GREAT RIVER ENERGY

APPLICATION TO THE
MINNESOTA PUBLIC UTILITIES COMMISSION
FOR A
ROUTE PERMIT

ALTERNATIVE PERMITTING PROCESS

PARKERS PRAIRIE 115 KV PROJECT

PARKERS PRAIRIE
115 kV SUBSTATION AND TRANSMISSION LINE
REBUILD

Docket TL-11-867

GREAT RIVER ENERGY℠
A Touchstone Energy® Cooperative

24 October 2011

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

LIST OF ACRONYMS

ACRONYMS	
ACSR	Aluminum conductor steel reinforced
BPA	Bonneville Power Administration
Commission	Minnesota Public Utilities Commission
Corps	United States Army Corps of Engineers
CP	Canadian Pacific
CSAH	County State Aid Highway
dBA	Decibel
DNR	Minnesota Department of Natural Resources
EMF	Electromagnetic fields
EPA	Environmental Protection Agency
EQB	Minnesota Environmental Quality Board
G	Gauss
HVTL	High voltage transmission line
Hz	Hertz
kV	Kilovolt
kV/m	Kilovolts per meter
LREC	Lake Region Electric Cooperative
mG	Milligauss
MHS	Minnesota Historical Society
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MW	Megawatt
NAC	Noise area classifications
NESC	National Electrical Safety Code
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetlands Inventory
OTP	Otter Tail Power
ppm	Parts per million
PWI	Public Water Inventory
RF	Radio frequency
SWPPP	Stormwater Pollution Prevention Plan
USFWS	United States Fish and Wildlife Service

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Description of Application

Application for a Route Permit for 115 kilovolt (kV) Substation and Overhead High Voltage Transmission Line (HVTL) Rebuild to Support Increased Load Growth in the Parkers Prairie Area.

Pursuant to Minnesota Statutes Section 216E.04 and Minnesota Rules 7850.2800 to 7850.3900, Great River Energy (Applicant) hereby makes application to the Minnesota Public Utilities Commission (Commission) for a Route Permit for an overhead 115 kV HVTL and associated substation modifications in Otter Tail County, Minnesota (Project). The Project will meet the electrical needs of the Applicant's member cooperative Lake Region Electric Cooperative (LREC) customers located in the Parkers Prairie area. A route permit is required because the proposed HVTL would be capable of operating at a nominal voltage of more than 100 kV and is greater than 1,500 feet in length.[1] This Application is submitted under the alternative permitting process (see August 25, 2011 letter, Appendix A).[2,3] The proposed HVTL is less than 10 miles in length (2.1 miles), therefore, a certificate of need is not required.[4]

The Application is divided as follows:

1. **EXECUTIVE SUMMARY** – background information on the Applicant and LREC and a brief description of the Project.

2. **INTRODUCTION** – proposed ownership of the HVTL and associated facilities;[5] the permittee for the Project, discussion of the reason for the Project, eligibility for the alternative permitting process; explanation why a certificate of need is not required and Notice to the Commission.

3. **PROJECT INFORMATION** –Project cost analysis including costs of construction, operation and maintenance.[6]

4. **DESCRIPTION OF THE PROPOSED PROJECT** – detailed description of the proposed Project, including HVTL specification and design and substation specifications;[7] and information on the

[1] *See* Minn. Stat. § 216E.01, Subd. 4.
[2] Letter from Marsha Parlow, Great River Energy to Burl W. Haar, MN PUC. 25 August 2011. *See* Appendix A.
[3] *See* Minn. Stat. § 216E.04 and Minn. R. 7850.1000 and 7850.1300 .
[4] Minn. Stat §§ 216B.2421, subd. 2(3) and 216B.243, subd. 2 requiring a certificate of need for 115 kV lines more than ten miles in length or that crosses a state line.
[5] Minn. R. 7850.1900 subpt. 2(A).
[6] Minn. R. 7850.1900 subpt. 2(K).
[7] Minn. R. 7850.1900 subpt. 2(D).

alternatives considered by the Applicant and reasons they were rejected.[8]

5. **ENGINEERING AND OPERATIONAL DESIGN OF PROPOSED HVTL** – Project engineering and operational design concepts, including electric and magnetic fields and air quality.[9]

6. **PROPERTY/RIGHT OF WAY ACQUISITION AND RESTORATION** – existing utility and public rights of way along the Proposed Route,[10] description of right of way requirements, property/right of way acquisition procedures, tree clearing and right of way restoration procedures.[11]

7. **CONSTRUCTION, OPERATION AND MAINTENANCE OF THE HVTL**–description of the procedures and practices for construction, operation and maintenance of the proposed HVTL.[12]

8. **ENVIRONMENTAL INFORMATION** – description of the environmental setting, effects on environmental and human resources, and mitigative measures,[13] including identification of land uses and environmental conditions along the Proposed Route.

9. **AGENCY INVOLVEMENT, PUBLIC PARTICIPATION, AND PERMITS AND APPROVALS NEEDED** – agency contact and public participation opportunities and a list and brief description of possible federal, state and local permits required for the proposed Project.[14]

10. **SUMMARY** – key elements of the Route Permit Application and a comparison to the established factors for consideration in evaluating this Application.[15]

Content requirements of a Route Permit Application are outlined in Minnesota Rules 7850.1900, subpart 2. A Completeness Checklist detailing where information required by rule can be found in this Application is provided in Table 1.

[8] Minn. R. 7850.3100.
[9] Minn. R. 7850.1900 subpt. 2(J).
[10] Minn. R. 7850.1900 subpt. 2(I).
[11] Minn. R. 7850.1900 subpt. 2(M).
[12] Minn. R. 7850.1900 subpt. 2(M).
[13] Minn. R. 7850.1900 subpts. 2(E-F) and 3.
[14] Minn. R. 7850.1900 subpt. 2(N).
[15] Minn. R. 7850.4100.

Table 1 Completeness Checklist

Authority	Required Information	Where
Minn. R. 7850.2800, Subp. 1(C)	Subpart 1. **Eligible Projects**. An applicant for a site permit or a route permit for one of the following projects may elect to follow the procedures of parts 7850.2800 to 7850.3900 instead of the full permitting procedures in parts 7850.1700 to 7850.2700 for high voltage transmission lines of between 100 and 200 kilovolts	2.4
Minn. R. 7850.2800, Subp. 2.	Subpart 2. **Notice to Commission**. An applicant for a permit for one of the qualifying projects in subpart 1, who intends to follow the procedures of parts 7850.2800 to 7850.3700, shall notify the PUC of such intent, in writing, at least 10 days before submitting an application for the project	2.5 & Appendix A
Minn. R. 7850.3100	**Contents of Application** (alternative permitting process) The applicant shall include in the application the same information required in part 7850.1900, except the applicant need not propose any alternative sites or routes to the preferred site or route. If the applicant has rejected alternative sites or routes, the applicant shall include in the application the identity of the rejected sites or routes and an explanation of the reasons for rejecting them	Section 4.4 (See also 7850.1900, Subp.2 below)
Minn. R. 7850.1900, subp. 2 (applicable per Minn. R. 7850.3100)	**Route Permit for HVTL** (a) a statement of proposed ownership of the facility at the time of filing the application and after commercial operation	Section 2.1
	(b) the precise name of any person or organization to be initially named as permittee or permittees and the name of any other person to whom the permit may be transferred if transfer of the permit is contemplated	Section 2.2
	c) at least two proposed routes for the proposed high voltage transmission line and identification of the applicant's preferred route and the reasons for the preference	Not applicable, per Minn. R. 7850.3100
	(d) a description of the proposed high voltage transmission line and all associated facilities including the size and type of the high voltage transmission line	Sections 1.2, 4.1, 4.2 Figures B-1 to B-6, 5-1
	(e) the environmental information required under 7850.1900, Subp. 3	See Minn. R. 7850.1900, subp. 3 (A)-(H) below
	(f) identification of land uses and environmental conditions along the proposed routes	Section 8 Figures B-8 to B-12
	(g) the names of each owner whose property is within any of the proposed routes for the high voltage transmission line	Section 9.2 & Appendix C
	(h) United States Geological Survey topographical maps or other maps acceptable to the chair showing the entire length of the high voltage transmission line on all proposed routes	Figures B-1 to B-2, B-8 to B-12, 1-2
	(i) identification of existing utility and public rights-of-way along or parallel to the proposed routes that have the potential to share right-of-way with the proposed line	Section 6.1
	(j) the engineering and operational design concepts for the proposed high voltage transmission line, including information on the electric and magnetic fields of the transmission line	Sections 5.1-5.3, Tables 5-1 and 5-2 Sections 8.2.3 & 8.2.4
	(k) cost analysis of each route, including the costs of constructing, operating and maintaining the high voltage transmission line that are dependent on design and route	Section 3.4 Table 3-1

Authority	Required Information	Where
	(l) a description of possible design options to accommodate expansion of the high voltage transmission line in the future	Section 4.3
	(m) the procedures and practices proposed for the acquisition and restoration of the right-of-way, construction and maintenance of the high voltage transmission line	Sections 6.2-6.5 Figure B-7
	(n) a listing and brief description of federal, state and local permits that may be required for the proposed high voltage transmission line	Section 9.3 Table 9-1
	(o) a copy of the Certificate of Need or the certified HVTL list containing the proposed high voltage transmission line or documentation that an application for a Certificate of Need has been submitted or is not required	Section 2.3 (Not Required)
Minn. R. 7850.1900, subp. 3	**Environmental Information** (a) a description of the environmental setting for each site or route	Section 8.1
	(b) a description of the effects of construction and operation of the facility on human settlement, including, but not limited to, public health and safety, displacement, noise, aesthetics, socioeconomic impacts, cultural values, recreation and public services	Section 8.2 Figure B-3–B-6
	c) a description of the effects of the facility on land-based economies, including, but not limited to, agriculture, forestry, tourism and mining	Section 8.3 Figure B-8
	(d) a description of the effects of the facility on archaeological and historic resources	Section 8.4
	(e) a description of the effects of the facility on the natural environment, including effects on air and water quality resources and flora and fauna	Sections 8.5 – 8.7 Figures B-8- B-12
	(F) a description of the effects of the facility on rare and unique natural resources	Section 8.5.4 Figure B-10
	(g) identification of human and natural environmental effects that cannot be avoided if the facility is approved at a specific site or route	Section 8
	(h) a description of measures that might be implemented to mitigate the potential human and environmental impacts identified in items A to G and the estimated costs of such mitigative measures	Section 8

1. EXECUTIVE SUMMARY

1.1 General

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 LREC, the distribution cooperative serving the area proposed to be supplied by Great River Energy's new transmission line (Figure 1-1). Great River Energy's distribution cooperatives, in turn, supply electricity and related services to more than 645,000 residential, commercial and industrial customers in Minnesota and Wisconsin.

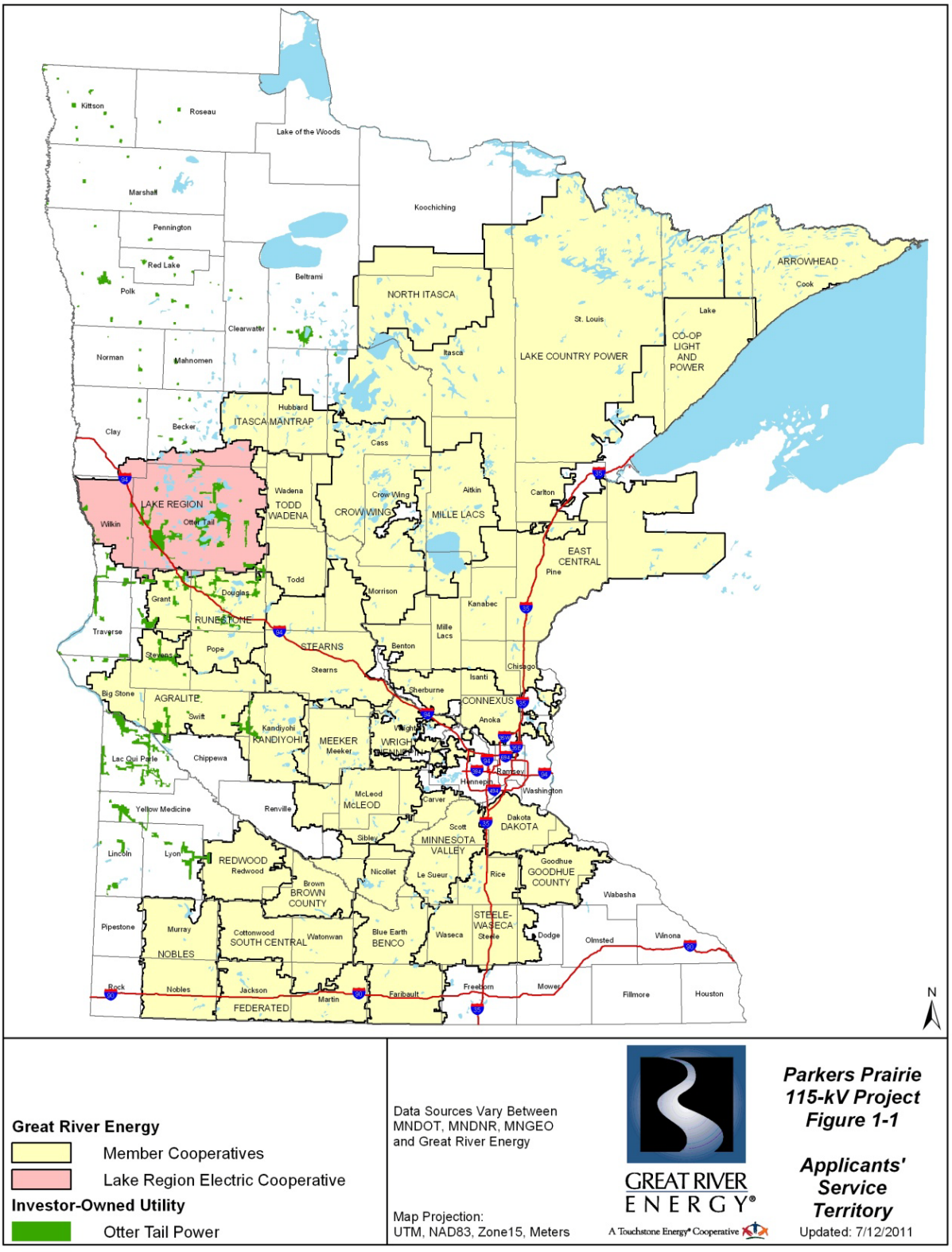
Great River Energy's 2,800-megawatt (MW) generation system includes a mix of baseload and peaking plants, including coal-fired, refuse-derived fuel, natural gas and oil plants as well as new wind generators. Great River Energy owns approximately 4,500 miles of transmission line in Minnesota, North Dakota, South Dakota and Wisconsin.

