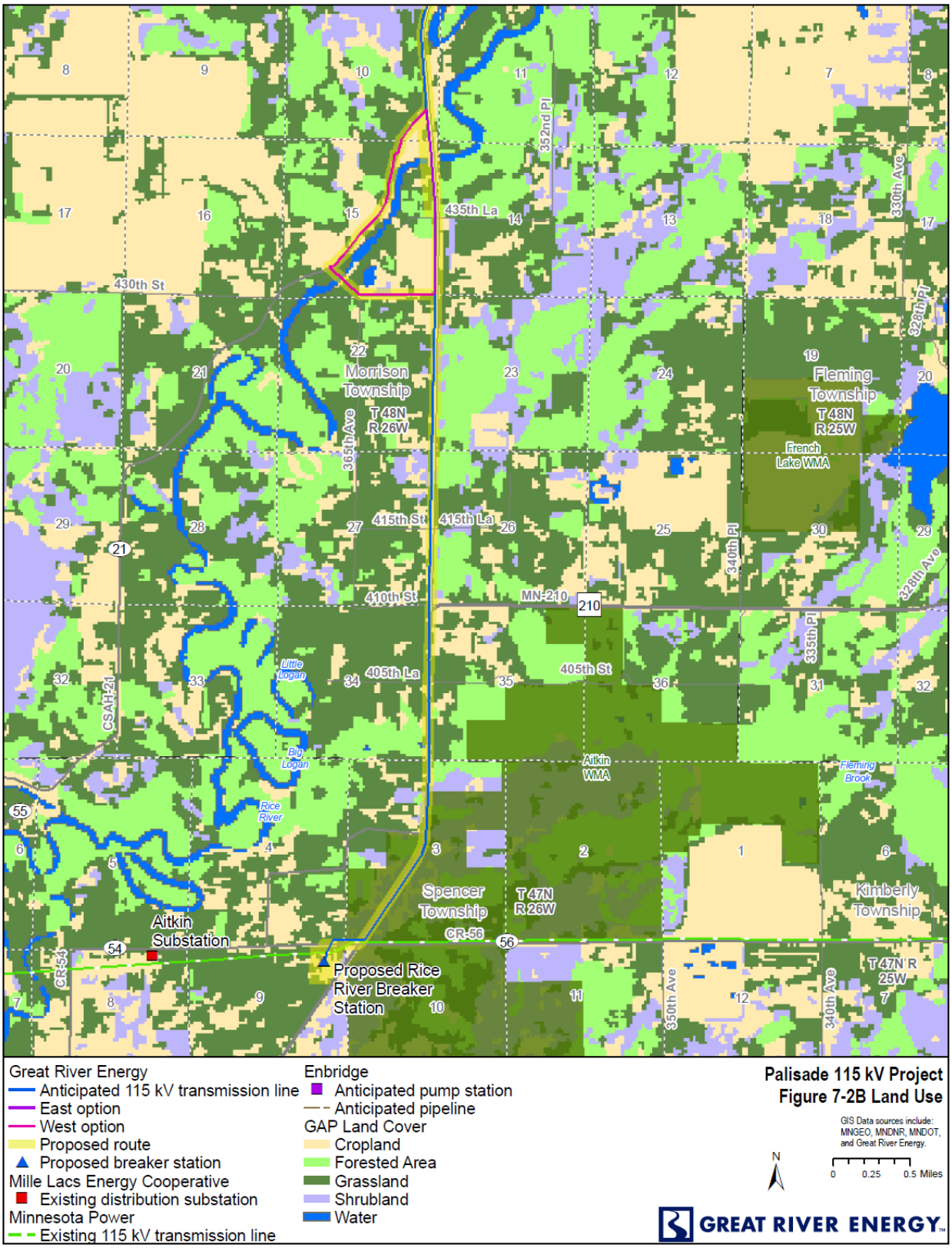


Figure 7-3A. Zoning - North

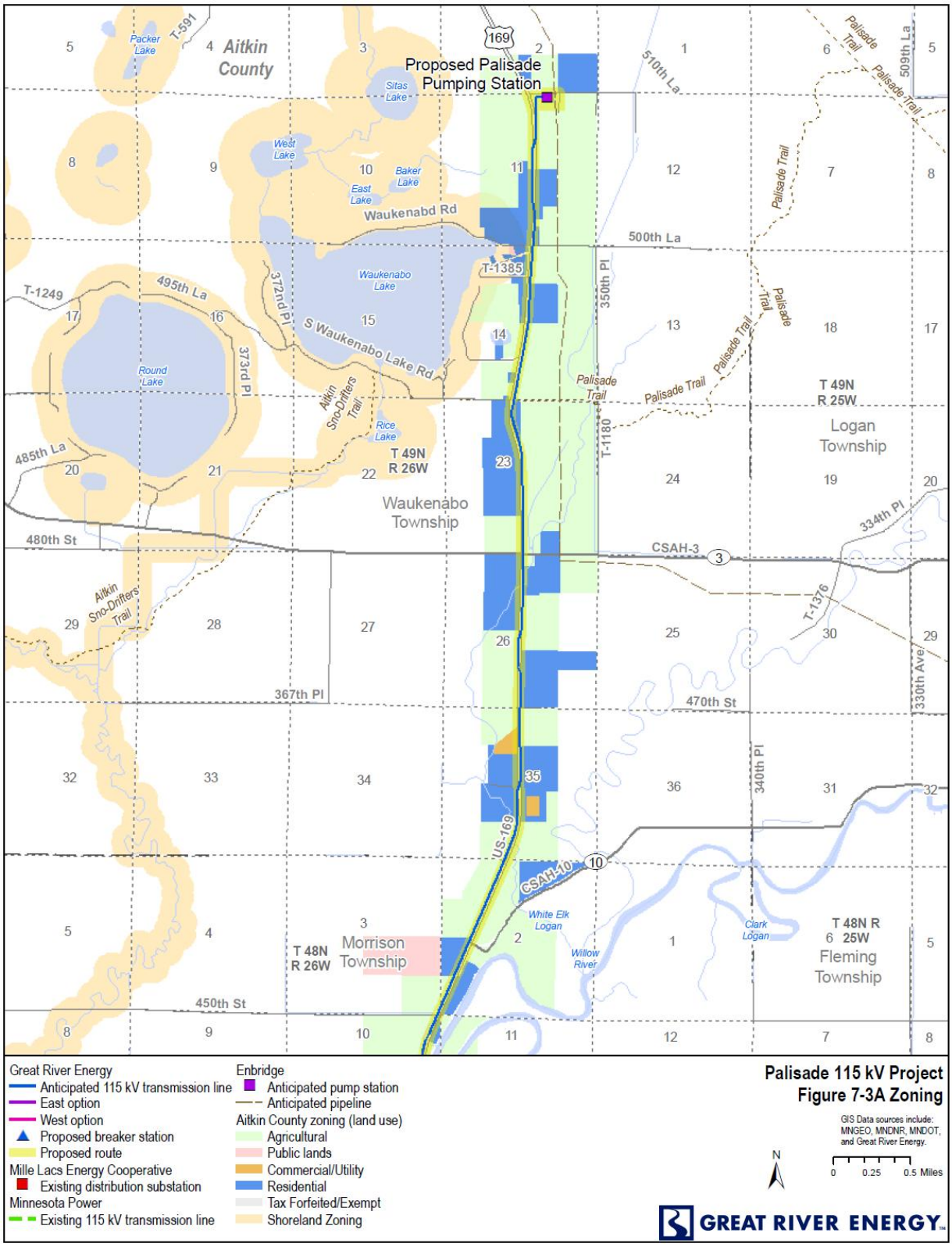
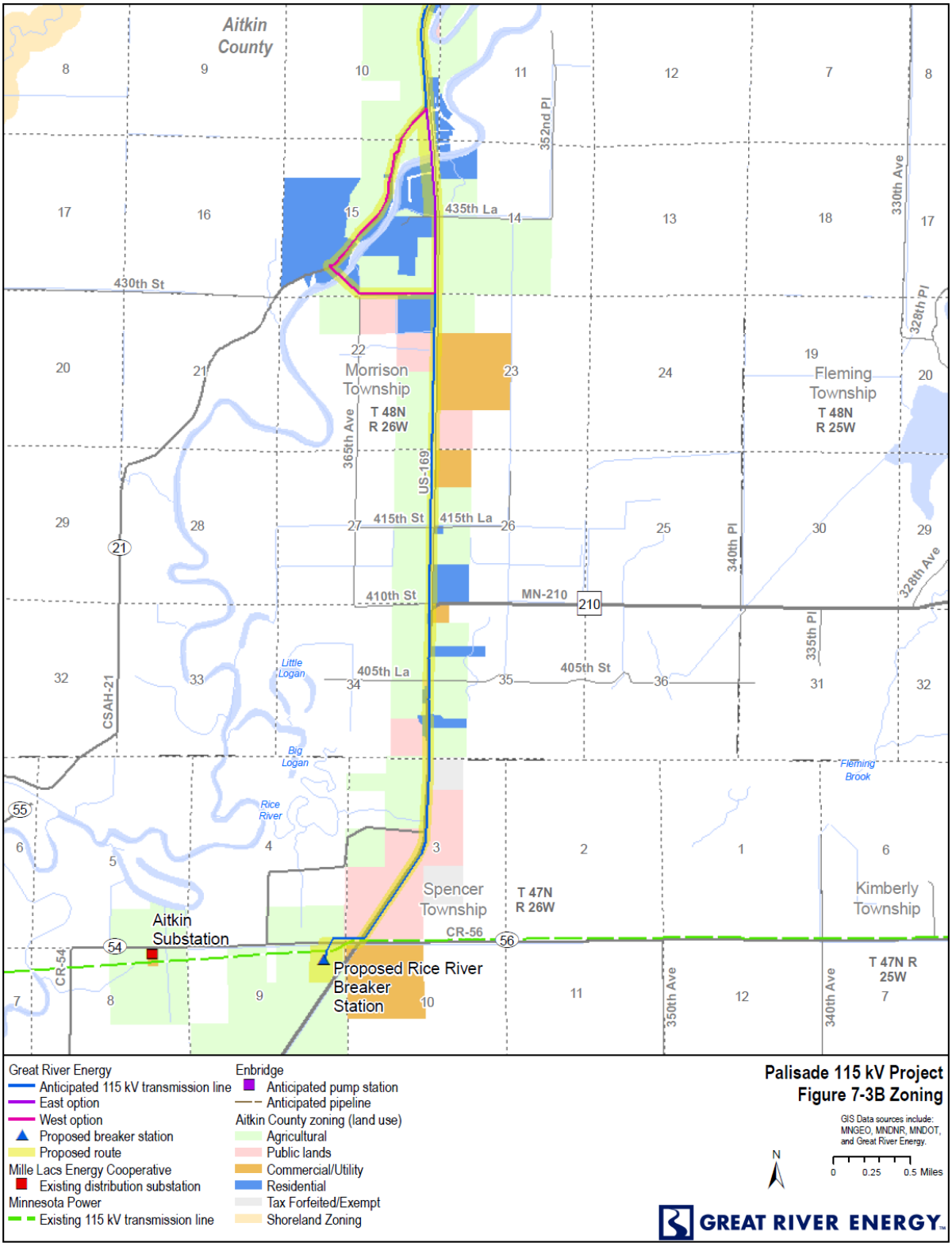


