GREAT RIVER ENERGY
&
MINNESOTA POWER

APPLICATION TO THE
MINNESOTA PUBLIC UTILITIES COMMISSION
FOR A
ROUTE PERMIT

ALTERNATIVE PERMITTING PROCESS

SOUTHDALE TO SCEARCYVILLE
115 KV HIGH VOLTAGE TRANSMISSION LINE AND
BREAKER STATION

Docket
ET2/TL-08-712

GREAT RIVER ENERGY℠
A Touchstone Energy® Cooperative

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AN ALLETE COMPANY

17 July 2008

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List of Acronyms

ACSR	Aluminum conductor steel reinforced
ACSS	Aluminum conductor steel supported
CFR	Code of Federal Regulations
Commission	Minnesota Public Utilities Commission
Corps	United States Army Corps of Engineers
CSAH	County State Aid Highway
dB(A)	Decibel
EMF	Electromagnetic Fields
EPA	Environmental Protection Agency
G	Gauss
HVTL	High voltage transmission line
kV	Kilovolt
mG	Milligauss
MHS	Minnesota Historical Society
MISO	Midwest Independent Transmission System Operator
MNDNR	Minnesota Department of Natural Resources
MNDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MW	Megawatt
NAC	Noise area classifications
NERC	North American Electric Reliability Council
NESC	National Electric Safety Code
NWI	National Wetlands Inventory
ppm	Parts per million
USGS	United State Geological Survey
USFWS	United States Fish and Wildlife Service

Description of Application

Application for a Route Permit for a 115 kilovolt ("kV") Overhead High Voltage Transmission Line ("HVTL") to Support Increased Electrical Load Growth in North Central Minnesota.

Pursuant to Minnesota Statutes Section 216E.04 and Minnesota Rules Chapter 7849.5500, Great River Energy and Minnesota Power (the "Applicants") hereby apply to the Minnesota Public Utilities Commission ("Commission") for a Route Permit for a 115 kV overhead HVTL and a breaker station in Cass County and Crow Wing County, Minnesota ("Project"). The application is submitted under the alternative permitting process.[1]

The Application is divided as follows:

1. **EXECUTIVE SUMMARY** – background information on Great River Energy, Great River Energy cooperatives, Minnesota Power, and a brief description of the Project.
2. **INTRODUCTION** – discussion of the need for the Project; eligibility for the Alternative Permitting process; summary of the Certification process and the notice to the Commission.
3. **PROJECT INFORMATION** – the proposed ownership of the line and associated facilities,[2] the permittees for the Project, and a cost analysis of the Project including costs of construction, operation, and maintenance.[3]
4. **ALTERNATIVES CONSIDERED AND REJECTED** – alternatives considered by the Applicants and the reasons they were rejected.[4]
5. **DESCRIPTION OF THE PROPOSED PROJECT** – detailed description of the Project[5] including line specification and design, breaker station location, and possible design options to accommodate expansion of the Project in the future.[6]
6. **ENVIRONMENTAL INFORMATION** – description of the environmental setting, effects on environmental and human resources, and mitigating measures,[7] including the identification of land uses and environmental conditions along the proposed route.
7. **ENGINEERING AND OPERATIONAL DESIGN OF PROPOSED HVTL** – engineering and operational design concepts for the Project, including electric and magnetic fields, air quality, and radio/television interference.[8]
8. **PROPERTY/RIGHT OF WAY ACQUISITION AND RESTORATION** – existing utility and public rights of way along or parallel to the proposed route that have the

[1] *See* Minn. Stat. § 216E.04 (2006) and Minn. R. 7849.5500 to 7849.5720 (2007).
[2] Minn. R. 7849.5220 subpt. 2(A).
[3] Minn. R. 7849.5220 subpt. 2(K).
[4] Minn. R.7849.5530.
[5] Minn. R. 7849.5220 subpt. 2(D).
[6] Minn. R. 7849.5220 subpt. 2(L).
[7] Minn. R. 7849.5220 subpts. 2(E-F) and 3.
[8] Minn. R. 7849.5220 subpt. 2(J).

potential to share the right of way with the proposed line,[9] including description of right of way requirements, property/right of way acquisition procedures,[10] tree clearing and right of way restoration procedures.