Great River Energy is a member of the Midwest Reliability Organization and the Midwest Independent Transmission System Operator.

LREC distributes electricity and related services to approximately 14,720 residential, commercial and industrial customers and seasonal homes in Minnesota. LREC's wholesale power provider is Great River Energy.

The Applicant's and LREC's mission is to provide safe, reliable, competitively - priced energy to those they serve. System power flow studies indicate there will be low voltage issues across the local LREC and Otter Tail Power (OTP) distribution systems if unplanned outage events of the regional 41.6 kV transmission grid occur.

Figure 1-1 Great River Energy Service Territory



1.2 Description of the Project

The Applicant analyzed the existing power service to the region and determined the existing electrical network has reached its capacity and will be deficient for serving new load growth. To address this deficiency, a new transmission line is required to meet existing and future electric load requirements. See Section 3.1 for further information on studies that determined the need.

The proposed facility additions described below will provide voltage support across the local LREC and OTP distribution systems west of the City of Parkers Prairie and will reduce the radial exposure of the line to Parkers Prairie by about four miles.

1.2.1 Proposed Project

The purpose of the Project is to upgrade the existing Parkers Prairie distribution substation from a 41.6 kV system to a proposed 115 kV system, which will improve the electrical reliability to LREC members. To supply the upgraded distribution substation, the proposed Project would include rebuilding two miles of the existing Lake Region Parkers Prairie Tap (LR-PPT) 41.6 kV transmission line owned by Great River Energy and constructing 360 feet of new transmission line to connect to the existing Great River Energy Lake Region Inman to Alexandria (LR-IA) 115 kV transmission line. Figures depicting various aspects of the Project are provided in Appendix B.

The proposed Project (a total of 2.1 miles of transmission line) includes the following components:

- Rebuild approximately two miles of existing LR-PPT line between the Parkers Prairie Substation and the LR-IA 115 kV transmission line (Figure B-1, Appendix B). Approximately 360 feet of new transmission line will also be constructed to connect to the LR-IA line. Along roads, the transmission line poles would be approximately two to five feet outside of road right of way. Taller poles may be needed to cross the railroad tracks.

- Expand the LREC Parkers Prairie Substation approximately 40 feet to the south and modify to accommodate the new transmission line.

- Construct a 115 kV, 2000 amp, 3-way switch structure at the intersection of the proposed 115 kV transmission line and the LR-IA 115 kV transmission line.

- Replace two to four structures on the existing LR-IA 115 kV line with slightly taller structures that gradually raise the height of the conductors for the connection to the proposed switch structure.

- Remove approximately 1650 feet of the overhead 41.6 kV line that runs south of the proposed 115 kV line and parallel along MN 27.

The Proposed Route for the new transmission line is described below and shown in Figure 1-2.

1.2.2 Proposed Route

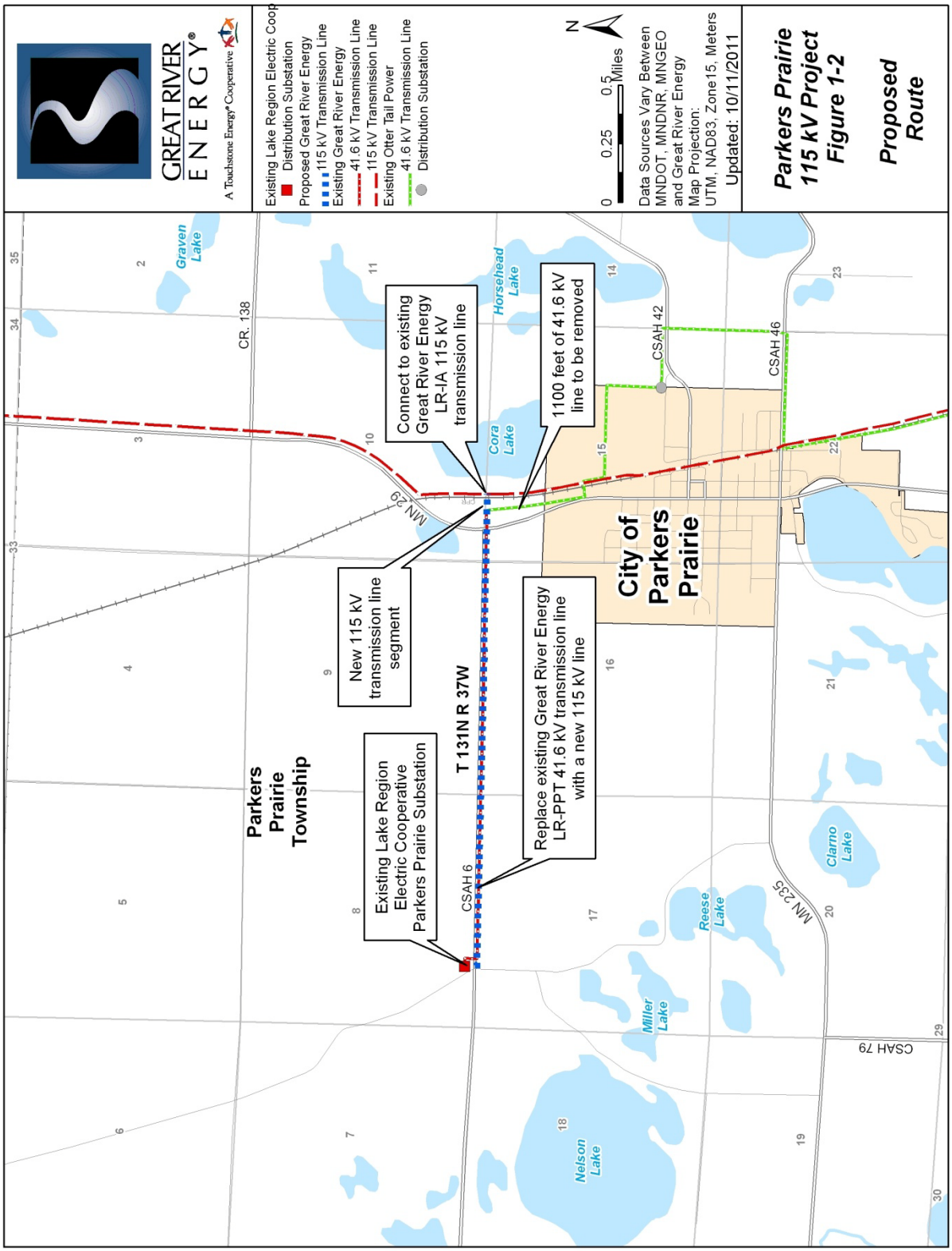
The Proposed Route exits the south side of the Parkers Prairie Substation, runs east along County State Aid Highway (CSAH) 6 for approximately two miles to Minnesota State Highway (MN) 29, then continues east approximately 360 feet across MN 29 and the Canadian Pacific (CP) railroad to the existing LR-IA 115 kV transmission line.

The route width proposed is 300 feet wide, 150 feet on each side of the Proposed Route centerline (Figure B-1, Appendix B). The proposed easement width in most areas is 100 feet, 50 feet on each side of the transmission centerline.

There is a distribution line on the north side of CSAH 6. Great River Energy plans to be on the south side of CSAH 6; however, in the event there are issues with landowners on the south side (i.e. guying rights or conflicts with center pivot irrigation systems), Great River Energy would want flexibility to explore other options, such as underbuilding or burying the distribution line.

The existing 41.6 kV line, south of CSAH 6, is generally 50 feet south of the centerline of the road. The road right of way is also 50 feet from the centerline. The exact dimension of the 41.6 kV line right of way is unclear because the existing easement documents do not specify a width. However, a 50-foot right of way has been maintained on that line. The requested right of way for the proposed 115 kV line is 100 feet. The proposed 115 kV transmission structures will be placed approximately 5 feet outside of the road right of way. Great River Energy stays out of road right of way as a standard practice to accommodate future road improvements (Figure B-2, Appendix B).

Figure 1-2 Proposed Route



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2. INTRODUCTION

2.1 Proposed Ownership

Great River Energy will own approximately 2.1 miles of single circuit 115 kV overhead transmission line that will extend from the existing Parkers Prairie Substation south and east to the existing LR-IA 115 kV transmission line.

Great River Energy will acquire a permanent easement for the high voltage (115 kV) transmission facilities and control building (for metering, instrumentation, telecommunications and the battery bank) that it will own and operate separately at the Parkers Prairie Substation.

2.2 Permittees

Great River Energy will be named as permittee for this Project. Transfer of the permit to any other person or organization is not anticipated.

Contact information for the Applicant is provided below.

Permittee: Great River Energy
12300 Elm Creek Blvd.
Maple Grove, Minnesota 55369

Contact: Marsha Parlow
Transmission Permitting Analyst
Environmental Services

Phone: (763) 445-5215

Email: mparlow@grenergy.com

2.3 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 in part 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."[16] The proposed Parkers Prairie Project is less than ten miles in length and does not cross a state line; therefore a certificate of need is not required.

[16] Minn. Stat. § 216B.2421, subd. 2(3).

2.4 Eligibility for the Alternative Permitting Process

The Parkers Prairie Project involves rebuilding of the LR-PPT 41.6 kV line to 115 kV and a 115 kV, 2000 amp 3-way switch with grading structures to connect the rebuilt line to the LR-IA 115 kV transmission line, and modification of existing substation facilities. Because the proposed transmission line Project is between 100 kV and 200 kV, it is eligible for review under the alternative permitting process authorized by Minn. Stat. § 216E.04, subd. 2(3) and Minn. Rules 7850.2800, subp. 1(C). The Applicant requests that the Project be considered for review under the alternative permitting process.

Permit application requirements are listed in Table 1. This table includes cross-references indicating the location of required information contained within the Parkers Prairie Project Route Permit Application.

2.5 Notice to the Commission

The Commission was notified by a letter dated and e-filed August 25, 2011, that the Applicant intended to utilize the alternative permitting process for the proposed Parkers Prairie Project.[17] This notice complies with the requirement to notify the Commission at least ten days prior to submission of an application.[18] A copy of this letter is included in Appendix A.

[17] Minn. Stat. § 216E.04 and Minn. R. 7850.2800.
[18] Minn. R. 7850.2800, subpt. 2.

3. PROJECT INFORMATION

3.1 Project Purpose

The Project is being proposed to address low voltage issues that jeopardize reliable electrical service to consumers in the rural areas of Parkers Prairie. The need for this Project has been addressed in planning documents.[19] [20] If voltage cannot be maintained within acceptable limits, electrical appliances and lighting will not perform as expected and could potentially be damaged.

3.1.1 Transmission System Description

The largely rural west side of Parkers Prairie is presently served from the 41.6 kV system. The Parkers Prairie Substation is located at the radial end of an old and high impedance transmission line. This results in a large voltage drop along the 41.6 kV high impedance lines and causes low voltage problems in the area.

The 41.6 kV system that serves the area cannot maintain acceptable system voltages during contingencies. The substation is served from the Miltona 115/41.6 kV substation at system normal and from Brandon 115/41.6 kV substation during contingencies on the Miltona 115/41.6 kV transformer or Miltona – Parkers Prairie Tap 41.6 kV line. The Parkers Prairie Substation serves a relatively large load in the area, and the fact that it is located on the radial end of an aged high impedance transmission line causes a significant voltage drop along the 41.6 kV lines that serve the Parkers Prairie Substation. This results in low voltage problems in the area during critical contingences to the Parkers Prairie Substation (Figure B-3, Appendix B).

3.2 Project Location

The proposed Parkers Prairie 115 kV Project is located northwest of Parkers Prairie in Parkers Prairie Township, Sections 8, 9, 10, 15, 16 and 17, T131N, R37W, Otter Tail County, Minnesota (Figure B-1, Appendix B and Figure 1-2).

3.3 Project Schedule

Construction is expected to begin on the Parkers Prairie Project in late 2012. An in-service date in spring 2013 is anticipated.

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[19] Great River Energy 2008 Long Range Plan – Pages F17-F18
http://www.greatriverenergy.com/deliveringelectricity/planningforthefuture/doc083180.pdf

[20] http://www.greatriverenergy.com/deliveringelectricity/planningforthefuture/transmissionsystemassessmentmap_western.pdf

3.4 Project Cost Analysis

3.4.1 Project Costs

Estimates for the proposed transmission line is divided into three categories: pre- and post-construction; construction; and operation and maintenance costs. Pre- and post-construction costs include expenditures for permitting, surveying (land and cultural resources), engineering, right of way acquisition, right of way clearing and right of way restoration. Construction costs include substation modifications and transmission line construction. The Applicant and LREC also evaluated the operation and maintenance costs associated with the Project after it is placed in service.