Figure 7-3B. Zoning - South



7.4 Land-based Economies

7.4.1 Agriculture

According to the 2012 United States Department of Agriculture (USDA) Census of Agriculture[20], Aitkin County had 471 individual farms with an average farm size of 260 acres, for a total of 122,591 acres in farming, down by 8% from 2007. Conversely, the 2012 market value of agricultural products were over $15 million, which was 16% higher than in 2007.

Based on preliminary field surveys and review of aerial photographs, there is no known center pivot irrigation system within the proposed route. Based on land use data (**Figures 7-2A and 7-2B**), approximately 144 and 153 acres of croplands would be affected by the transmission line ROW for the East Route Option and the West Route Option, respectively.

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.

The extent of temporary agricultural impacts that would result from construction is dependent upon final engineering design. 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 may occur as a result of structure placement along the Project centerline. The area of impact would be the footprint of the pole itself and the area immediately surrounding the pole (approximately 4 square feet per pole), although the majority of the ROW easement will be available for agricultural cultivation.

Great River Energy will work with landowners to minimize impacts to all farming operations 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 grazing land, crops, or property. If

[20] http://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Minnesota/cp27001.pdf

movement outside of the ROW is necessary during construction, permission will be obtained and any crop damage will be paid to the landowner.

- When weather and ground conditions permit, deep ruts that are hazardous to farming 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 hay meadows, alfalfa fields, pastures and cultivated productive lands, compacted soils will be loosened and ruts will be leveled by scarifying, harrowing, disking, or by other approved methods. Damage to ditches, tile drains, 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.

- The transmission line will be designed to accommodate existing or proposed center pivot irrigation systems, with transmission poles located as near as practicable to the outer edge of the road ROW and the placement of pole locations to avoid the maximum radius of the system as it passes along the road ROW. Irrigation stops or electrical supply apparatus are allowable in the easement area and appropriate grounding requirements will be discussed with the landowners.

- 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.

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

- 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**

Forested areas in the Project area are shown on **Figures 7-2A and 7-2B.** The proposed route and alignment would necessitate the clearing of approximately 2.2 acres and 1.1 acres of forested land for the East and West Route Options, respectively. Forests in the Project area have routinely been logged for the forest industry and 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 ROW would need to be cleared of vegetation to ensure the safe and reliable operation of the transmission line. Because the proposed alignment primarily follows existing utility and road ROWs, additional forest impacts due to additional ROW acquisition and subsequent clearing will be reduced.

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.
- If possible, windbreaks comprised of compatible (maturing to a height of 15 feet or less) vegetation may be allowed in the outer edges of the ROW. Such windbreaks would be discussed with landowners during easement negotiations.

7.4.3 **Tourism**

There are no major tourist destinations in close proximity to the proposed route. Visitor destinations within the area include the trails, rivers, and lakes. Popular activities include camping, fishing, hunting, bird watching, canoeing/kayaking, boating, swimming, biking, hiking, skiing, riding ATVs and snowmobiles. The state forest and WMA within the Project area provides opportunities for viewing wildlife in intact ecosystems. Historic areas provide the chance to learn about the regional and local history.

The Project will not interfere with any local tourist activities. The proposed Route paralleling existing road ROW ensures that more pristine trails, river sections and wildlife areas are not disturbed.

Impacts and Mitigation

The proposed route avoids many of the areas in the Project vicinity that would be considered tourist destinations such as regional lakes, and the Project would not preclude tourism activities or appreciably diminish the use of or experience at tourist destinations. Although some tree clearing will be required, it will be along the edge of existing ROWs and should not significantly affect wildlife viewing opportunities.

As no impacts on tourism are expected, no mitigation is proposed.

7.4.4 **Mining**

Based on visual observations during preliminary routing analyses, there are no known gravel pits or mines in close proximity to the Project. If future sand or gravel mines were to be located in close proximity to the Project, the Project would not preclude mining activities. Any future mining activities would be limited in extent by the existing roadways. By locating the Project parallel to existing road ROW, Great River Energy avoids creating new areas that could limit the extent of mining activities.

Impacts and Mitigation

As no impacts on mining are expected, no mitigation is proposed.

7.5 Archaeological and Historic Resources

Merjent completed a Phase IA cultural resource assessment of the Project (**Appendix E**). The assessment included a literature review of the proposed transmission line plus a one-mile buffer, which was conducted online and at the Minnesota State Historic Preservation Office (SHPO) located at the Minnesota History Center in St. Paul, Minnesota. 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.

7.5.1 Previously Recorded Archaeological Sites

There is one previously recorded archaeological site within the study area (**Table 7-6**). The site is over one-half mile from the Project. None of the sites are within the proposed route.

Merjent's assessment recommends "that there will be no adverse impacts on known or suspected resources as a result of this Project. The majority of the Project has been designed to parallel the existing US Highway 169 corridor, which has been previously surveyed and does not need to be re-investigated for this Project."

Table 7-6. Previously Recorded Archaeological Resources in Project Vicinity

Site Number/Site Name/Site Type	Site Significance	Location Relative to Project
21AKbd/Site Lead/prehistoric	Unknown	East of Project corridor

7.5.2 Previously Recorded Standing Historic Structures

There are 12 previously recorded standing historic structures in the study area (**Table 7-7)**. All were previously inventoried. The integrity of these structures was not defined and none were evaluated for the National Register of Historic Places.

Merjent's assessment concludes, "Given public and private development over the almost 30-year period since the 1986 survey, it is likely that additional structures would already have been identified. In addition, if these twelve or any other structures were truly significant, it is likely that previous public and private developers over the past 30 years would have been tasked with evaluating the potential adverse effects of their projects. Merjent recommends that no architectural review is appropriate for this Project."

Table 7-7. Previously Recorded Standing Historic Structures in Project Vicinity

Site Number/Site Name/Site Type	Site Significance	Location Relative to Project
AK-MOR-001/Waldeck Ranch	Unevaluated	East of Project
AK-MOR-002/District 33 School House	Unevaluated	West of Project
AK-MOR-003/Bridge No. 4817	Unevaluated	East of Project
AK-MOR-004/Captain Sutton Stopping Place/Inn	Unevaluated	West of Project
AK-MOR-005/Hassman School	Unevaluated	West of Project
AK-SPN-001/Cyprien Cartie Farmstead	Unevaluated	North and West of Project
AK-WKB-001/Waukenabo School	Unevaluated	North and West of Project
AK-WKB-004/CCC Camp Buildings	Unevaluated	West of Project
AK-WKB-005/Waukenabo Township Hall	Unevaluated	West of Project
AK-WKB-007/Welsh Ranch	Unevaluated	East of Project
AK-WKB-008/log building	Unevaluated	West of Project
AK-WKB-009/Bridge No. 7383	Unevaluated	East of Project

Impacts and Mitigation

Given public and private development over the almost 30-year period since the 1986 survey, Great River Energy believes it is unlikely that additional historic structures would be identified near the proposed transmission facilities and feel that no further architectural review is warranted for the Project.

Great River Energy does not believe there will be any adverse impact on known or suspected archaeological resources as a result of this Project.

The Minnesota Historical Society (MHS) was contacted[21] requesting information on the possible effects of the proposed Project on historic properties in the Project area. In a letter dated July 15, 2015[22], MHS concludes that the Project will not impact any listed properties on the National or State Registers of Historic Places or any known or suspected archeological properties (**Appendix E**). As noted by in the MHS response, if a federal permit (e.g., Corps wetlands permit) is required, Section 106 consultation may be required. The Corps or MHS may require additional surveys as part of any Section 106 consultation. However, given the findings of Merjent's Phase IA and the proximity of the Project to U.S. Highway 169, which was thoroughly assessed for archeological impacts, Great River Energy does not anticipate the need for further surveys.

If any archaeological sites are identified during placement of the poles along the permitted route, construction work will be stopped and MHS 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 MN 307.08.

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[21] Letter from Mark Strohfus, Great River Energy to Sarah Beimers, MHS. June 10, 2015. Appendix E

[22] Letter from Sarah Beimers, MHS to Mark Strohfus, Great River Energy. July 15, 2015. Appendix E.

Great River Energy will make every effort to avoid impacts to identified archaeological and architectural resources. In the event that an impact would occur, Great River Energy will consult with the appropriate reviewing agency to determine the necessary steps regarding treatment of the resource. While avoidance of the resource would be a preferred action, mitigation for Project-related impacts on archaeological and architectural resources eligible for the National Register of Historic Places may include an effort to minimize Project impacts on the resource and/or additional documentation through data recovery.