9. **CONSTRUCTION PRACTICES AND OPERATION AND MAINTENANCE OF THE HVTL** – description of the procedures and practices for construction, operation, and maintenance of the proposed line.[11]
10. **AGENCY INVOLVEMENT, PUBLIC PARTICIPATION, AND PERMITS/APPROVALS NECESSARY** – agency contact and public participation opportunities, including a reference to the list of landowners within the proposed route; a list and brief description of federal, state and local permits that may be required for the Project.[12]
11. **SUMMARY OF FACTORS TO BE CONSIDERED IN EVALUATING THIS APPLICATION** – key elements of the Route Permit Application (Application) and a comparison to the established factors to be considered in evaluating this Application.[13]

[9] Minn. R. 7849.5220 at subpt. 2(I).
[10] Minn. R. 7849.5220 at subpt. 2(M).
[11] Minn. R. 7849.5220 at subpt 2(M).
[12] Minn. R. 7849.5220 at subpt. 2(N).
[13] Minn. R. 7849.5910.

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 twenty-eight member distribution cooperatives including Crow Wing Power, which serves a portion of the area to be supplied by the proposed HVTL (Figure 1-1). The Great River Energy distribution cooperatives, in turn, supply electricity and related services to more than 614,000 members/consumers in Minnesota and Wisconsin. Great River Energy is a member of the Midwest Independent Transmission System Operator ("MISO").

Great River Energy's 2,532-megawatt ("MW") generation system includes a mix of baseload and peaking plants (including coal-fired, refuse-derived fuel, natural gas and fuel oil plants), as well as wind generators. Great River Energy owns approximately 4,550 miles of transmission line in Minnesota, North Dakota, South Dakota and Wisconsin.

Minnesota Power is an investor-owned utility headquartered in Duluth, Minnesota. Minnesota Power supplies retail electric service to 135,000 retail customers and wholesale electric service to 16 municipalities in a 26,000-square-mile electric service territory located in northeastern Minnesota. Minnesota Power's electric service territory is shown in Figure 1-2. Minnesota Power generates and delivers electric energy through a network of transmission and distribution lines and substations throughout northeastern Minnesota. Minnesota Power's transmission network is interconnected with the regional transmission grid to promote reliability and Minnesota Power is a member of MISO.

The mission of both Great River Energy and Minnesota Power is to provide safe, reliable, competitively-priced energy to those they serve. The electrical load in north central Minnesota has grown beyond the capability of the existing electrical system.

Specifically, the existing transmission system from the City of Brainerd to the City of Baxter is fast approaching its electrical capability. Loss of a line or transformer could result in potential long-term outages. The Project described in this Application would provide a needed 115 kV transmission loop source into the area that would allow the Applicants to maintain the necessary voltage, capacity, and reliability requirements on their respective transmission systems. As explained in detail in Section 2, this Project is essential to ensure safe, reliable electric power to consumers in the Cities and surrounding areas of Brainerd and Baxter.