3.4.2 Pre- and Post-Construction Costs

Pre-construction costs include labor and expenses for preparation and approval of the Application, public information meetings, public hearings, any required natural resource or cultural resource surveys, licensing or permitting fees, easement and land acquisition for approximately 2.1 miles of transmission line right of way, surveying, engineering, and the cost of right of way clearing. Post-construction costs include the restoration and revegetation of disturbed soils after construction of the Project is complete.

3.4.3 Construction Costs

Transmission line costs vary depending on the structure type, the number of structures per mile (i.e. span length), the height and diameter of the wood poles, labor and hardware costs. Line construction costs include the cost of structures, insulators, conductors, bird flight diverters where necessary and labor, as well as any costs of equipment that will be used to construct the new line and modify the substation.

Single pole with underbuild construction costs are approximately $430,000 per mile including removal of the existing distribution and transferring to the new poles. Single pole (without underbuild) costs are approximately $340,000 per mile. The single pole structures with underbuild would be more expensive because of additional costs incurred by removing the existing lower voltage circuit distribution and reattaching it to the new poles and the need for shorter average spans, resulting in more structures per mile.

Estimated Project costs are shown in Table 3-1.

Table 3-1 Estimated Project Costs (2011 Dollars)

Owner	Route	Estimated Pre- and Post-Construction Costs $	Estimated Construction Costs - 115 kV Transmission Line $	Estimated Substation Modification Costs $	Total Project Cost $
Great River Energy	Proposed Route (2.1 miles)	465,000	681,000	75,000	1,221,000
LREC	NA	NA	NA	250,000	250,000
Total	**2.1 miles**	**465,000**	**681,000**	**325,000**	**1,471,000**

All costs for the transmission line will be borne by the Applicant. Distribution substation modification costs will be borne by LREC.

3.4.4 Operation and Maintenance Costs

Operation and maintenance costs associated with the Parkers Prairie Substation will be minimal, other than weed control inside the substation.

The estimated annual cost of right of way maintenance is between $500 and $750 per mile of transmission line.

In addition to these right of way maintenance costs, annual operating and maintenance costs associated with 115 kV transmission lines in Minnesota currently average about $600 per mile. Storm restoration, annual inspections and ordinary replacement costs are included in these annual operating and maintenance costs.

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4. PROJECT ANALYSIS

The Applicant is proposing the following transmission Project in the Parkers Prairie area:

- Rebuild approximately two miles of existing LR-PPT line between the Parkers Prairie Substation and the LR-IA 115 kV transmission line (Figure B-1, Appendix B). Approximately 360 feet of new transmission line will also be constructed to connect to the LR-IA line. Along roads, the transmission line poles would be approximately two to five feet outside of road right of way. Taller poles may be needed to cross the railroad tracks.

- Expand the LREC Parkers Prairie Substation approximately 40 feet to the south and modify to accommodate the new transmission line.

- Construct a 115 kV, 2000 amp, 3-way switch structure at the intersection of the proposed 115 kV transmission line and the LR-IA 115 kV transmission line.

- Replace two to four structures on the existing LR-IA 115 kV line with slightly taller structures that gradually raise the height of the conductors for the connection to the proposed switch structure.

- Remove approximately 1650 feet of the overhead 41.6 kV line that runs south of the proposed 115 kV line and parallel along MN 27.

These transmission improvements are discussed in more detail below.

4.1 Transmission Line

4.1.1 Route Selection Process

The proposed 2.1 miles of overhead 115 kV transmission line were reviewed during the electrical planning process by a team comprised of transmission planning, right of way, field services, transmission construction and maintenance, environmental and engineering design personnel (siting team). The siting team reviewed the general Project area for significant routing and siting issues that may arise, as well as any electric system performance issues associated with the various route alternatives. The process described below was used with a Proposed Route selected for this Application in accordance with Minnesota Rules 7850.3100. No route alternatives were identified for this Project (see Section 4.4).

4.1.2 Route Selection Criteria

The siting team analyzed the Project area using various geographic data (e.g., aerial photos, topographic maps, public water inventory maps, etc.). Preliminary route options were then identified based on opportunities to:

- Parallel roads to help decrease the amount of right of way required;
- Reduce impacts to the reliability of existing transmission systems during construction.

4.1.3 Proposed Route

The Proposed Route for which the Applicant is requesting a permit from the Commission exits the south side of the Parkers Prairie Substation, runs east along CSAH 6 for approximately two miles to MN 29, continues east approximately 360 feet across MN 29 and the CP railroad to the existing LR-IA transmission line as shown in Figures B-4 to B-7 (Appendix B).

4.1.4 Route Width Requested

The Applicant requests that the Commission approve a 300-foot route that extends 150 feet on both sides of the road centerline, the LR-IA centerline, and cross country over the CP railroad to the LR-IA line to allow flexibility to accommodate potential challenges along the Route. The Applicant's right of way will be 50 feet on each side of the transmission centerline in most areas. There may be guying outside of the 50 foot right of way; however, they will remain in the permitted route area.

4.2 Substation Modifications

The existing Parkers Prairie Substation (Figure B-4, Appendix B) is located in Section 8, Township 131N, Range 37W in Parkers Prairie Township. LREC will replace the transformer and associated equipment to accommodate the new 115 kV to 12.5 kV transformation at the Parkers Prairie Substation. LREC is considering expansion of their Parkers Prairie Substation fence line approximately 40 feet south of the existing substation. This expansion will be on existing LREC property.

The Applicant will own and operate all the high voltage (115 kV) transmission facilities, the control building (which contains metering and telecommunications equipment), instrumentation and the battery bank.

4.3 Design Options to Accommodate Future Expansion

The Project is designed to maintain necessary reliability requirements in the area and is sized to accommodate electric demand growth and future electrical system configurations that may be needed to continue to provide a reliable electrical system. The Parkers Prairie Substation conversion to 115 kV will greatly extend the life of the remaining 41.6 kV system in the area.

4.4 Alternative Routes Considered and Rejected

The alternative review process under which this application is submitted, does not require an applicant for a Route Permit to identify and evaluate an alternative route to the preferred route, as is required for transmission lines above 200 kilovolts. Because the preferred route in this case is an existing transmission line, there is little likelihood that another route would be preferable to the preferred route. However, Minn. Stat. 216E.04, subd. 3 and Minn. Rules 7850.3100 require an applicant to identify any alternative routes that were considered and rejected.

Because the preferred route follows an existing transmission line, there were no readily apparent alternative routes to consider to determine whether they offered any benefits over the preferred route.

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5. ENGINEERING AND OPERATIONAL DESIGN OF THE PROPOSED HVTL AND EXISTING SUBSTATION

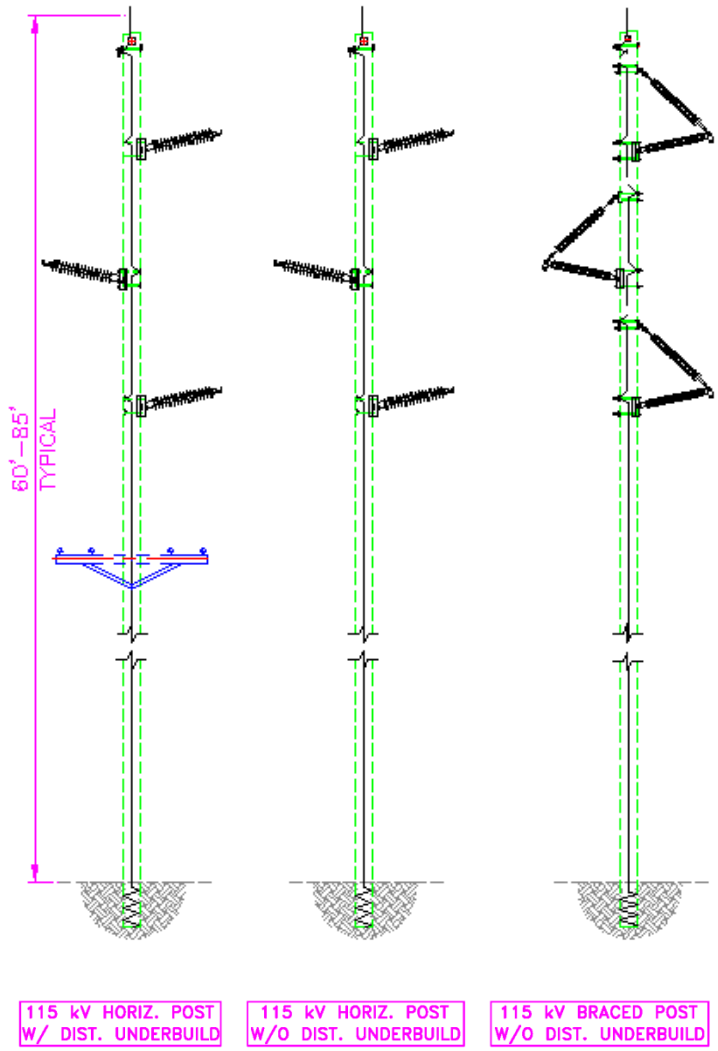
5.1 Transmission Structures

Design voltage of the proposed transmission line is 115 kV. Total length of the Project is approximately 2.1 miles, with slight variations depending on the exact route chosen. The proposed line and the existing substation are within Otter Tail County, Minnesota.

The transmission line would be constructed with 477 aluminum conductor steel reinforced (ACSR). The line would use three single conductors (not bundled).

Typical structure types to be used for this Project are shown in Figure 5-1.

Figure 5-1 Schematic Diagrams of Typical Structures



Single pole wood structures with horizontal post insulators will be the primary structure used for the Project. Horizontal post insulators will be used unless design requires longer spans beyond the capability of the insulators, in which case a braced post design will be utilized to accommodate the increased loadings. Deflections in the horizontal alignment may require guying (the use of anchors and support cables) or specialty structures. In isolated cases, the horizontal length of guy wire and anchor assemblies could extend as much as twenty feet beyond of the standard right of way width. In these situations, the Applicant will negotiate and acquire an additional "box-shaped" easement area outside of the standard right of way width to accommodate the additional length of the guy wires. The guying easements will be situated within the boundary of the permitted route. Where guying is not practicable, direct-embedded laminated wood poles or steel poles on drilled pier concrete foundations will be utilized.

The single circuit structures will have three single conductor phase wires and one shield wire. The phase wires will be 477 thousand circular mil ACSR with seven steel core strands and 26 outer aluminum strands. The shield wire will be 0.465 optical ground wire. The average span length will be approximately 300-400 feet and structure heights will range from 60 to 85 feet above ground. Structures, pole heights and spans will vary depending upon topography and environmental constraints (such as highway crossings, stream crossings, and required angle structures). The proposed right of way easement width is 50 feet on each side of the transmission centerline. The average diameter of the wood poles at ground level is 20 inches.

A 115 kV, 2000 amp, 3-way switch structure will be located at the intersection of the proposed 115 kV transmission line and the LR-IA 115 kV transmission line. The switch structure will likely consist of a direct-embedded laminated wood pole, which may or may not require the use of guy wires. However, a self-supporting steel pole on a drilled pier foundation may be required. In either case, the switch would be directly mounted to the structure.

Two to four structures on the existing LR-IA 115 kV line may need to be replaced with slightly taller grading or transitional structures that gradually raise the height of the conductors for the connection to the proposed switch structure.

Approximately 1650 feet of the overhead 41.6 kV line that runs south of the proposed 115 kV line and parallel along MN 27 will be removed in the 2013 timeframe. OTP has indicated that the 1650 feet (northern section) will no longer be needed and the remaining southern section may be operated at 12.5 kV for distribution service. OTP and Great River Energy will coordinate on which utility will remove the 1650 feet of line.

5.1.1 Construction Considerations

Clearances

The transmission line will be designed to meet the National Electric Safety Code (NESC) and the Institute of Electrical and Electronics Engineers standards. The NESC recommends minimum safety standards for clearances over roadways, buildings, signs, light standards, and other facilities.

The Applicant has company standards that meet or exceed the NESC requirements. Clearances over highways and roadways will exceed the 20.1 feet recommended by the NESC. Although the NESC gives recommended clearances over buildings, the Applicant generally does not locate transmission lines directly over a building unless it cannot be avoided. Horizontal clearances to buildings, signs, light standards, and other installations will be determined by calculating the blowout of the wire, structure deflection, and safe electrical clearance from the line.

Clearance checks would be performed during the design of the transmission line, as the locations of structures will not be known until that time. The structure locations, span lengths, and tension in the wires will ultimately affect the amount of blowout on the transmission line. Blowout will be addressed in design and is not expected to go beyond the edge of transmission right of way.

5.1.2 Material Requirements

Construction of the transmission line will require the use of renewable, recycled and non-renewable resources. Renewable resources consist of the wooden poles, recycled resources consist of conductors and shield wires, and non-renewable resources consist of insulators, and related hardware.

5.2 Substation Modifications

The proposed Project involves upgrade of the Parkers Prairie Substation. LREC will own all common substation facilities (land, fence, etc.) and operate the low voltage distribution facilities. Great River Energy will have a permanent easement for its transmission facilities on the Parkers Prairie Substation property.