7.6 Natural Environment

7.6.1 Air Quality

The air quality in Aitkin County is better than the National Ambient Air Quality Standards for all criteria pollutants (ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, particulate matter, and lead)[23].

Impacts and Mitigation

The only potential air emissions from a transmission line result from corona, which may produce ozone and nitrogen dioxide. 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.

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 **Figures 7-4A, 7-4B, 7-5A and 7-5B**. 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 Mississippi River (Brainerd) watershed, of the Upper Mississippi River Basin.[24]

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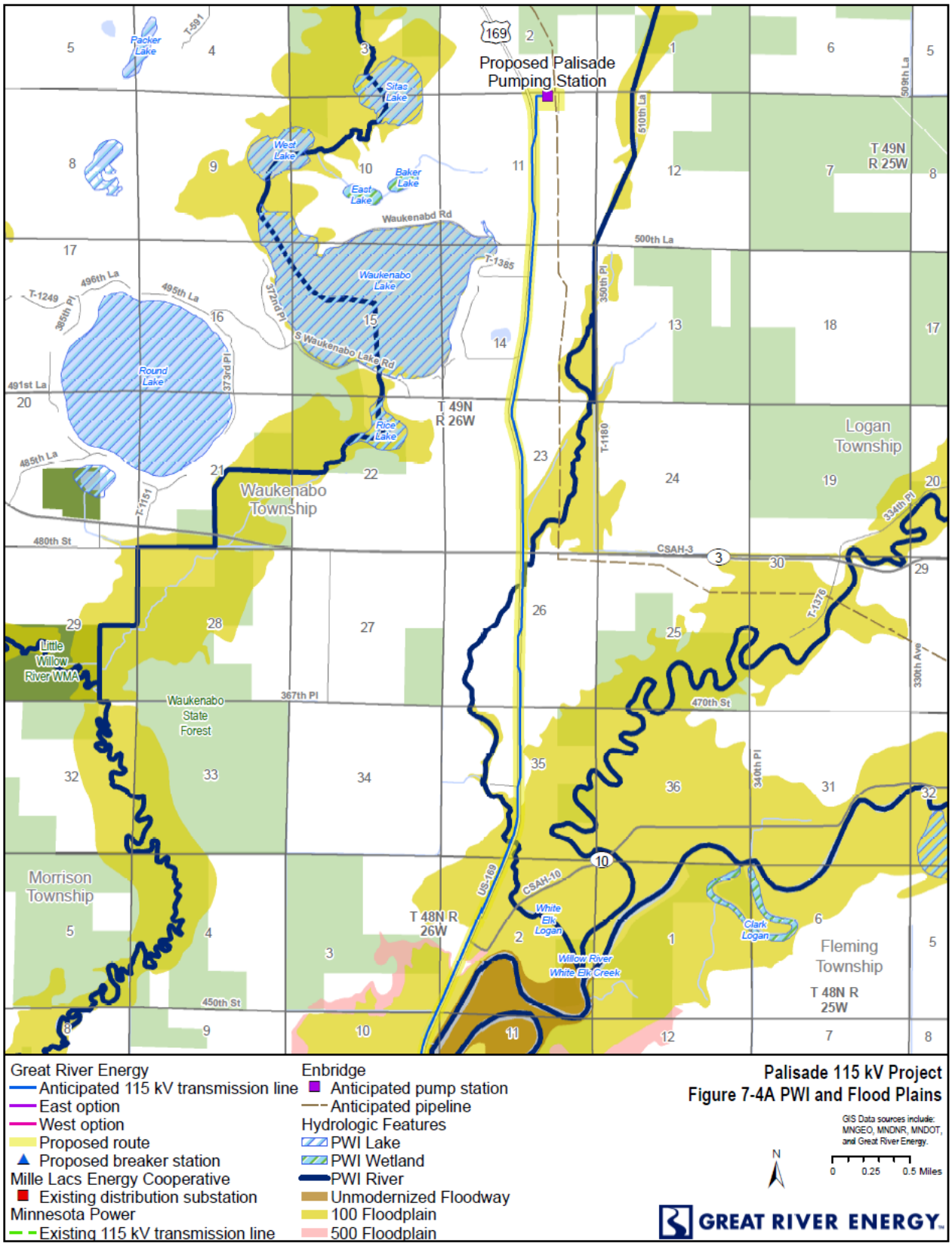
[23] http://www.pca.state.mn.us/index.php/air/air-quality-and-pollutants/general-air-quality/state-implementation-plan/minnesota-state-implementation-plan-sip.html

[24] http://www.pca.state.mn.us/index.php/view-document.html?gid=6050.

Figure 7-4A. Public Waters and Flood Plains – North



Great River Energy
- Anticipated 115 kV transmission line
- East option
- West option
- Proposed route
- Proposed breaker station

Mille Lacs Energy Cooperative
- Existing distribution substation

Minnesota Power
- Existing 115 kV transmission line

Enbridge
- Anticipated pump station
- Anticipated pipeline

Hydrologic Features
- PWI Lake
- PWI Wetland
- PWI River
- Unmodernized Floodway
- 100 Floodplain
- 500 Floodplain

Palisade 115 kV Project
Figure 7-4A PWI and Flood Plains

GIS Data sources include: MNGEO, MNDNR, MNDOT, and Great River Energy.