Figure 1-1 Great River Energy Service Territory Map

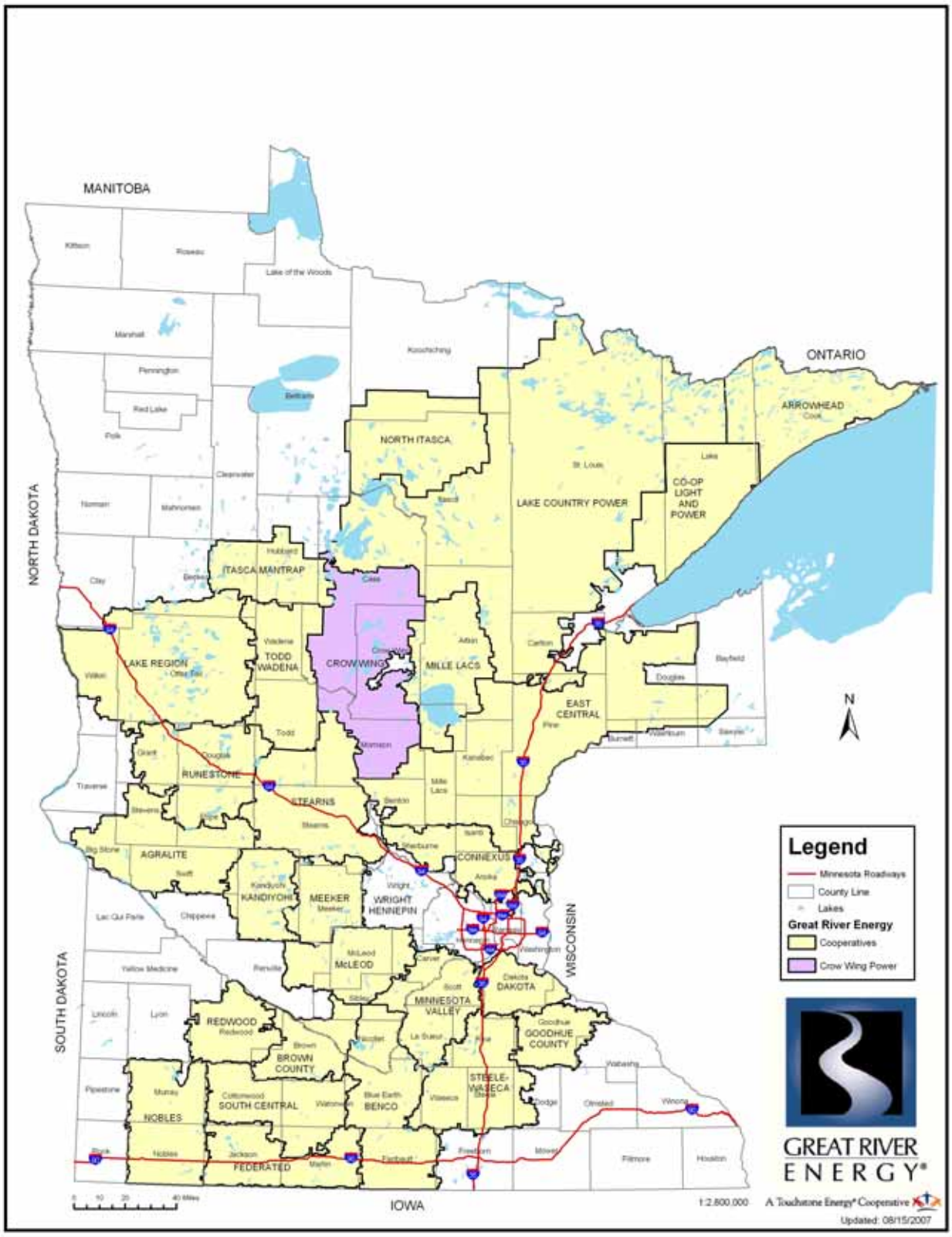
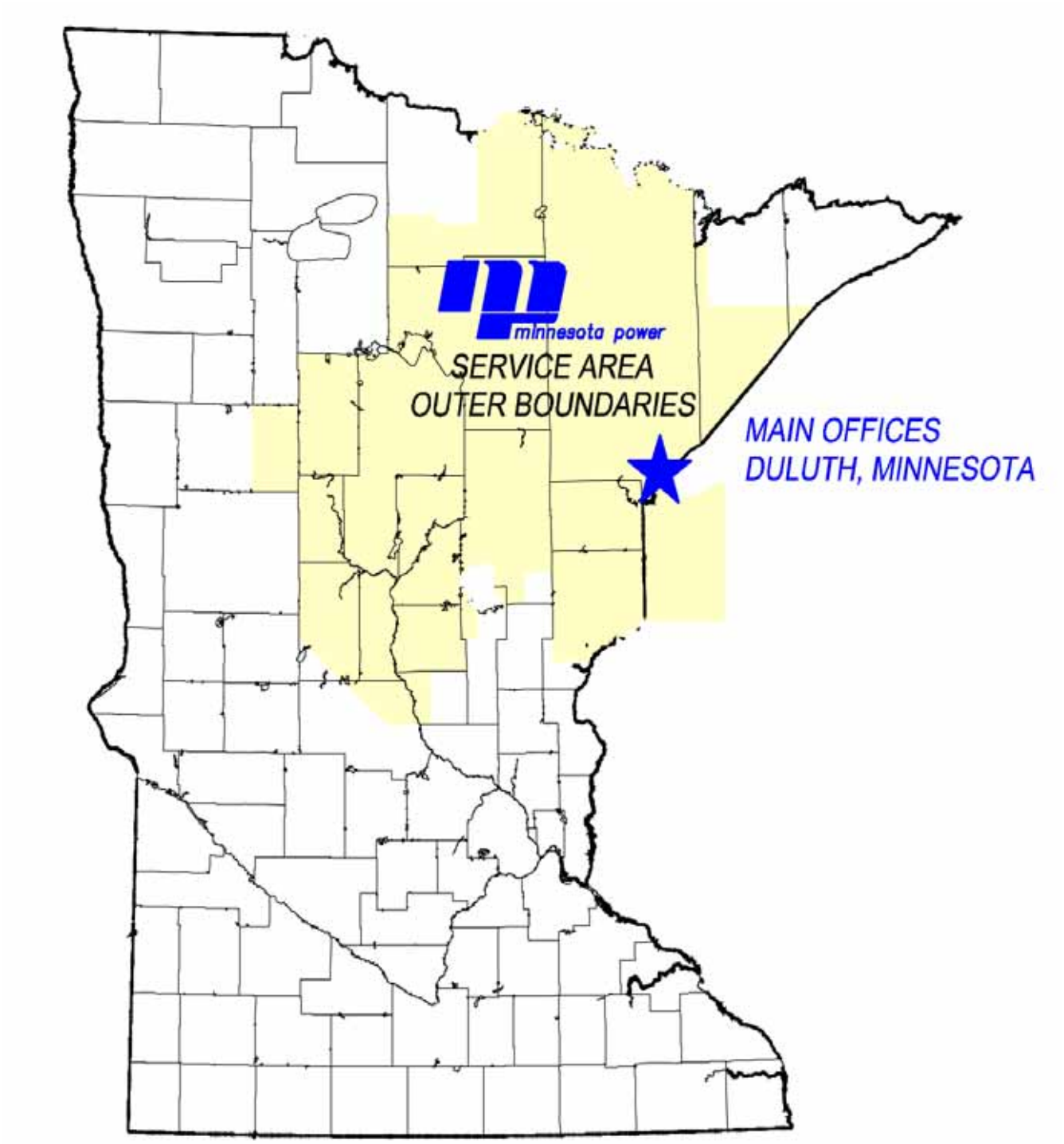