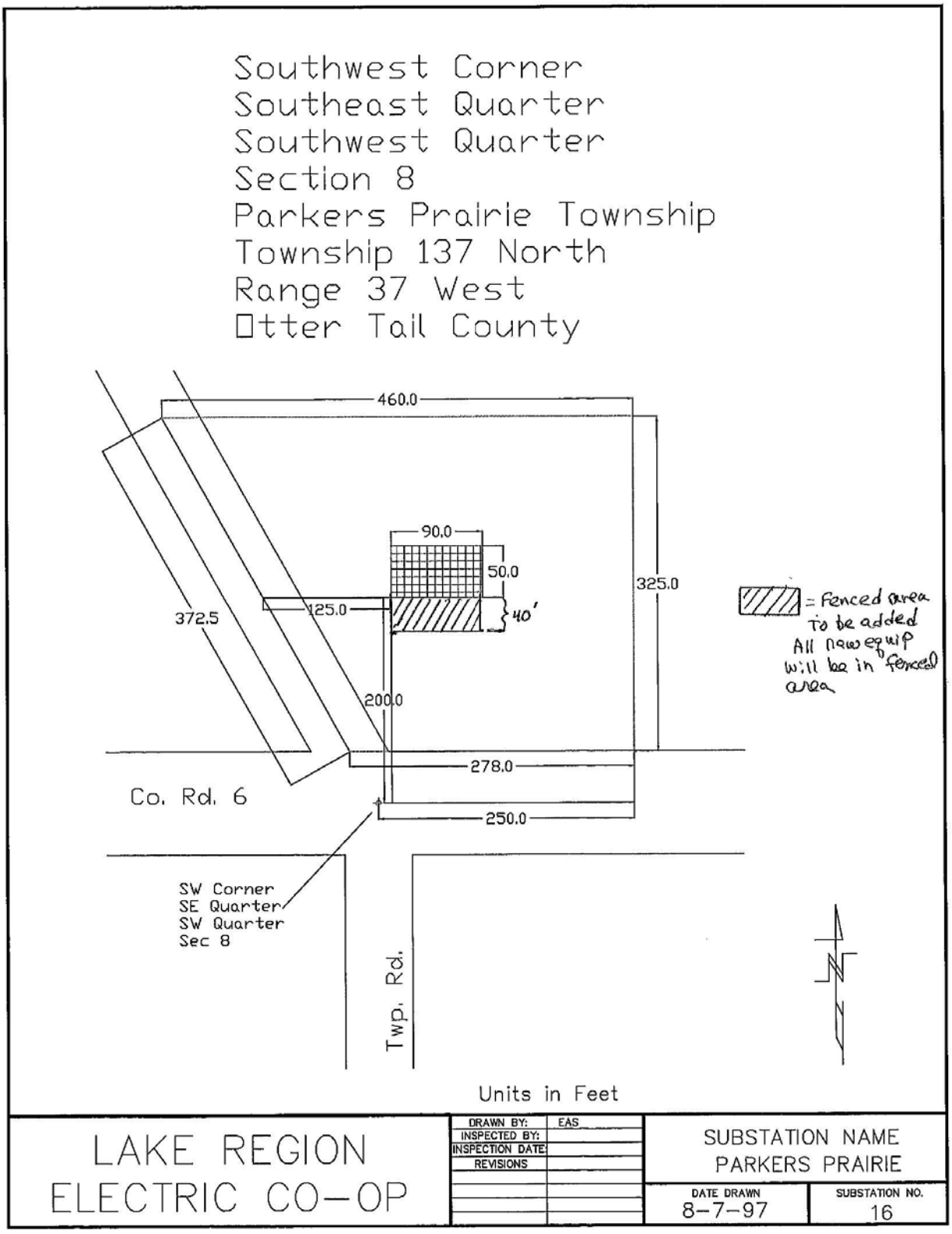
The proposed Project will require these additional components:

- Construction of a new 115 kV high side, fuses and disconnect switches at LREC Parkers Prairie Substation for the 115 kV line termination,
- Current and potential distribution transformers and meter to accommodate the Parkers Prairie Substation upgrade from the 41.6 kV system to the 115 kV system.

- Other minor equipment and additional foundations to accommodate the new transformers and high side dead-end and other related structures.

Applicant will own and operate its respective high voltage (115 kV) facilities and control buildings, except the 115 kV high side structure that LREC will construct in Parkers Prairie Substation for the 115 kV line termination. LREC is proposing to expand the site approximately 40 feet south (Figure 5-2), which would involve some grading activity. All components will reside within the fenced in area.

Figure 5-2 Layout of Proposed Parkers Prairie Substation Expansion



5.3 Electric and Magnetic Fields

The term "EMF" refers to electric and magnetic fields that are coupled together such as in high frequency radiating fields. For lower frequencies such as for power lines, EMF should be separated into electric fields and magnetic fields. HVTLs operate at a frequency of 60 hertz (Hz) (cycles per second), which is in the non-ionizing portion of the electromagnetic frequency spectrum. Fields are considered ionizing when they cause electrons to eject from their orbits around a normal atom, which typically occurs in frequency ranges of 10^{16} to 10^{22} Hz.

5.3.1 Electric Fields

The transmission line voltage generates an electric field, but the magnitude of the electric field rapidly decreases with distance from the conductor. The electric field is expressed in a unit of volts per meter. Although there is no state or federal standard for transmission line electric field exposures, the Minnesota Environmental Quality Board (EQB) developed a standard of a maximum electric field limit of 8 kilovolts per meter (kV/m) at one meter above ground. That standard, which has been used by the Commission in routing assessments, was implemented to mitigate serious hazard from shocks when touching large objects parked under transmission lines with voltage of 500 kV or greater.

Table 5-1 summarizes the electric fields calculated for the Project during the 115 kV operation of the transmission line.

5.3.2 Magnetic Fields

Magnetic fields result from the flow of electricity (current) in the transmission line. The intensity of the magnetic field is related to the current flow through the conductors. The magnetic field associated with the transmission line surrounds the conductor and rapidly decreases with the distance from the conductor. The value of the magnetic field density is expressed in the unit of gauss (G) or milligauss (mG). Recent studies of the health effects from power frequency fields conclude that the evidence of health risk is weak.[21]

Table 5-2 summarizes the magnetic fields calculated for the Project (same scenarios as Table 5-1) during the 115 kV operation of the transmission line.

5.3.3 Summary

The proposed 115 kV line will have a maximum magnitude of electric field density of approximately 1.29 kV/m underneath the conductors, one meter above

[21] 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/.

grade (Table 5-1), which is well below the maximum limit of 8 kV/m that has been a permit condition imposed by the EQB in other transmission line routing proceedings. Research on the biological effects from electric fields on animals and humans has shown no significant association with disease in humans.

The maximum magnetic field for the Parkers Prairie Project is 141.25mG (five feet from centerline) without distribution underbuild, maximum loading scenario (Table 5-2). Meanwhile, the maximum magnetic field for the Parkers Prairie Project is 90.09 mG (five feet from centerline) with distribution underbuild, maximum loading scenario (Table 5-2).

Table 5-1 Calculated Electric Fields (kV/m) for Proposed 115 kV Transmission Line Designs (3.28 feet above ground)

Scenario	Maximum Operating Voltage (kV)	Distance to Proposed Centerline										
		-300'	-200'	-100'	-50'	-25'	Max.	25'	50'	100'	200'	300'
Horizontal Post Operation No Distribution Underbuild Average Load	121	0.01	0.02	0.06	0.21	0.50	1.29	0.66	0.19	0.07	0.02	0.01
Horizontal Post Operation No Distribution Underbuild Emergency Load	121	0.01	0.02	0.06	0.21	0.50	1.29	0.66	0.19	0.07	0.02	0.01
Horizontal Post Operation With Distribution Underbuild Average Load	121	0.01	0.02	0.07	0.19	0.25	0.44	0.38	0.17	0.06	0.02	0.01
Horizontal Post Operation With Distribution Underbuild Emergency Load	121	0.01	0.02	0.07	0.19	0.25	0.44	0.38	0.17	0.06	0.02	0.01

Note: The maximum electric field in the Applicant's proposal is 1.29 kV/m at 5 foot offset from centerline, which is well under the maximum limit of 8 kV/m that has been a permit condition imposed by EQB in other transmission line routing proceedings.

Table 5-2 Calculated Magnetic Fields (mG) for Proposed 115 kV Transmission Line Designs (3.28 feet above ground)

Scenario	Maximum Operating Voltage (kV)	Distance to Proposed Centerline										
		-300'	-200'	-100'	-50'	-25'	Max.	25'	50'	100'	200'	300'
Horizontal Post Operation No Distribution Underbuild Average Load	121	0.02	0.05	0.20	0.64	1.47	2.99	1.75	0.73	0.22	0.06	0.03
Horizontal Post Operation No Distribution Underbuild Emergency Load	121	1.14	2.53	9.38	30.04	69.58	141.25	82.63	34.28	10.16	2.64	1.18
Horizontal Post Operation With Distribution Underbuild Average Load	121	0.06	0.13	0.49	1.73	5.03	12.65	5.90	2.20	0.60	0.15	0.07
Horizontal Post Operation With Distribution Underbuild Emergency Load	121	1.12	2.43	8.29	22.04	40.18	90.09	64.43	31.55	10.26	2.72	1.21

Note: The maximum magnetic field for the Project is 141.25 mG at 5 foot offset from centerline.

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6. PROPERTY/RIGHT OF WAY ACQUISITION AND RESTORATION

6.1 Identification of Existing Utility and Public Rights of Way

6.1.1 Utility Rights of Way

LREC operates an existing aerial distribution line on the north side of CSAH 6. Typically, distribution systems are located within roadway right of way, with only minimal right of way needed to adequately maintain the system. The proposed 115 kV transmission line will be replacing the existing Great River Energy LR-PPT 41.6 kV transmission line located along the edge of the roadway right of way on the south side of CSAH 6. Unless there is a need to cross over to the north side of CSAH 6 with the proposed 115 kV transmission line, it will not have any impact on the existing distribution line.

The existing 41.6 kV transmission line was constructed and placed in service around 1970, and easements acquired at that time were vague in describing a defined width of the right of way. Furthermore, records reveal only prescriptive easement rights along some segments of the existing 41.6 kV line. Historically, many trees have been permitted to grow within ten feet of the conductors, so the establishment of a clearly defined right of way has not been observed over the lifetime of the existing 41.6 kV transmission line.

6.1.2 Public Road Rights of Way

The Proposed Route would parallel a public roadway right of way for the majority (two miles or ninety-five percent along CSAH 6) of the 2.1 mile route. Applicant anticipates that where the Route follows CSAH 6, the transmission line structures will be approximately five feet outside the roadway right of way, resulting in overlapping of the transmission line and roadway right of ways.

6.2 Right of Way Requirements

Generally, a 100-foot wide right of way (50 feet on each side of the transmission centerline) is proposed for the 115 kV transmission line. Along roads, the transmission line structures will be placed approximately five feet outside of the roadway right of way with a portion of the transmission line right of way overlapping the roadway right of way. In areas where the transmission line is along a road, the effective width of the new transmission line right of way would be approximately 55 feet. It is Great River Energy's standard policy to place transmission line structures outside of roadway right of way. In this way, Great River Energy can minimize relocation costs when accommodating future roadway improvement projects. It should be noted that the Otter Tail County Highway Department allows the transmission line right of way to overlap its roadway right of way with the appropriate permits (see Figure B-2).

In isolated cases, additional right of way may need to be acquired for guy wire and anchor assemblies, or special design requirements resulting from the actual design survey.

6.3 Property/Right of Way Acquisition Procedures

Should a route permit be issued by the Commission, easement acquisition will commence following the design survey and establishing the actual transmission centerline. Acquisition usually consists of easements for a transmission line or a switch structure, or acquiring fee title in the case of a substation expansion. As a general practice, landowners will be notified of the initial phase of the transmission Project, including survey and soil investigation. Upon completion of the survey and preliminary design, landowners will be contacted to discuss Project details, including the proposed transmission centerline and structure/anchor locations, at which time the easement/fee title acquisition negotiations will commence.

During the acquisition phase of the Project, landowners are provided a copy of the conveyance documents which generally includes a copy of the route permit, complaint procedures, easement documents, structure design or photos, an offer of compensation and a plan showing the proposed transmission line or facility relative to each landowner's property. Additional information may also be provided to each landowner explaining power line safety, easement acquisition procedures, and damage settlement procedures. In addition to permanent easements necessary for the construction of the line, marshalling yard agreements may be obtained from certain landowners for temporary construction, access, or staging areas for temporary storage of poles, vehicles, or other related items. Landowners will be notified in the event site access for soil boring is required to determine soil suitability in areas where unstable soil characteristics may require special transmission structure design.

If efforts to negotiate an easement are unsuccessful, the Applicant has condemnation authority to obtain the necessary easement pursuant to Minnesota Statutes Section 308A.201, subd. 13 (2011) and by Section 222.36. In a condemnation proceeding initiated by the Applicant, the landowner is awarded just compensation representing the value of the easement. The amount of the award is determined by three court-appointed commissioners.

6.3.1 Transmission Line Easement Acquisition

The Applicant will acquire easement rights for the new 115 kV transmission line. The Applicant’s representatives will be available to discuss easement issues with all property owners.

6.3.2 Substation

It is not anticipated that additional land will be needed to accommodate the modifications at the existing Parkers Prairie Substation. LREC is contemplating expansion of the substation fence 40 feet on the south side. The substation expansion will be situated on property owned by LREC. During the substation modification phase, any nearby property owners will be advised of the construction schedules.

6.4 Tree Clearing and Staking

After land rights have been secured, landowners will be notified of the initial construction phase of the Project including schedules, ingress and egress to and from the planned facility, tree and vegetation removal, damage mitigation, and other related construction activities.