N

0 0.25 0.5 Miles

GREAT RIVER ENERGY

Figure 7-4B. Public Waters and Flood Plains - South

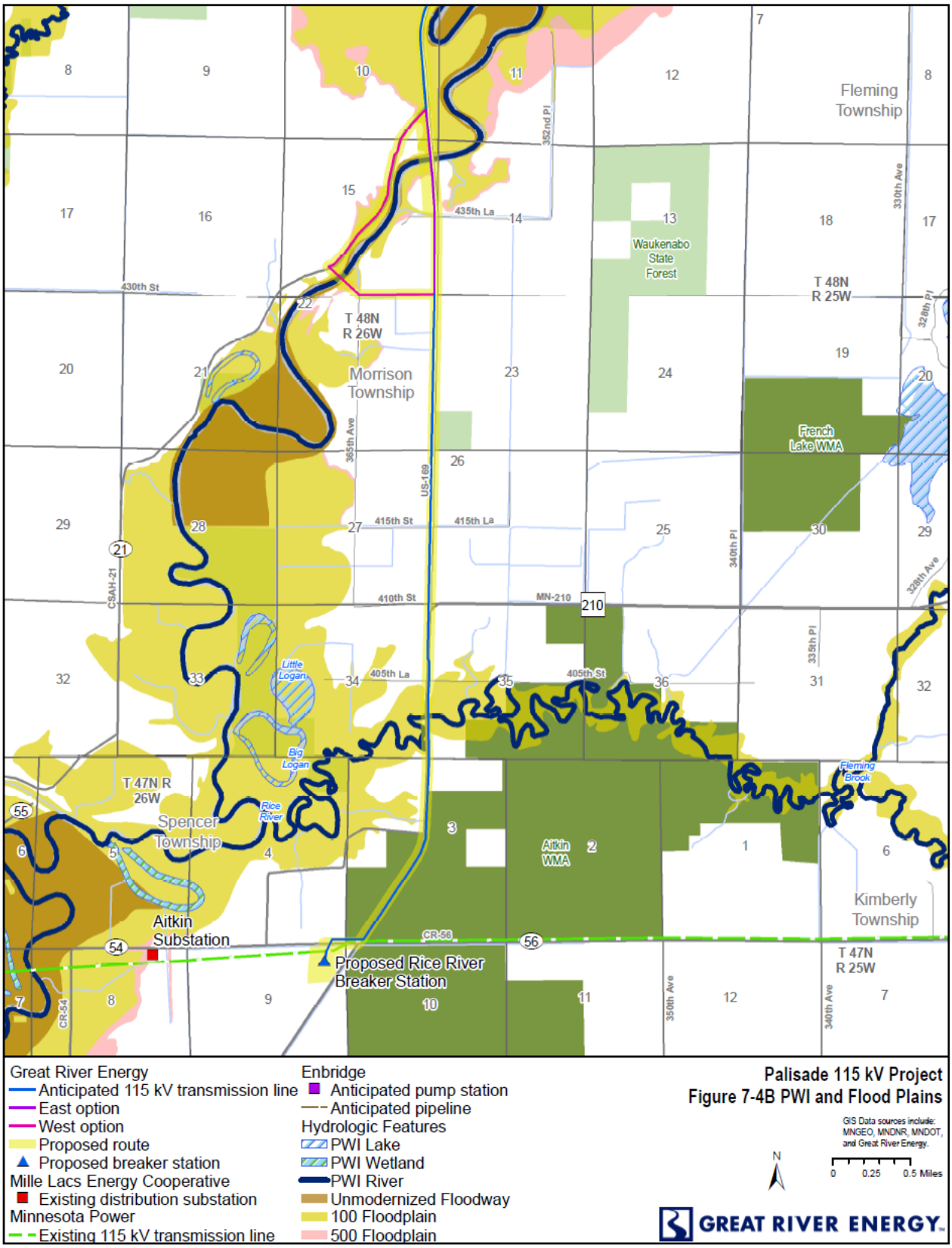


Figure 7-5A. National Wetlands Inventory - North

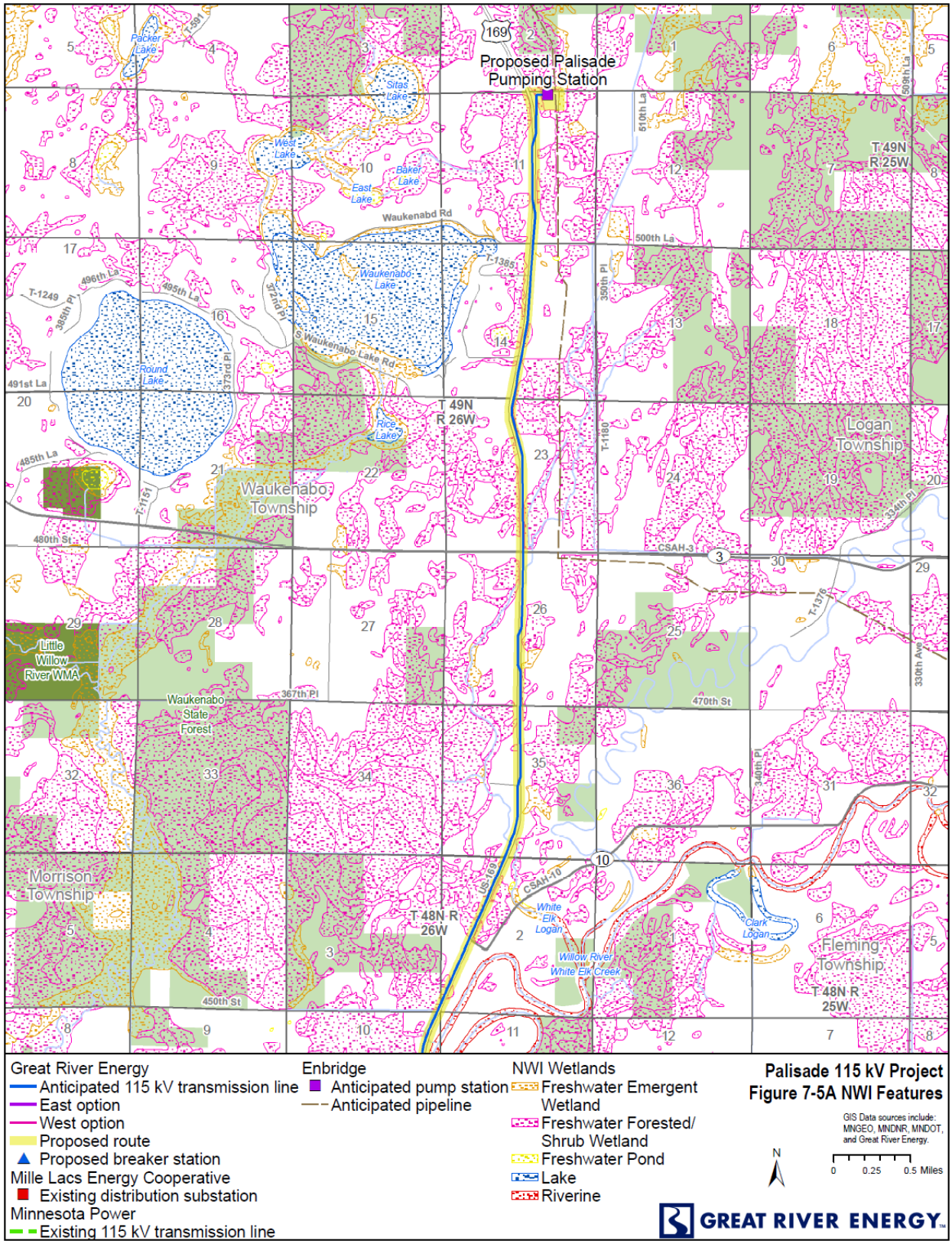
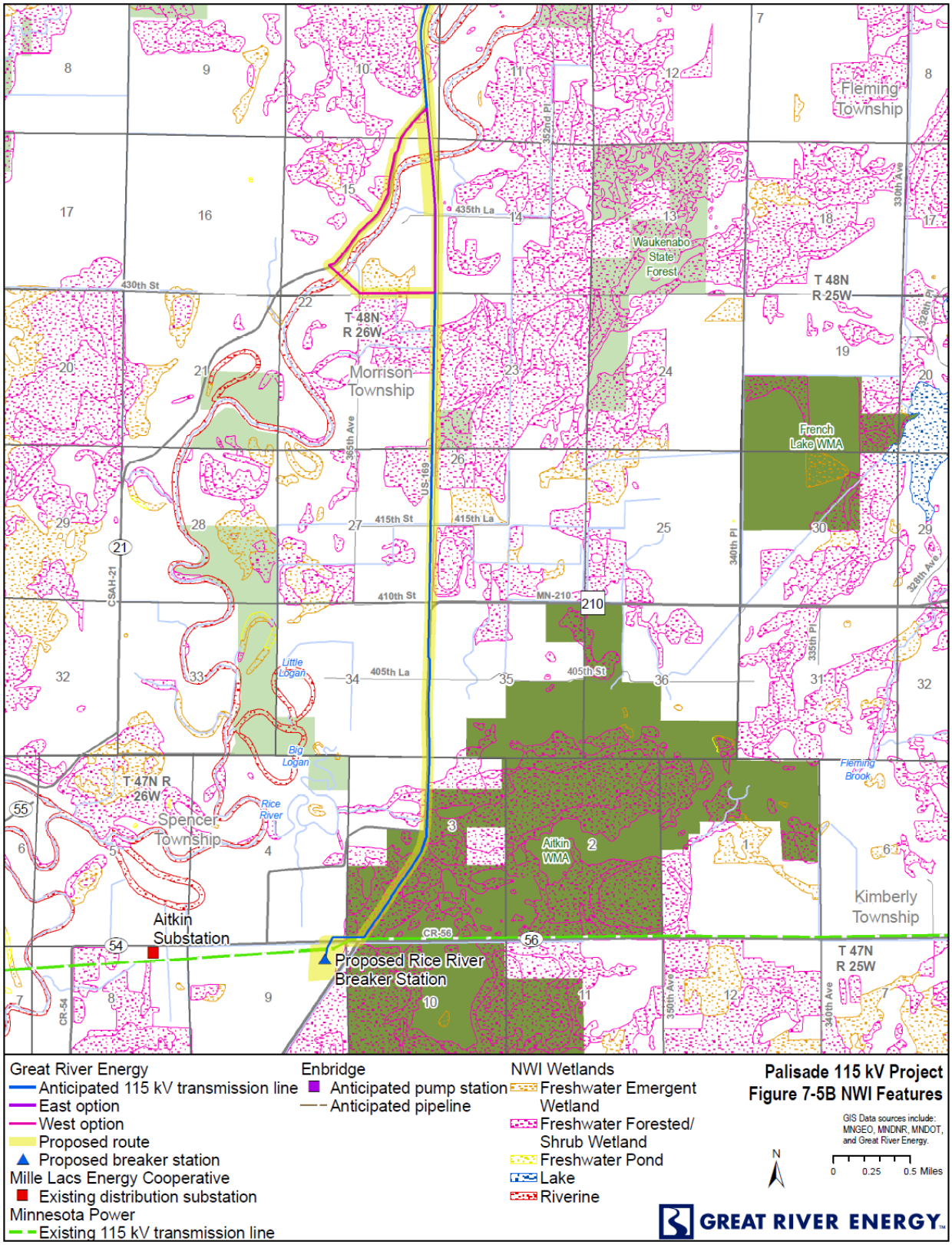


Figure 7-5B. National Wetlands Inventory – South



Ground Water

The DNR divides Minnesota into six groundwater provinces. Aitkin County is in the Central Province, which is described as sand aquifers in generally thick sandy and clayey glacial drift overlying Precambrian and Cretaceous bedrock.[25]

Lakes

Lakes in the Project area include Waukenabo Lake (666 acres), Round Lake (634 acres), Sitas Lake (59 acres), and West Lake (51 acres) (**Figures 7-4A, 7-4B, 7-5A and 7-5B**)[26]. The route is closest to Waukenabo Lake, about 1,200 feet from open water.

Rivers and Streams

The Project will cross the Rice River, Mississippi River, and two crossings of the White Elk Creek. The Willow River is located west of the Project (**Figures 7-4A, 7-4B, 7-5A and 7-5B**).

Public Waters

Public Waters are wetlands, water basins and watercourses of significant recreational or natural resource value in Minnesota as defined in Minnesota Statutes Section 103G.005. The DNR has regulatory jurisdiction over these waters, which are identified on the DNR Public Waters Inventory (PWI) maps (**Figures 7-4A and 7-4B)**.

The Rice River, Mississippi River and the White Elk Creek are all listed as Public Waters and will be crossed by the proposed transmission line.

Impaired Waters

Section 303(D) of the Federal Clean Water Act requires states to publish, every two years, a list of streams and lakes that are not meeting their designated uses because of excess pollutants (impaired waters). The list, known as the 303(d) list, is based on violations of water quality standards. In Minnesota, the MPCA has jurisdiction over determining 303(d) waters. These waters are described as "impaired."

Portions of the Rice River and the Mississippi River are listed as impaired.

Wetlands

Wetlands are important resources for flood abatement, wildlife habitat, and water quality. Wetlands that are hydrologically connected to the nation's navigable rivers are protected federally under Section 404 of the Clean Water Act. In Minnesota, wetlands are also protected under the Wetland Conservation Act.

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[25] http://files.dnr.state.mn.us/natural_resources/water/groundwater/provinces/gwprov.pdf

[26] http://www.dnr.state.mn.us/maps/compass.html

The U.S. Fish and Wildlife Service (USFWS) produced maps of wetlands (**Figures 7-5A and 7-5B)** based on aerial photographs and Natural Resources Conservation Service (NRCS) soil surveys starting in the 1970s. These wetlands are known as the National Wetland Inventory (NWI). Wetlands listed on the NWI may be inconsistent with current wetland conditions; however, NWIs are the most accurate and readily available database of wetland resources within the Project area and were therefore used to identify potential wetlands in proposed ROW.

Information on wetlands within the proposed ROW are provided in **Table 7-8.**

Within the proposed East Route Option ROW, approximately 17 acres of wetlands would be impacted. Approximately 16 of those acres are forested or shrubbed. Within the proposed West Route Option, approximately 20 acres of wetlands would be impacted. Approximately 18 of those acres are forested or shrubbed. The final acreage of wetlands affected by the Project will depend on the final route and alignment approved by the Commission and final design.