Figure 1-2 Minnesota Power Service Territory



1.2 Description of the Proposed Project

Great River Energy proposes to construct approximately 9.3 miles of overhead 115 kV HVTL (designated "CW-SS") and Minnesota Power proposes to construct a breaker station located near its existing "24" 115 kV transmission line to meet the growing electrical load of the project area. The proposed 115 kV transmission line route (the "Proposed Route") is located in Crow Wing and Cass counties and extends from the west side of Baxter, Minnesota to the north portion of Sylvan Township, Minnesota to the proposed Minnesota Power Scearcyville 115 kV Breaker Station approximately two miles north of Minnesota Trunk Highway 210 ("Highway 210") and 0.6 miles east of County State Aid Highway 18 (CSAH 18). The Proposed Route traverses through Cass and Crow Wing counties. The Applicants propose a Route of varying widths to the Commission to allow strategic alignment of the transmission line and breaker station to minimize public and environmental impacts.

The "CW-SS" 115 kV transmission line (the "Line") will connect the existing Great River Energy "CW-BS" 115 kV transmission line in the City of Baxter to a new Minnesota Power Scearcyville 115 kV Breaker Station proposed to be located in the north portion of Sylvan Township. The Scearcyville Breaker Station will then connect the Project to the existing Minnesota Power "24" 115 kV transmission line. The Line will overtake approximately 3.3 miles of the existing Minnesota Power "504" 34.5 kV distribution line between the existing Great River Energy "CW-BS" 115 kV transmission line and County State Aid Highway 36 ("CSAH 36"). The 3.3-mile portion of the existing Minnesota Power "504" 34.5 kV distribution line will be underbuilt on Great River Energy's new "CW-SS" 115 kV transmission line structures. The Line will then turn north and follow CSAH 36 approximately 1.6 miles, will turn west and cross 0.5 miles of Minnesota Power property, and then will turn north and follow Little Pine Road 0.3 miles to Highway 210. The Line will then turn west and follow Highway 210 for approximately one mile before it turns north again and follows CSAH 18 for 1.9 miles. The Line will then turn northeast and follow the existing Minnesota Power transmission/distribution lines for 0.6 miles to the proposed Scearcyville 115 kV Breaker Station. Minnesota Power will then connect the Scearcyville 115 kV Breaker Station to its existing "24" 115 kV transmission line with approximately 0.1 miles of 115 kV transmission line.