The first phase of construction activities will involve survey staking the centerline of the new transmission line, followed by removal of trees and other vegetation from the right of way. As a general practice, all vegetation is removed from the right of way, unless it is negotiated with individual landowners that low-growing brush or tree species be allowed to remain or be established on the outer limits of the easement area. All tall-growing tree species that endanger the safe and reliable operation of the transmission facility will be removed from the transmission line right of way.

The NESC states that “trees that may damage ungrounded supply conductors should be pruned or removed” Danger trees generally are those that are dead, weak or leaning in the direction of the energized conductors. The width of the easement will be consistent with the permitted route. Given the predominantly agricultural land use of the Project area, it is unlikely that danger trees would exist beyond the boundary of the permitted route.

The second phase of construction will involve staking the location of structures, followed by structure installation and stringing of conductor wire.

6.5 Right of Way Restoration

Upon completion of construction activities, landowners will be contacted to determine whether or not construction damages have occurred. Areas that sustain construction damage will be restored to their pre-construction condition to the extent possible. Landowners will be notified of the completion of the Project, and asked to report any outstanding construction damage that has not been remedied or any other issues related to the construction of the transmission line. Once construction cleanup is complete and construction damages have been successfully mitigated, landowners will be sent a final contact letter signaling the close of the Project and requesting notification of any outstanding issues related to the Project.

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7. CONSTRUCTION PRACTICES AND OPERATION AND MAINTENANCE OF THE HVTL AND ASSOCIATED SUBSTATION

7.1 Construction Practices

7.1.1 Transmission Line

The proposed 115 kV transmission line would be constructed at existing grade elevations. Therefore, no pole locations would require grading, unless it is necessary to provide a level area for construction access and activities.

The Applicant designs and constructs transmission lines using the most cost-effective methods based on past experiences and practices and in compliance with the latest industry standards, as well as environmental and other permit conditions. The Applicant adheres to NESC standards regarding clearances to ground, clearance to crossing utilities, clearance to buildings, right of way widths, erecting power poles, and stringing of transmission line conductors.

The Applicant typically utilizes outside contractors for construction activities on large transmission line projects. The specifications used are developed by the Applicant's Engineering and Project Management Department. A copy of the Applicant's easement restriction list, environmental restriction lists, the HVTL permit, and any required state or local permits are given to the awarded contractor prior to construction.

Typical tangent structures will be wood; however, laminated wood, or steel direct-embedded poles may need to be used in special circumstances where the typical wood poles may not provide sufficient support. The structures will require a hole dug 10 to 15 feet deep with a 3 to 4 foot diameter for each pole. Any excess soil will be thin spread or removed from the site as required. The poles may be backfilled with native soils, crushed rock or concrete depending on design conditions. In lowland areas, a galvanized steel culvert may be also inserted for pole stability due to poor soil capacity.

Angle structures will typically be guyed and anchored. In some instances, an angle structure may consist of a self supporting, direct embedded laminated pole or, a self-supporting steel pole that will require a drilled pier concrete foundation. The pier will typically have a diameter of 4 to 8 feet, with a depth of 15 to 30 feet, depending on soil conditions.

The switch structure will likely consist of a direct-embedded laminated wood pole, which may or may not require the use of guy wires. However, a self-supporting steel pole on a drilled pier foundation may be required. In either case, the switch would be directly mounted to the structure.

Depending on the exact location and height of the new switch structure, two to four grading structures may need to be installed to replace existing structures on the LR-IA 115 kV transmission line. These grading or transitional structures are slightly taller to gradually raise the height of the conductors for the connection to the proposed switch structure. Wood poles will likely be used for the grading structures. However, if angle structures exist and guying is not practical, or if wood poles cannot provide sufficient support, self-supporting laminated wood poles or steel poles may be required.

Poles may be delivered to the staked location or to a designated marshalling yard depending on delivery and contractor availability. If the poles are delivered to a staked site, they are placed on the right of way out of the clear zone of any adjacent highways or designed pathways. The poles are typically framed with insulators and hardware on the ground and then lifted and placed in the hole via a bucket truck or a crane, depending on the weight of the structure.

Once the structures have been erected, conductors are installed by establishing stringing setup areas within the right of way. These stringing setup areas are typically located every two miles along the Project route. The conductors are pulled with a rope lead that connects to every structure through a dolly attached at the insulator location. Temporary guard or clearance poles are installed at crossings to provide adequate clearance over other utilities, streets, roads, highways, railroads, or other obstructions after any necessary notifications are made or permit requirements met to mitigate any concerns with traffic flow or operations of other utilities.

In lowland areas, construction activities may occur during the winter season to mitigate any damage to wetland areas or other sensitive areas, or to comply with required crossing permits. Any special requirements for the contractor will be addressed at a preconstruction meeting prior to the start of any construction activities.

During construction, when temporary removal or relocation of fences may occur, installation of temporary or permanent gates may be required. The Applicant's right of way agents will coordinate with the landowners on replacement of fences and gates. As part of easement restriction lists, the contractor will work around cultivated areas until harvest has occurred.

7.1.2 Substation Modifications

Modifications of the Parkers Prairie Substation will begin once permits are received and final designs are complete. A detailed construction schedule will be developed based upon availability of crews, outage restrictions for any transmission lines that may be affected, weather conditions, spring load restrictions on roads, and any restrictions placed on certain areas for minimizing impacts from construction. The substation will require grading to accommodate

the proposed 40 foot expansion to the south. New footings for the high side dead-end structure and a new slab for the transformer will be added.

All modifications will be completed in accordance with state, NESC, and the Applicant's construction standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, right of way widths, erection of power poles (to connect the line to the substation), and stringing of transmission line conductors.

If it is determined that more than one acre of soil will be disturbed, LREC and/or the Applicant will obtain a National Pollutant Discharge Elimination System (NPDES) construction stormwater permit from the Minnesota Pollution Control Agency (MPCA) and will prepare the required Stormwater Pollution Prevention Plan (SWPPP). Erosion control methods will be utilized to minimize runoff during substation modification activities.

Upon completion of construction activities, the Applicant and LREC will restore the sites. Post-construction reclamation activities include removing and disposing of debris, dismantling all temporary facilities (including staging areas), employing appropriate erosion control measures, and reseeding areas disturbed by construction activities with vegetation similar to that which was removed.

LREC and/or the Applicant will perform periodic inspections, maintain equipment, and make repairs over the life of the substation. LREC will also conduct routine maintenance as required to remove undesired vegetation that may interfere with the safe and reliable operation of the substation.

7.2 Operation and Maintenance

The Applicant will periodically use its transmission line right of way to perform inspections, maintain equipment, and repair damage. Regular maintenance and inspections will be performed over the life of the facilities to ensure a reliable system. Annual inspections will be done by foot, snowmobile, All-Terrain Vehicles, pickup truck, or by aerial means. These inspections will be limited to the acquired right of way and areas where obstructions or terrain require access off the easement. An aerial inspection of each transmission line is conducted monthly to ensure reliable operation.

The Applicant will conduct vegetation surveys and remove undesired vegetation that will interfere with the operation of the transmission line. Frequency of vegetation maintenance is on a three to seven year cycle. Right of way clearing practices include a combination of mechanical and hand clearing, along with an application of herbicides where allowed.

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8. ENVIRONMENTAL INFORMATION – PROPOSED PROJECT

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

The Project has been reviewed by a number of state and federal agencies. All environmental review correspondence related to the proposed 115 kV Project is provided in Appendix A.

8.1 Description of Environmental Setting

The Applicant is proposing to remove the existing 41.6 kV line between the substation and the IR-IA line and rebuild a new 115 kV transmission line to connect the Parkers Prairie Substation to the existing LR-IA line. The total length of the proposed 115 kV transmission line is approximately 2.1 miles, located in Parkers Prairie Township in Otter Tail County, Minnesota, as shown in Figure B-1 (Appendix B).

The Project area is dominated by agricultural land with small pockets of forest and lakes. Some residential areas exist along the road rights of way and are scattered within the area. The residential areas within the Project area are primarily single-family homes of varying density. Open space areas include cultivated lands with small pockets of forest, lakes and grasslands.

The environmental setting within the Project area includes two hydrologic features in Parkers Prairie Township. These hydrologic features are a wetland and Cora Lake located in Section 10. A mix of groundcover is present along the Proposed Route. The physiographic features (topography, soils, geology and farmland) are typical of this area and do not preclude the development of this Project.

8.2 Effects on Human Settlement

8.2.1 Public Health and Safety

There are different types of health and safety issues that could arise from a transmission project, including changes in traffic during construction, construction worker safety and change in flight patterns for a neighboring airport.

Proper safeguards would be implemented for construction and operation of the transmission facilities. The Project will be designed in compliance with local, state, NESC and the Applicant's standards regarding clearance to the ground, clearance to crossing utilities, strength of materials and right of way widths. Construction crews and/or contract crews would comply with local, state and NESC standards regarding installation of facilities and standard construction practices. The Applicant's established safety procedures as well as industry

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

The Minnesota Department of Transportation (MnDOT), Office of Aeronautics was contacted[22] requesting information on the possible effects of the proposed Project on airports or airstrips in the Project area. In an email [23] dated 29 August, 2011 (Appendix A), the MnDOT Office of Aeronautics indicated that "[t]he proposed transmission line will not have an impact on the Henning Municipal Airport or any other airports."

Impacts and Mitigation

Protective devices will be used to safeguard the public if an accident occurs and a structure or conductor falls to the ground. In such an event, breakers and switches that exist along the LR-IA line will be utilized to de-energize the line. The protection system on the existing LR-IA line is capable of reaching up to Parkers Prairie Substation to clear out faults that may occur along the new line. The protective equipment is designed to de-energize the transmission line should such an event occur and a fault on the new transmission line occur.

The Applicant will ensure that safety requirements are met during the construction and operation of the facility per Applicant's standards and local, state and federal requirements. Additionally, when crossing roads during stringing operations, traffic safety signage and flaggers, as required and necessary, 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.

During construction of the transmission line, the Applicant will flag construction activity with warning signs along the roadway per required MnDOT or County standards per permits. The Applicant's crews or contractors will comply with all Occupational Safety and Health Administration safety procedures during construction.

There are no anticipated impacts to airports in the area, therefore no mitigation is proposed.

[22] Letter from Marsha Parlow, Great River Energy to Dan Boerner, MNDOT. 25 July 2011. *See* Appendix A.

[23] Email from Dan Boerner, MNDOT to Marsha Parlow, Great River Energy. 29 August 2011. *See* Appendix A.

8.2.2 Displacement

The transmission line will be designed to avoid displacement of existing residences or farms. Displacement would be avoided by placing the transmission line away from the buildings.

8.2.3 Electromagnetic Fields

Considerable research has been conducted in recent decades to determine whether exposure to power-frequency electric and magnetic fields 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 EMF 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 electrical systems is common in the United States, the NIEHS stated that passive regulatory action, such as providing public education on reducing exposures, is warranted.[24]

The United States Environmental Protection Agency (EPA) comes 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 that, thus far, the evidence available is weak and is not sufficient to establish a definitive cause-effect relationship.[25]

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*

[24] Report is available at http://www.niehs.nih.gov/health/topics/agents/emf/
[25] http://www.epa.gov/radtown/power-lines.html

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.[26]

Based on findings like those of the Working Group and NIEHS, the Minnesota Public Utilities Commission has consistently found that "there is insufficient evidence to demonstrate a causal relationship between EMF exposure and any adverse human health effects."[27] This conclusion was further justified in the recent 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 electric and magnetic fields on human health. The administrative law judge (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 [EMF] exposure."[28] The Commission adopted this finding on July 15, 2010.[29]

8.2.4 Ozone and Nitrogen Oxide Emissions

Corona, which may produce ozone and oxides of nitrogen, consists of an ionic or electrical discharge from the surface of a transmission line conductor. It occurs when the electric field intensity or surface gradient on the conductor exceeds the

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

[27] 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)

[28] *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)

[29] *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)

breakdown strength of air. For a 115 kV transmission line, the conductor surface gradient is usually below the air breakdown level. Some imperfection, such as loose conductor support hardware or water droplets, is necessary to cause corona. When corona occurs, it will be within a few centimeters or less immediately surrounding a conductor. Ozone also 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. Therefore, humidity (or moisture), the same factor that increases corona discharges from transmission lines, inhibits the production of ozone. Ozone is a very reactive form of oxygen and combines readily with other elements and compounds in the atmosphere. Because of its reactivity, ozone is relatively short-lived.

On July 18, 1997, the EPA promulgated a regulation (62 Federal Register 38856) replacing the 1-hour ozone 0.12 parts per million (ppm) standard with an 8-hour standard of 0.08 ppm. The form of the 8-hour standard is based on the 3-year average of the annual fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area. Calculations using the Bonneville Power Administration (BPA) *Corona and Field Effects Program Ver. 3*[30] for a standard single circuit 115 kV project predicted a maximum concentration of 0.006 ppm near the conductor and 0.002 ppm at one meter above ground during foul weather or worst case conditions with rain at one inch per hour. During a mist (rain at 0.01 inch per hour) the maximum concentrations decreased to 0.0002 ppm near the conductor and 0.0001 ppm at one meter above ground level. For both cases, the ozone levels are below EPA standards.

Most calculations for the production and concentration of ozone assume high humidity or rain with no reduction in the amount of ozone due to oxidation or air movement. These calculations would therefore overestimate the amount of ozone that is produced and concentrated at ground level. Studies designed to monitor the production of ozone under transmission lines have generally been unable to detect any increase due to the transmission line facility.

8.2.5 Noise

There are two potential sources of audible noise from the Project; the conductors on the transmission line and the Parkers Prairie Substation. The Project is located in agricultural areas near low volume roads and will be some distance from most residences in the area.

[30] United States Department of Energy, Bonneville Power Administration. Corona and Field Effects Program Version 3.0 Computer Program. Vancouver, WA.