Table 7-8. Wetland Types within the ROW (NWI)

Cowardin Type[1]	No. of Basins	Wetlands in ROW (Acres)	Percent of Wetland Type within Proposed ROW
EAST ROUTE OPTION			
PFO/SSB	2	1.76	10.6%
PFO1/SSB	1	0.69	4.1%
PFO1B	1	0.11	0.6%
PSS/EM5B	4	4.91	29.6%
PSS1/EM5B	2	1.23	7.4%
PSS1/EM5C	2	0.01	<0.1%
PSS5B	4	2.00	12.0%
PSSB	6	5.28	31.8%
PUBHx	1	<0.01	<0.1%
R3UBH	1	0.61	3.7%
Total	**24**	**16.6**	**100%**
WEST ROUTE OPTION			
PEM5CH	1	1.79	8.9%
PFO/SSB	3	1.76	8.8%
PFO1/SB	1	0.69	3.4%
PFO1B	2	0.29	1.4%
PSS/EM5B	4	4.91	24.4%
PSS1/EM5B	3	2.92	14.5%
PSS1/EM5C	2	0.01	<0.1%

Cowardin Type[1]	No. of Basins	Wetlands in ROW (Acres)	Percent of Wetland Type within Proposed ROW
PSS5B	4	2.00	9.9%
PSSB	6	5.28	26.3%
PUBHx	1	<0.01	<0.1%
R3UBH	1	0.47	2.4%
Total	**28**	**20.11**	**100%**

[1]Cowardin et. al. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. US Department of the Interior, USFWS, Washington D.C.

The wetland type was classified using the Cowardin system that defines the habitat system, vegetative and sediment class and water regime. The wetland classification system is hierarchical, with wetlands and deepwater habitats divided among five major systems at the broadest level. The five systems include Marine (open ocean and associated coastline), Estuarine (salt marshes and brackish tidal water), Riverine (rivers, creeks, and streams), Lacustrine (lakes and deep ponds), and Palustrine (shallow ponds, marshes, swamps, sloughs). Systems are further subdivided into subsystems that reflect hydrologic conditions. Below the subsystem is the class that describes the appearance of the wetland in terms of vegetation or substrate. Each class is further subdivided into subclasses; vegetated subclasses are described in terms of life form, and substrate subclasses in terms of composition. The classification system also includes modifiers to describe hydrology (water regime), soils, water chemistry (pH and salinity), and special modifiers relating to man's activities (e.g., impounded, partly drained).

Some common symbols used in the wetland classification system include:

SYSTEM:	P – Palustrine	L - Lacustrine
CLASS:	RB - Rock Bottom	UB - Unconsolidated Bottom
	EM - Emergent	SS - Scrub-Shrub
	FO - Forested	OW - Open Water
MODIFIERS:	A - Temporarily flooded	B - Saturated
	C - Seasonally flooded	D - Seasonally well drained
	E - Seasonally saturated	F - Semipermanently flooded
	G - Intermittently flooded	H - Permanently flooded
SPECIAL MODIFIERS:	b - beaver	d - partially drained/ditched
	f - farmed	s – spoil
	x - excavated	

Impacts and Mitigation

The majority of the transmission line is overhead. The only subsurface activities are associated with the soil borings where the structures or foundations will be placed. Boring activities would have no long-term impacts to ground water. Placement of the structure or foundation in the soils would not impact general groundwater flows. No impacts to groundwater in the Project area are anticipated.

The transmission line will span all streams and rivers crossed by the route. Because the Project will span the rivers and streams it will not impede flow of the water or traffic on the water.

Construction activities near surface waters have the potential to increase turbidity due to runoff and sedimentation from construction activities. Great River Energy will avoid and mitigate impacts to surface water through the implementation of best management practices (BMPs) to minimize erosion and runoff. If the final design indicates that one or more acres of soil will be disturbed, Great River Energy will obtain a National Pollutant Discharge Elimination System (NPDES) Permit for Construction Activities from the Minnesota Pollution Control Agency that requires the development and implementation of a formal Stormwater Pollution Prevention Plan (SWPP Plan).

During construction and restoration activities, disturbed soils will be restored to previous conditions or better through seeding with appropriate seed mixes. Re-establishing vegetative cover will prevent any long-term erosion issues over the operating life of the Project.

Temporary impacts to wetlands may occur if they need to be crossed during construction of the transmission line. No staging or stringing setup areas will be placed within or adjacent to water resources, as practicable. Wetland impact avoidance measures that will be implemented during design and construction of the transmission lines include spacing and placing the power poles at variable distances to span and avoid wetlands, where possible. When it is not possible to span the wetland, several measures will be utilized to minimize impacts during construction:

- Construction crews will attempt to access the wetland with the least amount of physical impact to the wetland (e.g., shortest route) and will access poles near/in wetlands from roadways whenever possible to minimize travel through wetland areas.
- The structures will be assembled on upland areas before they are brought to the site for installation, when practicable.
- When possible, complete construction activities during frozen ground conditions.
- Construction mats (e.g., wooden mats or the Dura-Base Composite Mat System) will be used to protect wetland vegetation. Additionally, all-terrain construction vehicles may be used, which are designed to minimize impact to soils in damp areas.

Permanent impacts to wetlands would occur where structures must be located within wetland boundaries (approximately 20 square feet of permanent impacts per structure). Wetland vegetation would be restored in the disturbed areas following construction.

The Project will require a Section 10 Permit from the U.S. Army Corps of Engineers (Corps). The application for this permute requires specific design details that will not be available until after the Route Permit is issued. Great River Energy will complete the necessary application and submit it to the Corps after the Route Permit is issued. Great River Energy initiated contact with the Corps in a letter dated July 1, 2015[27]. The Corps responded that they will be unable to provide much review until further project details are available[28]

A Regional General Permit under Section 404 of the Clean Water Act from the Corps may be required for the Project. If so, Great River Energy will apply for a permit once design details are available, restore the wetlands as required by the Corps, and comply with the requirements of the Wetland Conservation Act.

Vegetation maintenance procedures under transmission lines prohibit trees from establishing. Existing trees must be removed throughout the entire ROW, including forested wetlands. These forested wetlands would undergo permanent vegetative changes within the ROW, and mitigation for the conversion of forested wetlands to emergent and scrub/shrub wetlands may be required by the Corps.

In the event that impacts to hydrologic features are unavoidable, Great River Energy will work with the jurisdictional agencies to determine the best ways to minimize the impacts and create appropriate mitigation measures.

7.6.3 **Flora and Fauna**

Flora

Presettlement vegetation in the area consisted of black spruce, tamarack, white cedar and black ash. The primary present day land uses in the Project area are forest management, agriculture, and recreation.

The Project will cross the Aitkin WMA, which provides potential habitat for native vegetation, wildlife and rare and unique resources.

Fauna

The DNR reports the area provides habitat for gray wolves, bald eagles, sharp-tailed grouse, sandhill cranes, trumpeter swans, boreal chickadees, Nelson's sharp-tailed sparrows and wood turtles [29]. The Aitkin WMA provides habitat for a variety of animal species, including birds, deer, small game and waterfowl. There are no USFWS Waterfowl Production Areas in the Project area.

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[27] Letter from Mark Strohfus, Great River Energy, to Rob Maroney, Corps. July 1, 2015. *See* Appendix E.

[28] Letter from Benjamin Cox, Corps, to Mark Strohfus, Great River Energy. August 24, 2015. *See* Appendix E.

[29] *Tomorrow's Habitat for the Wild and Rare: An action Plan for Minnesota Wildlife*, Tamarack Lowlands Subsection Profile, MN DNR, 2006
http://files.dnr.state.mn.us/assistance/nrplanning/bigpicture/cwcs/profiles/tamarack_lowlands.pdf

The USFWS website[30] for threatened and endangered species includes the Canada lynx (threatened), the gray wolf (threatened) and the northern long-eared bat (threatened) in Aitkin County.

The USFWS was contacted by letter[31] and by email[32] after the DNR Natural Heritage Information System (NHIS) data was obtained. USFWS replied in an email[33] dated August 13, 2015. Their response is discussed in **Section 7.7.**

Impacts and Mitigation

Minimal impacts to native vegetation are anticipated. The East Route Option would require clearing approximately 2.2 acres of trees, and the West Route Option would require clearing approximately 1.1 acres of trees. The proposed transmission line will follow existing road ROW for all of the Project (except for the Mississippi River crossing on the West Route Option) minimizing impacts to previously-undisturbed vegetation in that area. Great River Energy will implement an invasive species management plan (**Section 7.6.4**) to minimize the introduction of invasive species to the ROW.

There is minimal potential for the displacement of wildlife and loss of habitat from construction of the Project given the Project's close proximity to U.S. Highway 169. Wildlife that inhabits natural areas could be impacted in the short-term within the immediate area of construction. The distance that animals will be displaced will depend on the species. Additionally, these animals will be typical of those found in agricultural and forested settings and should not incur population level effects due to construction.

Raptors, waterfowl and other bird species may be affected by the construction and placement of the transmission lines. Avian collisions are a possibility after the completion of the transmission lines. Waterfowl are typically more susceptible to transmission line collision, especially if the transmission line is placed between agricultural fields that serve as feeding areas, or between wetlands and open water, which serve as resting areas. Bird diverters can be placed on the shield wire to help avoid avian impacts. Great River Energy will coordinate with the DNR (typically through the DNR's Water Crossing Licensing process) to identify areas where it would be beneficial to install bird diverters.

Great River Energy will address avian issues by working with the DNR and USFWS to identify any areas that may require marking transmission line shield wires and/or to use alternate structures to reduce the likelihood of collisions.