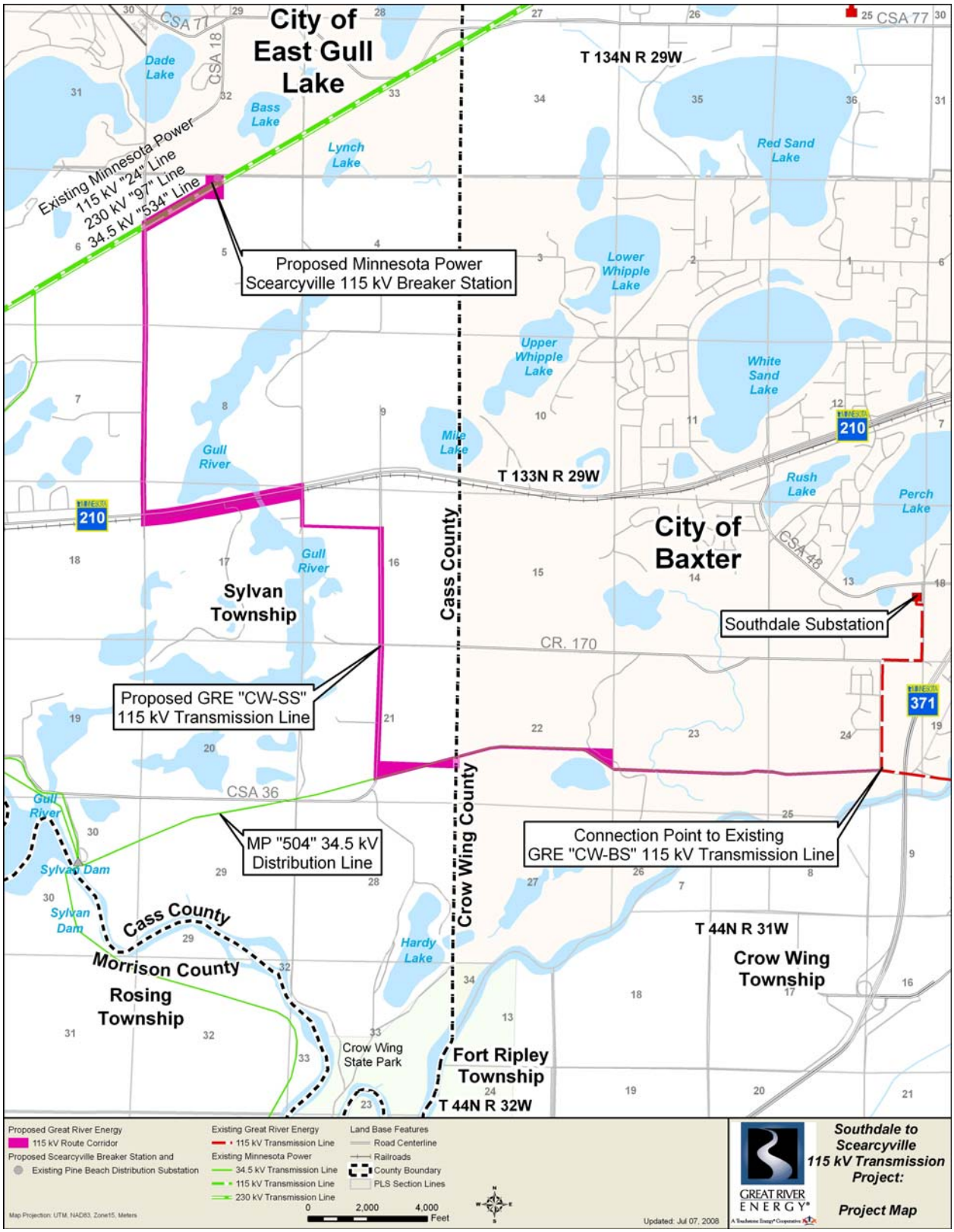
Great River Energy will own and maintain the entire proposed 115 kV transmission line and Minnesota Power will own and maintain the underbuilt 34.5 kV distribution line segment and the new Scearcyville 115 kV Breaker Station.

Minnesota Power proposes to construct the Scearcyville 115 kV Breaker Station in the north portion of Sylvan Township in close proximity to its existing "24" 115 kV transmission line and its Pine Beach Distribution Substation.

Future electric facility needs in the Southdale – Scearcyville ("Southdale") project area were considered during the routing and siting process and are explained in Section 5.4.

Figure 1-3 illustrates the Project and shows the surrounding area.

Figure 1-3 Proposed Project Map



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2. Introduction

2.1 Need for the Project

The addition of new electrical loads and an increase in demand from existing services are causing electricity delivery concerns in the project area. Continuing economic growth in the project area has contributed to the considerable increase in electrical use in the region.