Noise Measurement

Noise levels are measured on a logarithmic scale in units of decibels. The A weighted decibel (dBA) scale corresponds to the sensitivity range for human hearing. For example, a noise level change of 3 dBA is barely perceptible to average human hearing while a 5 dBA change in noise level is noticeable. A 10 dBA change in noise level is perceived as a doubling of noise loudness. Estimates of some common noise sources are presented in Table 8-1.[31]

Table 8-1 Common Noise Levels

Sound 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

Noise Regulations

Land use activities associated with residential, commercial, and industrial land are grouped together into Noise Area Classifications (NAC).[32] Residences, which are typically considered sensitive to noise, are classified as NAC 1. Each NAC is assigned both daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) limits for land use activities within the NAC.[33] Table 8-2 shows the MPCA daytime and nighttime limits in dBA for each NAC. The limits are expressed as a range of permissible dBA within a 1-hour period; L50 is the dBA that may be exceeded up to 50 percent of the time within an hour, while L10 is the dBA that may be exceeded up to 10 percent of the time within 1 hour.

[31] *A Guide to Noise control in Minnesota*, Minnesota Pollution Control Agency (1999). http://www.pca.state.mn.us/waste/pubs/noise.pdf
[32] Minn. R. 7030.0050.
[33] Minn. R. 7030.0040.

Table 8-2 Noise Area Classifications[34]

	Day (0700-2200)		Night (2200-0700)	
NAC	L_{50}	L_{10}	L_{50}	L_{10}
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

Typical noise sensitive receptors along the Route will include residences; however, most of the land use along the Route is rural timber, wetland or agricultural land. 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.

Conductor Noise

Audible noise from electrical conductors is due to point source corona (minor breakdown of air insulating a conductor) and is a function of conductor voltage gradient. The maximum noise emission from a transmission line occurs during heavy rain and wet conductor conditions. In foggy, damp, or rainy weather conditions, 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 general background noise level is usually greater than the noise from the transmission line. However, very few people are out near the line at these times. As a result, people do not normally notice audible noise from a transmission line during heavy rain. Transmission lines will typically produce audible noise at household background levels during light rain, dense fog, snow and other times when there is moisture in the air. During dry weather, audible noise from transmission lines is barely perceptible.

The industry standard for utilities is calculated based on L_{50} and L_5 for audible noise emissions. The L_5 is the noise level exceeded five percent of the time, or for three minutes in an hour. The worst-case scenario is when the transmission line is exposed to heavy rain conditions (one inch per hour). Anticipated levels for heavy rain conditions for 115 kV lines based on the results from the Bonneville Power Administration Corona and Field Effects Program version 3 (U.S. Department of Energy, BPA, Undated) are listed in Table 8-3.

[34] Minn. R. 7030.0040.

Table 8-3 BPA Program Results – Heavy Rain Case

L_5	L_{50}	Location
17.7 dBA	14.2 dBA	1 (edge of right of way)
18.8 dBA	15.3 dBA	3 (directly under the line)

BPA has developed a general guideline based upon public response to alternating current transmission line audible noise. The guideline indicates that numerous complaints can be expected if the line noise exceeds approximately 58.5 dBA and that few complaints should be expected if audible noise is limited to 52.5 dBA. The values for the proposed Project are well below the guidelines mentioned above and audible noise will be barely perceptible during fair weather.

Substation Noise

The proposed substation modifications will be designed and constructed to comply with the state noise standards (Minnesota Rules 7030) described above.

Noise associated with a substation includes the operation of transformers and switchgear. The transformers produce a constant low-frequency humming noise while the switchgear produces an impulsive or short duration noise during infrequent activation of the circuit breakers. Due to the infrequent operation of the switchgear, the noise generated would be considered temporary in nature and not predicted to exceed the MPCA Noise Limits.

Noise levels for a typical type of transformer to be installed for this Project at the Parkers Prairie Substation (measured one meter from the equipment) are 66 dBA when the transformer cooling fans are not running and 70 dBA when the fans are running. To conservatively predict future noise levels and compliance with the 50-dBA limit, the 70-dBA noise level was treated as a point source at the transformer and modeled to determine the distance where the noise levels would be reduced to 50 dBA.

A simplified, conservative model[35] was created to determine the distance at which the noise would attenuate to 50 dBA. Noise propagation through the outdoor atmosphere typically decreases in level with increasing distance between the source and the receiver. The noise attenuation is the result of several mechanisms, including geometrical spreading of the sound waves, shielding provided by physical structures, atmospheric absorption of the acoustic energy and ground effects on the sound waves. In general, the noise or sound pressure levels emitted from the substation will decrease approximately 6 dBA for each doubling of distance from the source to the receiver. The simplified model was prepared based on this 6-dBA reduction with a doubling of distance.

[35] The simplified model is based off the following formula: S2 = S1 – (20 * Log(d2/d1)). S2 = Noise level at distance d2 (dBA), S1 = Measured sound level at d1 (dBA), D1 = Distance from noise source to S1 noise measurement (ft), and D2 = Distance from noise source at which S2 is calculated (ft).

The model is conservative in that it does not factor in geometric spreading or any attenuation from shielding or ground effects.

Based on the model, substation noise level at the Parkers Prairie Substation would attenuate to 50 dBA at a distance of approximately 30 feet from the transformer. The nearest residence is approximately 395 feet from the Parkers Prairie Substation and at this distance, the noise level would be approximately 28 dBA.

Impacts and Mitigation

By siting the Project away from homes to the extent possible, the Applicant has minimized the potential for noise impacts to sensitive receptors. The calculated noise values for the proposed Project are well below the Minnesota regulatory limits. No impacts are anticipated; therefore, no additional mitigation is proposed. There is a potential for additional noise during construction of the Project; however, this will only be temporary and during daylight hours. The Applicant will work with neighboring residences if there are any concerns on noise during construction.

8.2.6 Radio/TV Interference

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 (RF) noise. If the discharges are excessive, the audible noise can reach annoyance levels and the RF 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 RF 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 line is provided in Section 5.3.1.

Because the likelihood of significant corona formation on the Project’s 115 kV line is minimal, the likelihood of radio and television interference due to corona discharges associated with the Project’s transmission line is also minimal. The Applicant 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 do

not expect radio and television interference to be an issue along the Proposed Route.

If radio interference from transmission line corona does occur with AM radio stations presently providing good reception, satisfactory reception can be obtained by appropriate modification of (or addition to) the receiving antenna system.

Interference with FM broadcast station reception is generally not a problem because:

- corona-generated RF noise currents decrease in magnitude with increasing frequency and are quite small in the FM broadcast band (88-108 megahertz), and

- excellent interference rejection properties inherent in FM radio systems make them virtually immune to amplitude type disturbances.

A two-way mobile radio located immediately adjacent to and behind a large metallic structure (such as a steel tower) may experience interference because of signal blocking effects. Movement of either mobile unit so that the metallic structure is not immediately between the two units should restore communications. This would generally require a movement of less than 50 feet by the mobile unit adjacent to a metallic tower. Noise in the frequency range of cellular type phones is almost nonexistent and the technology used by these devices is superior to that used in two-way mobile radio.

Digital and satellite television are expected to have very little interference with corona noise. Compared to previously used analog broadcasts, digital is more immune to electric interference but less tolerant to multipath issues (i.e. reflections from structures/conductors). TV picture reception interference can also be the result of a transmission structure blocking the signal to homes in close proximity to a structure. Because the structures proposed for this Project will primarily be wood, this is unlikely to occur. However, measurements can be made to verify whether a structure or conductors are the cause of reception problems. Reception problems for digital television can usually be corrected with the addition of an outside antenna. Moving the consumer's satellite dish will usually restore television reception.

Loose and/or damaged hardware may also cause television interference. If television or radio interference is caused by or from the operation of the proposed 115 kV line within a broadcast station's primary coverage area where good reception is presently obtained, the Applicant will inspect and repair any loose or damaged hardware in the transmission line, or take other necessary action to restore reception to the present level.

8.2.7 Aesthetics

The area is primarily agricultural with scattered rural homesteads. The transmission system in the area includes 41.6 kV and 115 kV lines. The 115 kV lines in the area are strung on single pole structures at 60 to 85 feet in height. The 41.6 kV lines in the area are overhead single pole construction approximately 39 feet in height.

The height of the structures will not be known until the line is designed. The height will depend on a number of things, including but not limited to, required ground clearance, terrain, presence (or lack thereof) of underbuild, etc. The switch structure will be the tallest structure in the line, as it will likely be 85 – 95 feet above ground. However, this may vary due to the issues identified above.

The Project will introduce additional transmission structures into the landscape. The Parkers Prairie Substation is proposed to expand approximately 40 feet to the south to accommodate the new high side and transformer.

The Applicant proposes to construct the 115 kV single circuit line using primarily single pole wood structures with horizontal post insulators. In some areas, such as where a longer span may be required, braced post insulators may be used. The average height will be between 60 and 85 feet, with an average span of 300 to 400 feet depending on the terrain and physical features in the area. The majority of the Project will be built with structures that have a narrow profile and that fit well next to roadways.

Of the 2.1 mile Proposed Route, 95 percent (2 miles) crosses over or runs parallel to local roads. None of these roadways are designated as Scenic Byways.

The transmission line will be visible along the roads that it parallels. The new 115 kV line will replace the existing LR-PPT 41.6 kV line on the south side of CSAH 6. The existing 41.6 kV line will be leaned during construction of the 115 kV line and removed when the 115 kV line is placed into service. The existing distribution line will remain on the north side of CSAH 6. Homes within 500 feet of the Proposed Route alignment are most likely to have their viewshed affected by the construction of a transmission line, and are therefore considered potentially high visual sensitivity resources.

Buildings were counted on both sides of the Proposed Route alignment (see Figures B-4 to B-7, Appendix B). The residences and farms within varying distances along the Proposed Route alignment include:

- No homes or accessory buildings within 100 feet of the Proposed Route alignment centerline.
- Three homes and 17 accessory buildings between 101 and 300 feet of the Proposed Route alignment centerline.

- Two homes and 17 accessory buildings between 301 and 500 feet of the Proposed Route alignment centerline.

There are a total of five homes and 34 accessory buildings within 500 feet of the Proposed alignment centerline.

Mitigation

Although the new transmission line will be a contrast to surrounding land uses, the Applicant will work with landowners to indentify concerns related to the proposed transmission line and upgraded substation. Mitigation will be implemented to the extent possible, as follows:

- Location of structures, right of way and other disturbed areas will be determined by considering input from landowners or land management agencies to minimize visual impacts.

- Care will be used to preserve the natural landscape; construction and operation will be conducted to prevent any unnecessary destruction of the natural surroundings in the vicinity of the work.

- To the extent practicable, the new transmission line will parallel existing infrastructure and rights of way.

- Structures will be placed at the maximum feasible distance from road, trail and water crossings, within limits of structure design.

- Landowners will be compensated for removal of mature yard trees, either through easement negotiations or on a separate basis.

8.2.8 Socioeconomics

Demographics

The population of Otter Tail County in 2010 was 57,303 (Table 8-4), with a 0.3% increase in population from 2000 through 2010. The number of persons per square mile (density) in 2010 was 28.9. The total number of housing units in 2009 was 35,700. The home ownership rate in 2009 was 79.3% and housing units in multi-unit structures 10.5%.

The minority population includes individuals who are members of the following population groups: Black; American Indian or Alaska Native; Asian; Native Hawaiian or other Pacific Islander; or Hispanic or Latino.

Otter Tail County is generally less racially and ethnically diverse than the state of Minnesota as a whole. Neither racial nor ethnic minorities would be disproportionately affected by the Project.

The latest available median household income (2008) for Otter Tail County was $42,011 with 12.8% of people living below the poverty level.

Construction Work Force Requirements

During construction, there will be minimal positive impacts to community services, hotels and restaurants to support the utility personnel and contractors. It is estimated that 15 to 20 workers will be employed during construction of the Project, which is expected to last less than a year.

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

Table 8-4 Population Characteristics, 2010

Characteristic	Minnesota	Otter Tail County
Population 2000	4,919,479	57,159
Population 2010[36]	5,303,925	57,303
Percent Change 2000-2010	7.8	0.3
Percent White[37]	88.6	96.1
Percent Black/African American	4.7	0.8
Percent American Indian	1.3	0.5
Percent Asian/ Pacific Islander	3.8	0.1
Percent Other race	--	--
Percent More than One Race	1.6	1.2
Percent Hispanic/Latino	4.3	2.6
Median Household Income[38]	$57,318	$42,011
Home Ownership Rate	74.6	79.3
Median Value of Owner Occupied Housing	$122,400	$152,400
Persons per household	2.52	2.28
Percentage Below Poverty Level Individuals	9.5	12.8

Z – Value greater than zero but less than 0.1%

[36] US Census Bureau, 2010 Website, http://2010.census.gov/2010census/data/
[37] US Census Bureau, 2010 Website, http://quickfacts.census.gov/qfd/states/27/27111.html
[38] US Census Bureau, 2010 Website, http://quickfacts.census.gov/qfd/states/27/27111.html

Impacts and Mitigation

Construction of the Project should result in short-term positive economic impacts in the form of increased spending for lodging, meals and other consumer goods and services. The Project is expected to last less than a year with a workforce usually with no more than twenty people employed. It is not anticipated that the Project will create new permanent jobs, but it will create temporary construction jobs that will provide one-time influx of income to the area.

Expenditures for equipment, energy, fuel, operating supplies and other products and services will benefit businesses in Otter Tail County. Indirect impacts may occur through the increased capability of the electric system to supply energy to commercial and industrial users, which will contribute to the economic growth of the region. The availability of reliable power in the area will have a positive effect on local businesses and residents. No mitigation is proposed.