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[30] US Fish and Wildlife Webpage Endangered Species. http://www.fws.gov/Midwest/Endangered/LISTS/minnesot-cty.html

[31] Letters from Mark Strohfus, Great River Energy, to Andrew Horton, US Fish and Wildlife Service. June 9, 2015. *See* Appendix E.

[32] Email from Mark Strohfus, Great River Energy, to Andrew Horton, US Fish and Wildlife Services. August 9, 2015. *See* Appendix E.

[33] Email from Andrew Horton, US Fish and Wildlife Services, to Mark Strohfus, Great River Energy. August 13, 2015. *See* Appendix E.

7.6.4 **Invasive Species Management**

The movement of construction equipment to, from, and between various work sites has the potential to introduce and/or spread invasive species. Such species include reed canary grass, common buckthorn, purple loosestrife, and leafy spurge, in addition to various invasive aquatic species.

Impacts and Mitigation

Invasive aquatic species, including Eurasian water-milfoil, flowering rush, and zebra mussels, are not expected to a significant issue for construction of the Project. Great River Energy anticipates a construction schedule that would allow for stringing of conductor over potentially-infested waters during winter months over the ice. To minimize the potential for the introduction or spread of other invasive species, Great River Energy would propose the following BMPs during Project construction to the applicable regulatory agency(ies):

- All disturbed areas will be revegetated using weed-free seed mixes. If practicable, native plant species will be used to revegetate disturbed areas. Weed-free straw or hay will be used for erosion control;

- Herbicidal or manual vegetation removal may be implemented to minimize the spread of invasive species where such removal is consistent with easement conditions or landowner restrictions;

- Construction vehicles will be cleaned and inspected to remove dirt, mud, plants, and debris from vehicles and equipment prior to arriving at, and leaving from, construction sites; and

- The Construction Field Representative will oversee BMP installation and effectiveness.

After detailed design for the Project is complete, Great River Energy will coordinate with the DNR to determine if any additional invasive species mitigation measures are required on DNR lands or across DNR waterways.

7.7 **Rare and Unique Natural Resources**

Great River Energy completed a desktop review of the Natural Heritage Inventory System (NHIS) records provided by the DNR as shown in **Figures 7-6A and 7-6B**. This review identified the Wilson's phalarope (state threatened), the yellow rail (special concern), and the upland sandpiper (watch list) are within close proximity to the Project.

Figure 7-6A. Rare Features – North

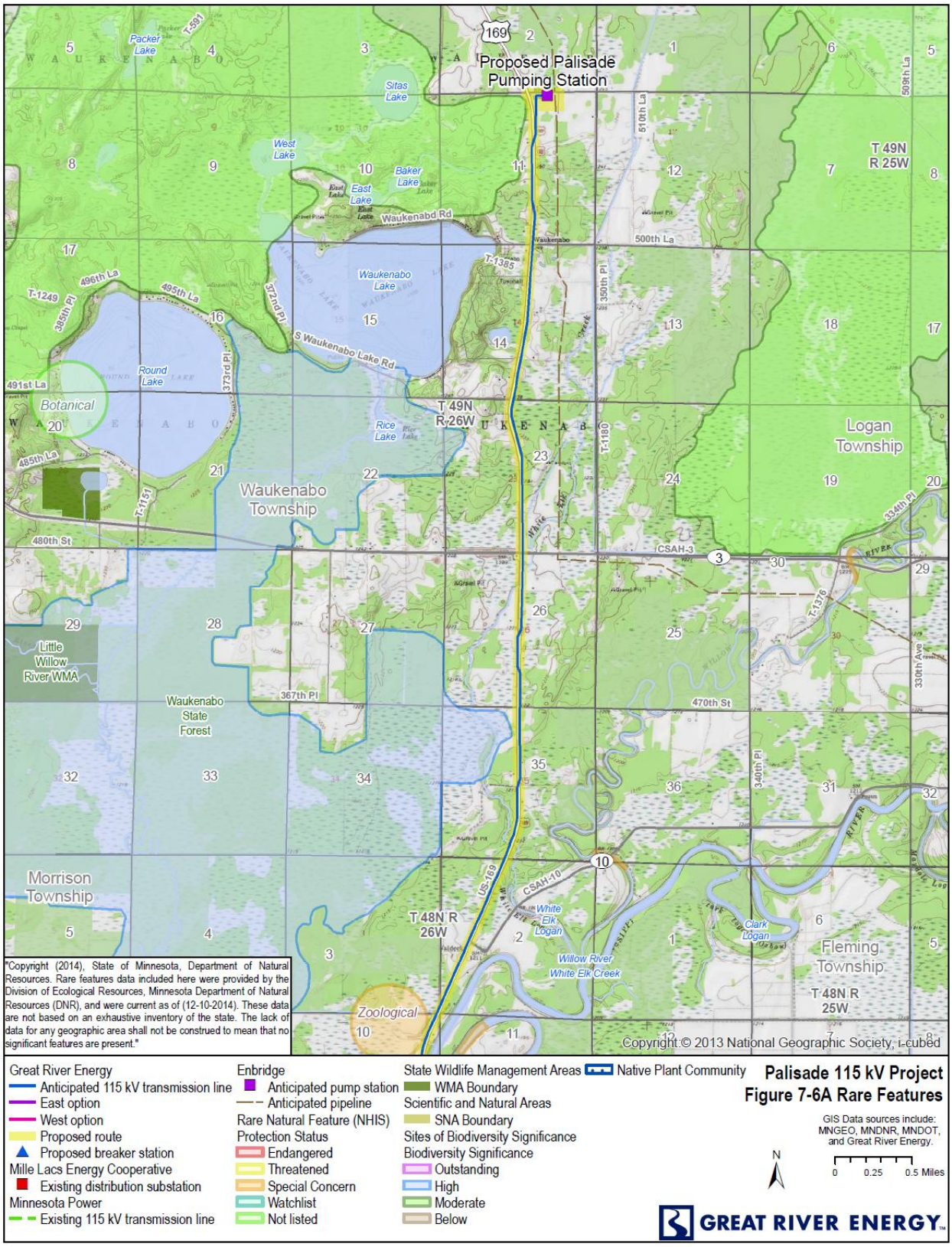
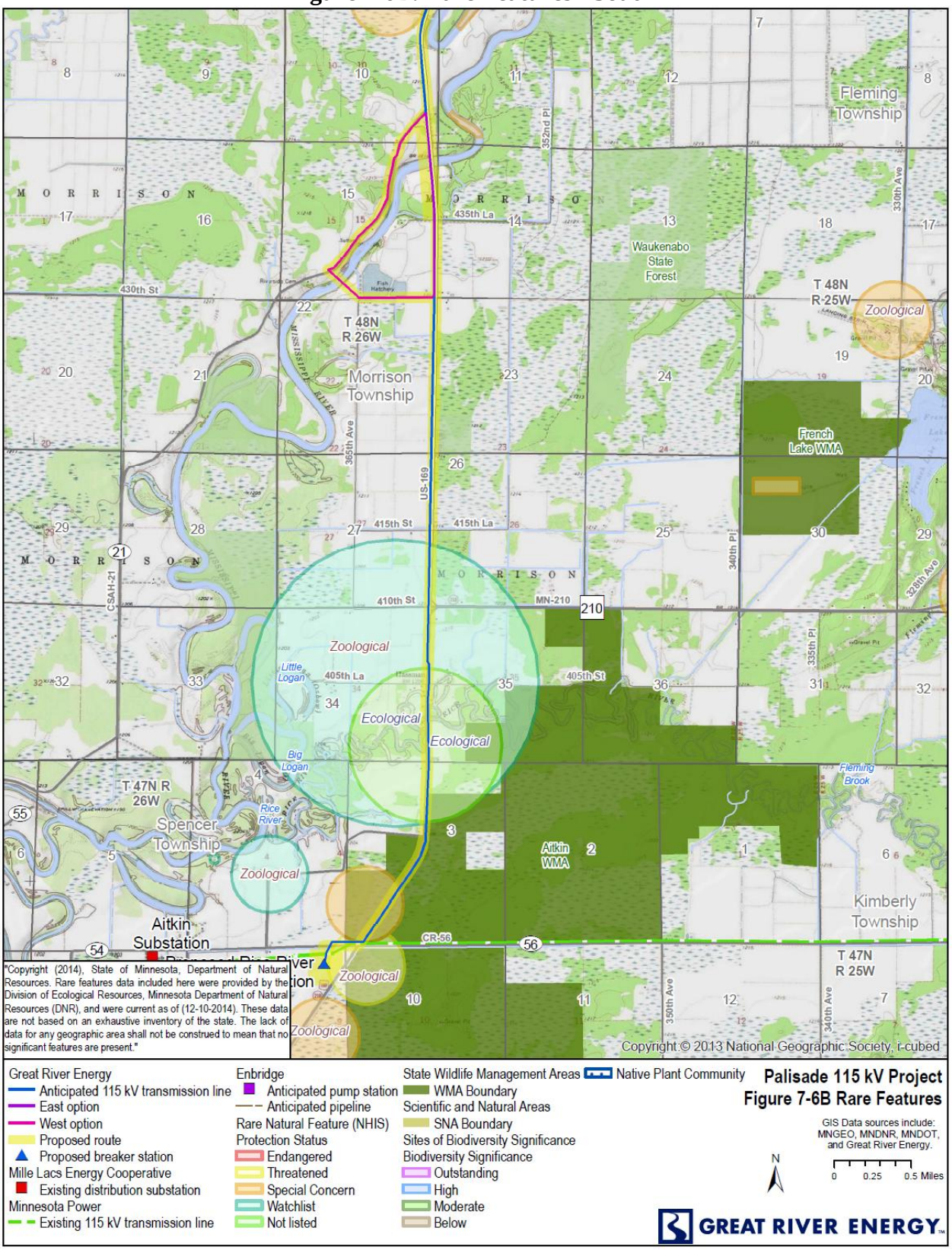


Figure 7-6B. Rare Features - South



Great River Energy also formally requested the DNR's input on the project through their NHIS Data Request process[34]. In an email dated August 7, 2015[35], the DNR identified:

- Two Sites of Biodiversity Significance adjacent to the Project. An area of Moderate Biodiversity is located west of U.S. Highway 169 in the vicinity of the Palisade Pump Station. An area of Significant Biodiversity, including a sedge meadow, is also located on the west side of the highway in Township 48N, Range 26W, Section 35 (**Figure 7-5A and Appendix E**). The DNR notes the sedge meadow is, "an uncommon but not rare native plant community in Minnesota."

- Several breading records of rare birds in the vicinity of the Project.

- The presence of northern long-eared bats (NLEB) within one-quarter mile of the requested route. The NLEB is a state-listed species of special concern and was recently listed by the U.S. Fish and Wildlife Service as threatened.

- The creek heelsplitter and the black sandshell, both state-listed species of special concern, as present in the Mississippi River in the vicinity of where the transmission line would span the river.

Impacts and Mitigation

Constructing along existing road ROW will avoid impacting undisturbed habitat in this area. Great River Energy will continue to coordinate with the DNR and USFWS to ensure that sensitive species in the Project area are not impacted by construction of the Project.

The following general measures will be used to help avoid or minimize impacts to area wildlife and rare natural resources during and after the completion of the proposed transmission line:

- Minimize tree felling and shrub removal that are important to area wildlife.

- Utilize BMPs to prevent erosion of the soils in the areas of impact.

- Implement sound water and soil conservation practices during construction and operation of the Project to protect topsoil and adjacent water resources and minimize soil erosion. Practices may include containing excavated material, protecting exposed soil, and stabilizing restored soil.

- Re-vegetate disturbed areas with native species and wildlife conservation species where applicable.

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[34] Email from Mark Strohfus, Great River Energy to Lisa Joyal, Minnesota Department of Natural Resources. June 9, 2015. *See* Appendix K.

[35] Email from Lisa Joyal, Minnesota Department of Natural Resources to Mark Strohfus, Great River Energy. August 7, 2015. *See* Appendix K.

- Implement raptor protection measures, including placement of bird flight diverters on the line at water crossings after consultation with local wildlife management staff.

The DNR recommended the following specific measures:

- *Given that activities in road rights-of-way can negatively affect adjacent native plant communities, especially through the introduction of invasive plant species, disturbance near these ecologically significant areas should be minimized. Actions to minimize disturbance may include, but are not limited to, the following recommendations:*

  - *Confine construction activities to the opposite side of the road from the Sites of Biodiversity. If this is not feasible, confine construction activities to the existing road rights-of-way;*
  - *As much as possible, operate within already-disturbed areas;*
  - *Minimize vehicular disturbance in the area (allow only vehicles necessary for the proposed work);*
  - *Do not park equipment or stockpile supplies in the area;*
  - *Do not place spoil within MBS Sites or other sensitive areas;*
  - *Inspect and clean all equipment prior to bringing it to the site to prevent the introduction and spread of invasive species;*
  - *If possible, conduct the work under frozen ground conditions;*
  - *Use effective erosion prevention and sediment control measures;*
  - *Revegetate disturbed soil with native species suitable to the local habitat as soon after construction as possible; and*
  - *Use only weed-free mulches, topsoils, and seed mixes. Of particular concern are birdsfoot trefoil (Lotus corniculatus) and crown vetch (Coronilla varia), two invasive species that are sold commercially and are problematic in prairies and disturbed open areas, such as roadsides.*

The DNR also noted the presence of the northern long-eared bat (NLEB), which is federally listed as threatened within one-quarter mile of the Project. The USFWS specifically commented on the NLEB in an August 13, 2015 email[36], which states:

> *Whether there will be a likely affect to the northern long-eared bat depends on the amount of suitable roosting habitat that will be removed as a result of this project. Based on our records, there is one known roost tree within 0.25 miles of your project area, however we anticipate the NLEB to be present along the entirety of this route where suitable habitat occurs. Conducting the forest clearing between January and April 2017 will greatly reduce the likelihood of direct take of the species, however, any clearing in the month of April runs an increased chance that NLEB will be present within the project area.*

[36] Email from Andrew Horton, US Fish and Wildlife Services, to Mark Strohfus, Great River Energy. August 13, 2015. *See* Appendix E.

> *If tree removal associated with this project is small and there is no clearing between April 1 and September 30th, then a no effect determination may be possible. Given this type of project however, I believe that the action will probably fall under a "may affect, but not likely to adversely affect" determination.*

The Project schedule currently has tree clearing slated for January 2017 to April 2017. Accordingly, Great River Energy anticipates that the USFWS will find that the Project may affect, but not likely to adversely affect the NLEB.

Once a route has been defined and detailed design of the line is available, Great River Energy will coordinate with the DNR and the USFWS to complete any required reviews and to ensure their concerns are addressed.

7.8 Physiographic Features

7.8.1 Topography

The proposed Project lies within the southwest portion of the Tamarack Lowlands Subsection of the Laurentian Mixed Forest Province under the DNR Ecological Classification Systems. This subsection is characterized as gently rolling, with a large lake plain and till plains.

The topography of the proposed routes is nearly level except at the Mississippi River crossing.

Impacts and Mitigation

Construction of the Project will not alter the topography along the routes; therefore, no mitigation is proposed.

7.8.2 Geology

Depth of glacial drift ranges from 100 to 300 feet thick with the thickest at the northern edge of the Glacial Lake Upham basin. Bedrock is Middle Precambrian, argillite, siltstone, quartzite or greywacke. Cretaceous shale, sandstone and clay are present near the southwest end of the basin.

Impacts and Mitigation

Few geological constraints on design, construction, or operation are anticipated in the Project area. If dewatering is found to be necessary during construction (e.g., during pole embedding), the effects on water tables would be localized and short term, and would not affect geologic resources. Construction of the Project will not alter the geology along the routes; therefore, no mitigation is proposed.

7.8.3 **Soils**

USDA data were reviewed to describe the soil resources in the vicinity of the Project. Soils are generally grouped into categories known as "associations." A soil association has a distinctive pattern of soils, relief and drainage, and is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. The following soil associations are present along the proposed route (**Figures 7-7A and 7-7B)**:

- Rifle-Greenwood
- Tonkey-Sago
- Willosippi-Spooner-Pengilly-Baudette
- Willosippi-Spooner-Brickton
- Cushing-Alstad

The U.S. Department of Agriculture describes these soils types as[37]:

> *The **Rifle** series consists of very deep, very poorly drained soils formed in organic deposits more than 51 inches thick in bogs and depressional areas within ground moraines, end moraines, outwash plains, and lake plains. These soils have moderately rapid permeability. Slopes range from 0 to 2 percent.*
>
> *The **Greenwood** series consists of very deep ,very poorly drained soils formed in organic deposits more than 51 inches thick on outwash plains, till floored lake plains, or lake plains. These soils have moderate or moderately rapid permeability. Slopes range from 0 to 2 percent.*
>
> *The **Tonkey** series consists of very deep, poorly drained and very poorly drained soils formed in stratified loamy and sandy glaciofluvial deposits on lake plains, outwash plains, or glacial drainageways. Slope ranges from 0 to 2 percent.*
>
> *The **Sago** series consists of very deep, very poorly drained soils formed in a thin layer of organic material and underlying stratified sandy and loamy sediments. They are in glacial lake plains and on river terraces. These soils have moderate to moderately rapid permeability in the organic material and moderate permeability in the lower material. Slopes range from 0 to 1 percent.*
>
> *The **Willosippi** series consists of very deep, poorly drained soils formed in predominantly loamy stratified lacustrine and glaciofluvial sediments on glacial lake plains and moraines. These soils have moderate or moderately rapid permeability in the upper part and moderate or moderately slow permeability in the lower part. Slopes range from 0 to 2 percent.*

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[37] http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/soils/home/?cid=nrcs142p2_053587