8.2.9 Cultural Values

Cultural values include those perceived community beliefs or attitudes in a given area that provide a framework for that community's unity. The communities in the vicinity of the Project (Parkers Prairie Township) appear to have cultural values corresponding with the economic activities of the region (agriculture and tourism).

Parkers Prairie is located in west central Minnesota, 20 miles north of I-94 and Alexandria. Parkers Prairie was founded as early as 1868 with a general store on the shores of Adley Lake and incorporated in 1903.

In 1867, legend has it that two men blazing a trail in the area, Parker and Adley climbed a tree and discovered a beautiful lake on the edge of the prairie. They decided to name the lake and prairie after themselves, thus, Parkers Prairie and Lake Adley. Eventually settlers of Swedish, German, Irish, Scotch and English descent poured in and began to settle and work the virgin land. Parkers Prairie developed into a prominent farming community.

Today, Parkers Prairie continues to be a farming community along with "Mom and Pop" businesses in the area. The area attracts recreational opportunities such as fishing, boating, camping, golfing, snowmobiling, cross-country skiing, and trap and skeet.[39]

Impacts and Mitigation

No negative impacts to cultural values are anticipated; therefore, no mitigation is proposed.

[39] http://www.parkersprairie.net/History.htm

8.2.10 Public Services

Public services provided in the Parkers Prairie area (i.e., police, fire protection, waste collection, etc.) will not be affected by the proposed transmission Project.

Impacts and Mitigation
No negative impacts to public services in the community are anticipated; therefore, no mitigation is proposed.

8.2.11 Utilities

There are LREC overhead distribution lines in Project area.

Impacts and Mitigation
The existing LREC overhead distribution line along the Proposed Route is anticipated to remain on the opposite of the road from the rebuilt line. If the alignment does run along the north side of the road, the distribution will be placed on the same structure (underbuilt) as the transmission line or buried underground.

8.2.12 Transportation

There are county and state roads in the area and there is a railroad at the east end of the Project. The proposed Project will follow along CSAH 6 and extend across both MN 29 and the Canadian Pacific Railway.

Impacts and Mitigation
There will be temporary impacts during construction of the transmission line. During construction temporary guard or clearance poles are installed at crossings to provide adequate clearance over other utilities, streets, roads, highways, railroads, or other obstructions after any necessary notifications are made or permit requirements met to mitigate any concerns with traffic flow or operations of other utilities. Additionally, traffic safety signage and flaggers, as required and necessary, will be utilized to eliminate traffic delays and provide safeguards for the public. The Applicant will follow required MnDOT or County standards per permits. No permanent impacts to transportation are anticipated; therefore, no mitigation is proposed.

8.3 Effects on Land-Based Economies

8.3.1 Agriculture

There is cultivated agricultural land and a small percentage of pasture, hay and grassland along the Proposed Route (Figure B-8, Appendix B). Approximately 13

percent of the length of the Proposed Route is hay, pasture or grassland. Approximately 87 percent of the Proposed Route is cultivated agricultural land.[40]

Impacts and Mitigation

The Project will result in permanent and temporary impacts to cultivated agricultural land. Permanent impacts will occur as a result of structure placement along the route centerline. The new 115 kV structures will generally be 25 to 30 feet taller than the existing 41.6 kV structures. The area of impact will be the footprint of the pole itself and the area immediately surrounding the pole (approximately 30 square feet), although the majority of the right of way easement will be available for agricultural cultivation. It is estimated that approximately 1,110 square feet of agricultural land would be impacted in the Proposed Route.

Temporary impacts will include leaning the 41.6 kV poles to keep the line in service during the installation of the new 115 kV poles. Once the substation and the new line are put into 115 kV service, the 41.6 kV poles and conductors will be removed.

In addition, temporary impacts such as soil compaction and crop damage within the right of way are likely to occur during construction. The majority of construction activity will occur in the easement area. If needed, a temporary storage area outside of the easement area for the storage of material and equipment may be leased for the duration of construction. The Applicant will work with landowners to minimize impacts to all farming operations along the Route. By aligning the transmission line parallel to the existing road right of way and the existing 41.6 kV easement, impacts can be minimized. The Applicant 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 re-vegetation, provide for proper drainage and prevent erosion.

Specific mitigation measures to be implemented include:

- The movement of crews and equipment will be limited to the right of way to the greatest extent possible, including access to the route. Contractors employed by the Applicant will limit movement on the right of way to minimize damage to grazing land, crops, or property. If movement outside of the right of way 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. Such ruts will be leveled, filled and graded or otherwise

[40] http://www.mngeo.state.mn.us/chouse/land_use.html

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 generally be avoided by locating these features during survey or discussion with landowners and then avoiding them during construction. If damage does occur, it will be repaired or compensation will be provided as an alternative. The property will be restored as nearly as practical to its original conditions.

- Right of way easements will be purchased through negotiations with each landowner affected by the Project. After construction and right of way restoration is complete, payment will be made for full value of crop damages or other remaining property damage that occurs during construction or maintenance.

- To the extent possible, construction will be scheduled during periods when agricultural activities will be minimally affected 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, the Applicant 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 not anticipated that temporary construction space outside of the right of way and on private property will be needed, with the exception of limited equipment access.

8.3.2 Forestry

The Minnesota Department of Natural Resources (DNR) Ecological Classification system places this area in the Hardwood Hills Subsection of the Eastern Broadleaf Forest Providence.[41] Approximately 75% of the timberland in the Hardwoods Hills Subsection is privately owned. There are two state forests encompassing 18,308 acres, and 8,419 acres of private inholdings. [42]

The Otter Tail County Zoning maps show that approximately 176,587 acres or 12% of the county is forested. The Proposed Route would cross no forested land. The forested land in the area is mostly windbreaks or small natural forested areas.

[41] http://www.dnr.state.mn.us/ecs/222Ma/index.html
[42] http://www.belwin.org/media/50yearvision/hardwood_hills_exp.pdf, page 4.

Impacts and Mitigation
The entire width of the transmission line right of way (50 feet on each side of the transmission centerline) would need to be cleared of vegetation that could potentially grow into the conductors. Based on the Land Use Map (Figure B-8, Appendix B), the Proposed Route will not affect forested land.

The Applicant will replace or compensate for windbreaks as determined through negotiations with individual landowners.

8.3.3 Tourism

Tourism in the Parkers Prairie area consists of fishing, boating, camping, golfing, snowmobiling, cross-country skiing, and trap and skeet.[43] Attractions in the Parkers Prairie area include Lake Adley (1.37 miles south), Inspiration Peak Park (10 miles west), and Lake Carlos State Park (10 miles south).[44]

There are no known tourism attractions within the Proposed Route.

Impacts and Mitigation
Tourism should be unaffected by the proposed Project because there are no known attractions within the Proposed Route. No mitigation is proposed.

8.3.4 Mineable Resources

Mineable resources should be unaffected by the proposed Project because there are no known mining resources in the vicinity of the Proposed Route. No mitigation is proposed.

8.4 Cultural Resources

Westwood Professional Services was contracted to conduct a cultural resources literature review of the Proposed Route.[45] The Minnesota Historical Society (MHS) was sent a letter[46] with the literature review to request information on the possible effects of the proposed Project on historic properties in the Project area. In a letter dated 14 September 2011 (Appendix A),[47] MHS indicated that the proposed Project was reviewed pursuant to the responsibilities given the State Historic Preservation Officer by the National Historic Preservation Act of 1966 and the Procedures of the Advisory Council on Historic Preservation (36 Code of Federal Regulations 800).

[43] http://www.parkersprairie.net/Tourism.htm
[44] http://www.parkersprairie.net/Tourism.htm
[45] Letter from Dean Sather, Westwood Professional Services to Marsha Parlow, Great River Energy, 25 July 2011. *See* Appendix A.
[46] Letter from Marsha Parlow, Great River Energy to Mary Ann Heidmann, MHS. 25 July 2011. *See* Appendix A.
[47] Letter from Mary Ann Heidemann, MHS to Marsha Parlow, Great River Energy. 14 September 2011. *See* Appendix A.

8.4.1 Archaeological and Historic Resources

Westwood Professional Services found that "the area has a low to moderate potential for cultural resources."[48] In the letter dated 14 September 2011, MHS indicated that "there are no properties listed in the National or State Registers of Historic Places, and no known or suspected archaeological properties in the area that will be affected by this project." [49]

Impacts and Mitigation

A monument of the District 50 White Oak School was identified west of the substation but will not be impacted by the Project. No other known historical resources were identified within the Proposed Route or near the substation site. Therefore, no impacts are anticipated during the installation of the transmission line. 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.

8.5 Natural Environment

8.5.1 Air Quality

Temporary air quality impacts caused by construction vehicle emissions and fugitive dust from right of way clearing and construction are expected to occur. The only potential air emissions from operation of a transmission line result from corona, which may produce ozone and oxides of nitrogen. This can occur when the electric field intensity exceeds the breakdown strength of the air. For a 115 kV transmission line, the conductor surface gradient is typically below the air breakdown level. As such, it is unlikely that any measurable emissions would occur from the conductor surface.

Impacts and Mitigation

No impacts to air quality are anticipated due to the operation of the transmission line; therefore, no mitigation is proposed.

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.

[48] Letter from Dean Sather, Westwood Professional Services to Marsha Parlow, Great River Energy, 25 July 2011. *See* Appendix A.

[49] Letter from Mary Ann Heidemann, MHS to Marsha Parlow, Great River Energy. 14 September 2011. *See* Appendix A.

8.5.2 Water Resources

Hydrologic features in the Project area and along the Proposed Route are shown in Figure B-9 (Appendix B).

Ground Water

The Minnesota Department of Natural Resources (DNR) divides Minnesota into six groundwater provinces. This Project is in the portion of Otter Tail County that falls in the Central Province, which is described as sand aquifers in generally thick sandy and clayey glacial drift overlaying Precambrian and Cretaceous bedrock.[50]

Surface Water

The Project area lies within the Redeye River (Leaf River) watershed of the Upper Mississippi River Basin.[51]

The Project would require a United States Army Corps of Engineers (Corps) permit under Section 10 of the Rivers and Harbors Act if the work involves a navigable water of the United States.[52]

The Corps was contacted[53] requesting information on the possible effects of the proposed Project on floodplains, waters, and wetlands in the Project area and along the Proposed Route. The Corps typically only provides a general response on a project until it receives a jurisdictional determination request and/or a permit application. In a letter dated August 3, 2011 (Appendix A),[54] the Corps did address its regulatory jurisdiction and permitting requirements.

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.

Based on review of the DNR website, there are no Public Waters, lakes, rivers, streams, ditches or riparian areas within the Proposed Route.[55] The MPCA website shows the closest impaired water near the Project is Lake Adley.[56] There

[50] http://files.dnr.state.mn.us/natural_resources/water/groundwater/provinces/gwprov.pdf (2009)
[51] http://www.pca.state.mn.us/water/basins/uppermiss/index.html (2009)
[52] Letter from Marsha Parlow, Great River Energy, to Leo Garbowski, USACE. 25 July 2011. *See* Appendix A.
[53] Letter from Marsha Parlow, Great River Energy, to Leo Garbowski, USACE. 25 July 2011. *See* Appendix A.
[54] Letter from Leo Grabowski, USACE to Marsha Parlow, Great River Energy, 3 August 2011. *See* Appendix A.
[55] http://files.dnr.state.mn.us/waters/watermgmt_section/pwi/MORR2OF2.pdf
[56] http://www.pca.state.mn.us/index.php/water/water-types-and-programs/minnesotas-impaired-waters-and-tmdls/assessment-and-listing/maps-of-minnesotas-impaired-waters-and-tmdls.html?menuid=&redirect=1

is no Federal Emergency Management Agency flood information available for the Project area.

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.

The United States Fish and Wildlife Service (USFWS) produced maps of wetlands based on aerial photographs and Natural Resources Conservation Service soil surveys starting in the 1970s. These wetlands are known as the National Wetland Inventory (NWI).[57] 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 wetlands along the Proposed Route. These maps show that there are no wetlands in the Proposed Route (Sections 13 and 24).

The DNR Public Water Inventory (PWI) shows that there are no public waters in the Proposed Route.

Impacts and Mitigation

No mitigation is proposed. The Proposed Route does not cross any lakes, and no navigable waters will be affected by the Project. The transmission line will not cross DNR Public Waters. The Project should have no impact on the impairment status of waters in the Project area.

Construction of the transmission line is not expected to alter existing water drainage patterns or floodplain elevations due to the small cross section per structure and their relatively wide spacing.

8.5.3 Natural Vegetation

The Project is located in the Northern Central Hardwoods Ecoregion, which is has undulating and rolling plain with drumlins and a mix of woodland, row crops and pasture.[58] Vegetative communities along the Proposed Route include cultivated fields, upland deciduous forests, shrubby grasslands, grasslands, and various types of wetlands.

Impacts and Mitigation

The DNR heritage database indicates that there is no native vegetation in the Proposed Route, therefore no mitigation is proposed.

[57] http://www.fws.gov/wetlands/Data/DataDownload.html
[58] http://www.epa.gov/wed/pages/ecoregions/mn_eco.htm

See Section 6.4 for impacts due to tree clearing along the transmission line right of way.

8.5.4 Wildlife/Rare and Unique Natural Resources

Wildlife

The USFWS website indicated that the gray wolf is present in Otter Tail County.[59] The USFWS was contacted by letter[60] and their response email[61] dated 12 September 2011 (Appendix A), indicated that "there are no federally listed or proposed species and/or designated or proposed critical habitat within the action area of the proposed project."