Figure 7-7A. Soils - North

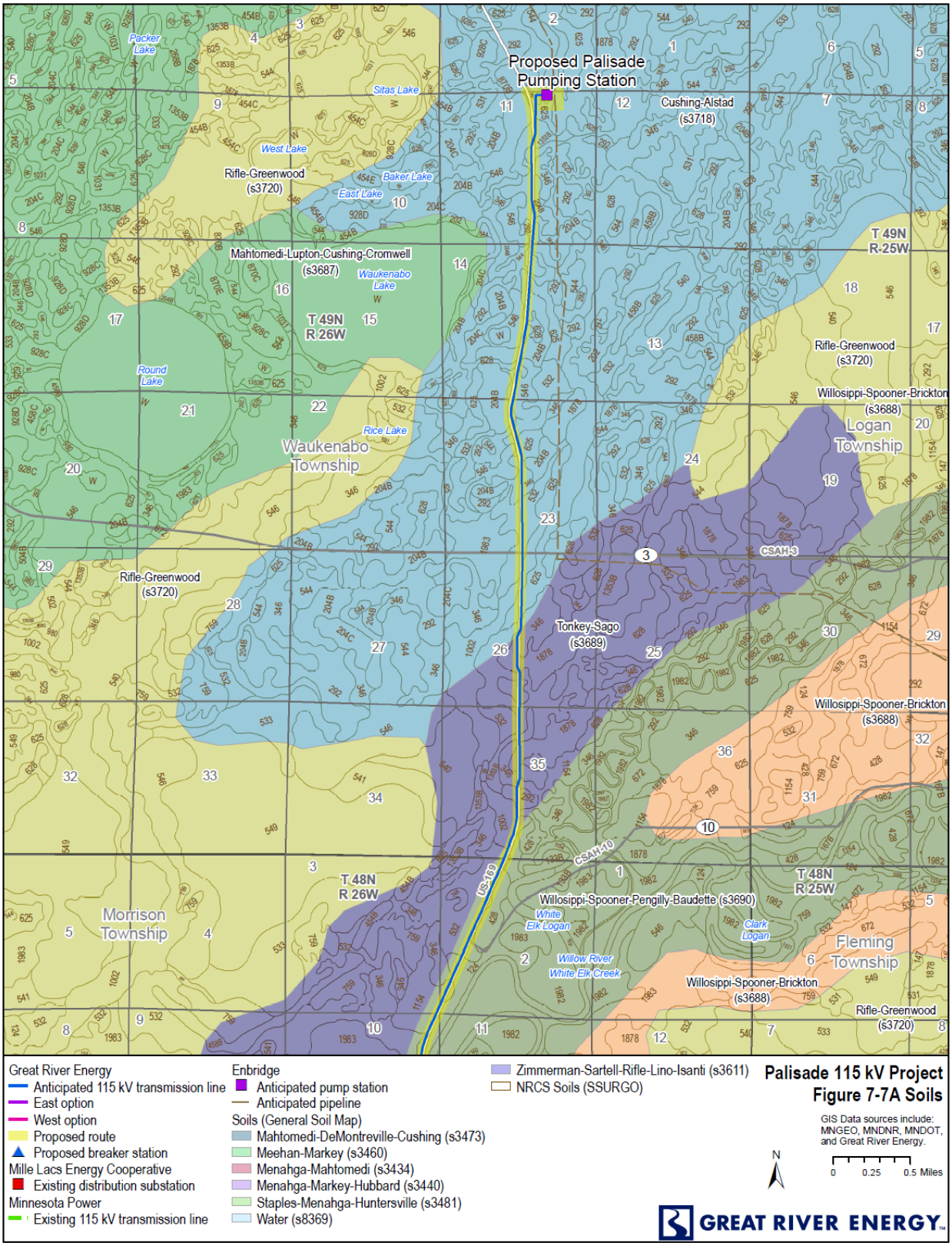
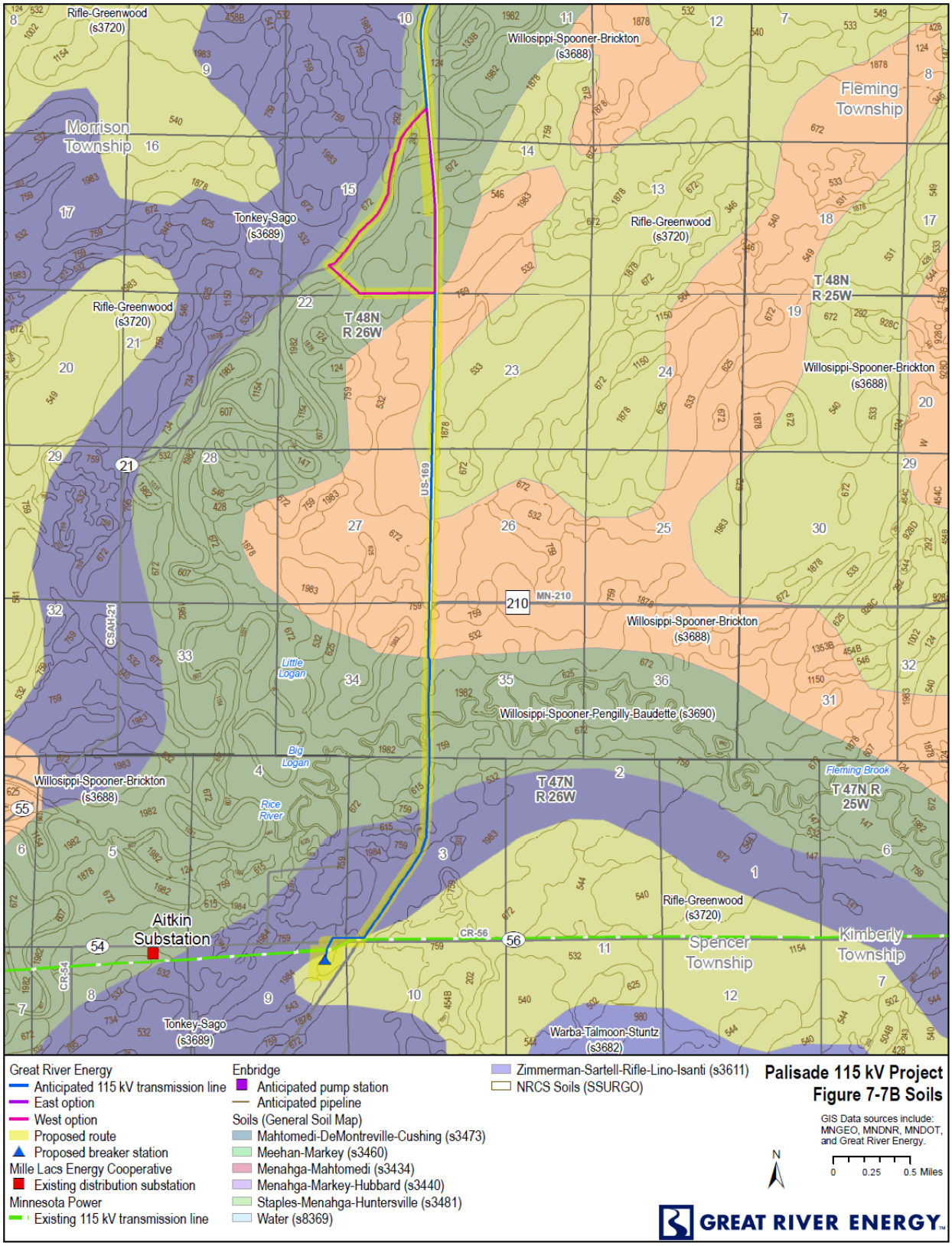


Figure 7-7B. Soils - South



*The **Spooner** series consists of very deep, poorly drained soils that formed in silty calcareous lacustrine sediments on glacial lake plains or ground moraines. The saturated hydraulic conductivity is moderate. Slope ranges from 0 to 2 percent.*

*The **Pengilly** series consists of very deep, poorly drained soils formed in loamy alluvium on flood plains. These soils have moderate permeability. Slopes are 0 to 2 percent.*

*The **Baudette** series consists of very deep, moderately well drained soils that formed in lacustrine deposits. These soils are on glacial lake plains and moraines. Slope ranges from 0 to 6 percent.*

*The **Brickton** series consists of very deep, poorly drained soils that formed in silty and clayey calcareous glacial lacustrine sediments on glacial lake plains and moraines. Slopes range from 0 to 2 percent.*

*The **Cushing** series consists of very deep, well drained soils that formed in loamy calcareous till on ground moraines. These soils have moderate permeability in the solum and moderately slow in the underlying till. Slopes range from 20 to 35 percent.*

*The **Alstad** series consists of very deep, somewhat poorly drained soils that formed in loamy, calcareous till. These soils are on moraines. Slope ranges from 0 to 4 percent.*

Impacts and Mitigation

Potential impacts of construction are compaction of the soil and exposing the soils to wind and water erosion. Impacts to physiographic features should be minimal during and after installation of the transmission line structures, and these impacts will be short term. There should be no long-term impacts resulting from this Project.

Soils will be revegetated as soon as possible to minimize erosion or some other method used during construction to prevent soil erosion.

If over one acre of soil will be disturbed during the construction of the transmission line, Great River Energy will obtain a NPDES construction stormwater permit from the MPCA and will prepare a Storm Water Pollution Prevention Plan. Erosion control methods and BMPs will be utilized to minimize runoff during line construction.

7.9 Unavoidable Impacts

Construction of the Palisade 115 kV Project will have nominal unavoidable impacts.

The Project will parallel road ROW for nearly all of the new 13 miles of transmission line. Paralleling existing road ROW will avoid the direct impacts associated with constructing new transmission ROW in areas that have remained relatively less disturbed than the road ROW.

The Project will require only minimal commitments of resources that are irreversible and irretrievable. Irreversible and irretrievable resource commitments are related to the use of

nonrenewable resources and the effects that the use of these resources have on future generations. Irreversible commitments of resources are those that result from the use or destruction of a specific resource that cannot be replaced within a reasonable time frame. Irretrievable resource commitments are those that result from the loss in value of a resource that cannot be restored after the action.

Those commitments that do exist are primarily related to construction. Construction resources include aggregate resources, concrete, steel, and hydrocarbon fuel. During construction, vehicles necessary for these activities would be deployed on site and would need to travel to and from the construction area, consuming hydrocarbon fuels. Other resources would be used in pole construction, pole placement, and other construction activities.

8 APPLICATION OF RULE CRITERIA

8.1 Route Permit

According to Minnesota Statutes Section 216E.02, subd. 1, it is the policy of the state of Minnesota to locate high voltage transmission lines in an orderly manner that minimizes adverse human and environmental impacts and ensures continuing electric power system reliability and integrity. The Commission has promulgated standards and criteria for issuing route permits (Minn. R. 7850.4000). That rule provides that the Commission shall issue route permits for high voltage transmission lines that are consistent with state goals to conserve resources, minimize environmental impacts and impacts to human settlement, minimize land use conflicts, and ensure the state's electric energy security through efficient, cost-effective transmission infrastructure.

The transmission line proposed for the Palisade 115 kV Project addresses all the criteria that are applied in evaluating a new transmission line project. Following existing road ROW conserves resources, while minimizes environmental and other impacts that would occur if the Project did not parallel the existing road ROW. Constructing the line at 115 kV capability helps ensure a reliable and secure power source for the Palisade Pump Station.

For all the reasons described in this Application, the Commission should issue a Route Permit for the Palisade 115 kV Project.

8.2 Conclusion

Great River Energy respectfully requests that the Commission issue a Route Permit that designates the route for the Palisade 115 kV transmission line. Great River Energy requests that the Commission designate a route wider than the necessary ROW for the Project, to allow flexibility in determining the precise location of the transmission centerline and structures.

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