Rare and Unique Features

Rare and unique natural features include federal and state protected and rare species, remnant areas of native vegetation, significant natural resource sites, and significant natural features.

The DNR was contacted[62] to request information on the possible effects of the proposed Project on rare and unique features in the Project area. Their response[63] email dated July 27 2011, stated "that there are no known occurrences of rare features in the area" (Figure B-10, Appendix B).

Impacts and Mitigation

No impacts to wildlife/rare and unique species are anticipated, therefore no mitigation is proposed.

8.6 Physiographic Features

8.6.1 Topography

The topography of Otter Tail County is the result of glacial deposition. The area is characterized by nearly level to moderate topography. The elevation ranges from approximately 1,460 to 1,490 feet above mean sea level.[64]

Impacts and Mitigation

The Project will not require grading along the right of way and excavation activities will be limited to pole locations. Construction of the Project will not alter

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

[60] Letter from Marsha Parlow, Great River Energy to Nick Rowse, US Fish and Wildlife Service. 25 July 2011. *See* Appendix A.

[61] Email from Nick Rowse, US Fish and Wildlife Service to Marsha Parlow, Great River Energy. 12 September 2011. *See* Appendix A.

[62] Letter from Marsha Parlow, Great River Energy to Lisa Joyal, Minnesota Department of Natural Resources. 25 July 2011. *See* Appendix A.

[63] Email from Lisa Joyal, Minnesota Department of Natural Resources to Marsha Parlow, Great River Energy. 27 July 2011. *See* Appendix A.

[64] http://www.dnr.state.mn.us/maps/tomo.html?mode=recenter&size=7&layer=24k&col=223&row=539

the topography along the Proposed Route; however, minimal grading maybe required at the Parkers Prairie Substation. No mitigation is proposed.

8.6.2 Geology

The project is located in the Hardwood Hills Subsection, which has 100 to 500 feet of glacial drift covering most of the bedrock. The thickest drift is in the northwestern half. Bedrock underlying the subsection is diverse. Cretaceous shale, sandstone, and clay and Lower Precambrian granite, meta-sedimentary and metaigneous gneiss, schist, and migmatite underlie the southern half. To the north are metasedimentary rocks, iron formation, enschist, and metavolcanic rocks.[65]

Glacial ice and meltwater deposits of sand and gravel created the rolling hills that are found throughout this region. Some of the highest hills extend to 1,800 feet above sea level. This landscape formed the original transition from the prairie to the west and the northern hardwood to the north and east.[66]

Impacts and Mitigation

Construction of the Project will not alter the geology along the Proposed Route; therefore, no mitigation is proposed.

8.6.3 Soils

This region is made up of excessively drained soils on landforms that are hill slopes with outwash plains topography. Soils in the Project area (Figure B-11, Appendix B) tend to be sandy loams or loamy sands.[67]

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.

Soils will be revegetated as soon as possible to minimize erosion or some other method used during construction to prevent soil erosion. Revegetation is usually accomplished by seeding native species indicative to the area. Mulch will be used in areas that need immediate cover.

If over an acre of soil will be disturbed during the construction of the Project, the Applicant and/or LREC will obtain a NPDES construction stormwater permit from the MPCA and will prepare a SWPPP. Erosion control methods and Best Management Practices will be utilized to minimize runoff during construction.

[65] http://www.dnr.state.mn.us/ecs/222Ma/index.html
[66] http://www.belwin.org/media/50yearvision/hardwood_hills_exp.pdf, page 3.
[67] http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

8.7 Land Use

Land use along the Proposed Route consists mainly of agricultural-related uses along with windbreaks, grassland, pastureland, undeveloped land and rural residential uses (Figure B-8, Appendix B). Cultivated land and forested land are discussed in Sections 8.3.1 and 8.3.2, respectively. Water resources are discussed in Section 8.5.2.

Impacts and Mitigation
Impacts to land use will be limited to the area of the footprint of the poles and areas accessed by heavy construction equipment. After construction of the Project is complete, disturbed soils will be stabilized with native vegetation as soon as possible and land use will be minimally impacted.

8.7.1 Public Lands and Recreational Areas

There are no regional parks, recreational areas or State Wildlife Management Areas within the Proposed Route.

Impacts and Mitigation
No known direct impacts to recreational land uses are anticipated; therefore no mitigation is proposed.

8.7.2 Zoning

A zoning map of the Project area is provided in Figure B-12 (Appendix B). The Proposed Route crosses areas designated Agricultural and Shoreland.[68] A Route Permit issued by the Commission supersedes any local zoning, building and land use regulations.[69] According to Section IV.13.A of the Shoreland Management Ordinance of Otter Tail County, Minnesota, this project is "exempt from all the provisions" of the ordinance.[70]

Impacts and Mitigation
Potential land use impacts along the Proposed Route due to the 115 kV transmission line will be limited. The Proposed Route for the 115 kV transmission line will be approximately 2.1 miles long and will offset 5 feet south of the existing 41.6kV line right of way and parallel road right of way as much as possible. The new 115 kV transmission line does not represent an incompatible land use with those that exist in the area. Therefore, anticipated impacts of the proposed Project on land use/zoning are minimal and no mitigation measures are proposed.

[68] http://www.co.otter-tail.mn.us/gis/
[69] Minn. Stat. §216E.10, subdiv. 1.
[70] http://www.co.otter-tail.mn.us/land/shoreland/SMOEFFECTIVE6-1-2011_Final.pdf

9. AGENCY INVOLVEMENT, PUBLIC PARTICIPATION, PERMITS AND APPROVALS REQUIRED

9.1 Agency Contacts/Public Participation

The Applicant contacted the following agencies for input on the proposed Project:

Minnesota Department of Transportation – Office of Aeronautics

Minnesota Department of Transportation – Transportation Department (Highway Issues)

Minnesota Historical Society – State Historic Preservation Office

US Army Corps of Engineers

Minnesota Department of Natural Resources

United States Fish and Wildlife Service

Correspondence to and from these agencies is provided in Appendix A.

The Applicant attended township board meetings in the Project area to describe the proposed Project to township board members. The township board understands the need for additional electrical capacity in the Parkers Prairie area. The Applicant also discussed the Project individually with the landowners in the Project area. The main issue discussed with landowners was how the Project affects farming activities.

9.2 Identification of Landowners

The names of each owner whose property is within the Proposed Route (Minnesota Rules 7850.1900, subp. 2G) are provided in Appendix C.

9.3 Required Permits and Approvals

A list of permits and other approvals that may be required for the Project in addition to a Minnesota Route Permit is presented in Table 9-1.

Table 9-1 Potential Permits Required

Permit	Jurisdiction
Federal Approvals	
Spill Prevention, Control and Countermeasure (SPCC) Plan (LREC, for Parkers Prairie Substation)	EPA
Minnesota State Approvals	
Utility Permit (Road Crossing Permits to cross or occupy state trunk highway road right of way)	MnDOT
NPDES Permit (LREC, for modifications at Parkers Prairie Substation) **NPDES Permit** (The Applicant, for line construction)	MPCA
Section 401, Clean Water Act	MPCA
Local Approvals	
Land Permits, including road crossing/right of way permits (may be required to occupy lands such as parklands, watershed districts, and other publicly-owned land)	County, Township
Road Crossing Permits	County, Township
Overwidth Loads Permits	County, Township
Driveway/Access Permits	County, Township

10. SUMMARY OF FACTORS TO BE CONSIDERED IN EVALUATING THIS APPLICATION

The Applicant has applied for a Route Permit for a 115 kV HVTL Project. The Project will allow both the Applicant and LREC to maintain necessary voltage and reliability requirements in the Parkers Prairie area. The Project includes rebuild of the Great River Energy LR-PPT 41.6 kV line. The endpoints are the existing Parkers Prairie Substation on the west and the existing Great River Energy LR-IA 115 kV transmission line on the east.

The role of the Commission is to determine the best route to follow to accomplish these goals, and to determine what mitigation efforts the Applicant should employ to reduce any human settlement or environmental consequences. Minn. Rules 7850.4100 lists 14 factors to consider in determining whether to issue a permit for the Proposed Route. Those factors are discussed briefly below.

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

Effects of the proposed Project on human settlement are discussed in Section 8.2 of this Application. The Project will not result in displacement of existing residences. Noise from the HVTL and modified substation will be minimal (Section 8.2.5).

Because the majority of the Proposed Route is the rebuild of the existing 41.6 kV line that is located along CSAH 6, there will be minimal aesthetic effects. The proposed HVTL and modified substation will have no impact on cultural values, recreation, or public services. Impacts to socioeconomics would be primarily of a short-term, beneficial nature.

It is anticipated that the existing LREC overhead distribution lines along the Proposed Route will not be impacted by the rebuilt transmission line. Along CSAH 6, the transmission line centerline will be approximately two to five feet outside of the road right of way.

B. Effects on public health and safety.

The proposed Project will be constructed to comply with NESC standards. Questions often arise about electric and magnetic fields (EMF), which are invisible lines of force that surround any electrical device. The term EMF refers to electric and magnetic fields and includes natural sources such as earth's magnetic field or fields produced during thunder storms, as well as manmade fields produced by electric transmission lines, radio/TV stations, etc. The electric and magnetic fields associated with the proposed Project are discussed in Sections 5.3 and 8.2.3 of this Application and summarized in Tables 5-1 and 5-2.

Electric field intensity is proportional to the voltage of the line and is measured in kV/m. Electrical fields are blocked by physical barriers, such as trees, buildings, etc.

The proposed 115 kV transmission line will have a maximum electric field density magnitude of approximately 1.29 kV/m underneath the conductors at one meter above ground level, which is well below the EQB standard of a maximum electric field limit of 8 kV/m at one meter above ground. That standard was implemented to mitigate serious hazard from shocks when touching large objects parked under transmission lines with voltage of 500 kV or greater.

Magnetic fields result from the flow of electricity (current) in the transmission line. Recent studies of the health effects from power frequency fields conclude that the evidence of health risk related to magnetic fields is weak. Currently the maximum flow will be limited to the size of the transformer at the Parkers Prairie Substation.

Because the magnetic field strength is dependent on current flow, it will continually change as electric demand increases or decreases. Typically the magnetic field will increase over time because the current flowing on the line increases as load growth occurs. The maximum magnetic field for the Project as proposed will be limited by the conductors.

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

The Proposed Route for the HVTL does not significantly impact any prime agricultural, forestry or mining property. Impacts on tourism should be minimal (Section 8.3).

D. Effects on archaeological and historic resources.

MHS indicated that “there are no properties listed in the National or State Registers of Historic Places, and no known or suspected archaeological properties in the area that will be affected by this project” (Section 8.4).

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

Effects of the proposed Project on the natural environment are discussed in Sections 8.5 to 8.7 of this Application.

No significant impacts to air quality will result from the proposed Project.

Impacts to native, undisturbed flora will be avoided and/or minimized. Only trees and shrubs that would interfere with the safe operation of the line will be removed.

There is minimal potential for the displacement of fauna and loss of habitat from construction of the Project. Wildlife that inhabits natural areas could be impacted in the short-term within the immediate area of construction. This impact will be temporary because there is similar habitat adjacent to the Project.

F. Effects on rare and unique natural resources.

The DNR indicated that there are no known occurrences of rare features in the vicinity of the Project. The USFWS determined that there are no federally-listed or proposed species and/or designated or proposed critical habitat within the action area of the Project (Section 8.5.4; Appendix B).

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

There are no known or likely plans to add additional transmission capacity along the Proposed Route. Therefore, the design is appropriate to this Project and maximizes energy efficiency.

The Applicant will work with affected landowners to use a design that mitigates the impact on their property and the right of way to the extent possible.

The Parkers Prairie Substation will be laid out to accommodate required equipment such as transmission line terminations, capacitor banks, transformers, and distribution related feeders should significant load growth occur in the area.

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

The Proposed Route parallels an existing road (CSAH 6) and offsets five feet south of an existing transmission line right of way for the majority of its length. The Proposed Route will cross MN 29 and the CP Railroad. The Applicant will work with the state and the railroad owner to identify and mitigate issues (Section 8.2.11).

I. Use of existing large electric power generating plant sites.

This criterion is not applicable.

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

See the comments under part H above.

K. Electrical system reliability.

LREC, along with the Applicant, serve the electric needs of the Parkers Prairie area. The purpose of the proposed Project is to provide stronger voltage support in both LREC and OTP distribution systems, which will improve service reliability.

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

The cost of constructing, operating, and maintaining the facilities along the Proposed Route are shown in Table 3-1. The Proposed Route parallels existing rights of way to the extent technically and economically feasible. This reduces the cost of acquiring easements and right of way preparation.

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

The only identified environmental effects that cannot be avoided are primarily short-term during the construction of the line and the upgrade of the substation. If any archaeological sites are identified during placement of the poles along the Proposed Route, work will be stopped and the MHS will be consulted. Native vegetation that is compatible with the operation and maintenance of the transmission line will be maintained within the Proposed Route. If required, native species will be planted or seeded in areas that are devoid of native species.

Soils will be re-vegetated as soon as possible to minimize erosion or some other method will be used during construction to prevent soil erosion. During construction temporary guard or clearance poles are installed at crossings to provide adequate clearance over other utilities, streets, roads, highways, railroads, or other obstructions after any necessary notifications are made or permit requirements met to mitigate any concerns with traffic flow or operations of other utilities.

N. Irreversible and irretrievable commitments of resources.

The Project does not require any irreversible or irretrievable commitment of resources. Should the line and/or substation be abandoned and removed at some time in the future, there is nothing related to their earlier placement that would prevent or require a different use of resources in the future.