The existing electrical systems (transmission lines, substations, etc.) are approaching their maximum electrical capacity. Loss of a facility in the Southdale project area may result in long-term outages. This situation has become a concern for summer and winter peak electricity use periods. With continued growth, the number of critical hours during the year will continue to increase.

The North American Electric Reliability Council ("NERC"), which develops standards for implementing secure and safe electrical delivery, mandates that certain levels of service be maintained to ensure that the transmission grid operates efficiently and reliably. Electric utilities must maintain power quality at a level that prevents damage to all customers' electrical loads. Based on these mandates, transmission improvements are necessary for this region. The Applicants are responsible for meeting these mandates by constructing, operating and maintaining a reliable transmission system in north central Minnesota.

The Project will provide a needed second 115 kV source to the Southdale project area. The Project will provide a more reliable transmission system to all electrical customers served in the project area if a nearby 115 kV line or transformer is out of service.

2.1.1 Existing Transmission System – City of Baxter and Sylvan Township

The bulk transmission system that serves the Southdale project area is served from the Riverton and Mud Lake 230/115 kV substations. The 230 kV systems at Riverton and Mud Lake are tied to large generation plants—Minnesota Power's Boswell in Grand Rapids, Minnesota, and Xcel Energy's Sherco in Becker, Minnesota, respectively. The Riverton Substation is also tied to North Dakota sources with 230 kV lines to the Wing River and Badoura substations.

The regional 115 kV system, which is supported by the Riverton and Mud Lake substations, is the main source of electricity to Brainerd, Baxter, and the surrounding area. Two 115 kV lines come into Brainerd from the east in nearly the same corridor that extends approximately 4.5 miles to the Mud Lake Substation area. One line continues another eight miles north to the Riverton Substation. Because both of the transmission lines are in nearly the same corridor, reliability is a concern, as Brainerd and the south side of Baxter depend on these lines for continued service. Both the Riverton and Mud Lake 115 kV lines are susceptible to line overloading depending on the power flow through the region.

This overloading is the reason a third source into Brainerd must be established by looping the radial Brainerd-Nokay-Southdale 115 kV line. By connecting the Minnesota Power “24” 115 kV transmission line near Pine Beach Road to the Great River Energy “CW-BS” 115 kV transmission line in Baxter through the Scearcyville 115 kV Breaker Station, will create a necessary western source into Brainerd and the surrounding area.

Crow Wing Power has experienced an average annual load growth of 14 percent over the past four years at its Baxter, Southdale, and Nokay substations that feed the Brainerd area. Crow Wing Power has identified a future need for a new substation west of Baxter in the Gull River area. This new substation will connect to the proposed project in Sylvan Township and is discussed further in Section 5.4.

2.2 Eligibility for the Alternative Permitting Process

Minnesota Statutes Section 216E.04 and Minnesota Rules Chapter 7849.5500, subpt. 1 provide for an alternative permitting process for certain facilities. Specifically, Minnesota Rules Chapter 7849.5500 subpt. 1(C) allows an applicant to use the alternative permitting process set forth in Minnesota Rules Chapters 7849.5500 to 7849.5720 to obtain a Route Permit for “high voltage transmission lines with voltages between 100 and 200 kilovolts,” provided that the required Commission notices are filed. As a 115 kV transmission line, the proposed Project qualifies for the alternative permitting process.

The permit application requirements are listed in Table 2-1. This table includes cross-references indicating the location of required information contained within the Southdale-Scearcyville Project Route Permit Application.

Table 2-1 Route Permit Application Required Information

Authority	Required Information	Where
Minn. R. 7849.5500, subpt. 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 7849.5500 to 7849.5720 instead of the full permitting procedures in parts 7849.5200 to 7849.5340 for high voltage transmission lines of between 100 and 200 kilovolts	Section 2.2
Minn. R. 7849.5500, subpt . 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 7849.5500 to 7849.5700, shall notify the Commission of such intent, in writing, at least 10 days before submitting an application for the project	Section 2.4 & Appendix A
Minn. R. 7849.5530	**Contents of Application** (alternative permitting process) The applicant shall include in the application the same information required in part 7849.5220, 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 4.1 (See also 7849.5220, Subp.2 below) Figures 4-1 to 4-6
Minn. R. 7849.5220, subpt. 2 (applicable per Minn. R. 7849.5530)	**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 3.1
	(b) the precise name of any person or organization to be initially named as permittee or permittees and the name of any other person to whom the permit may be transferred if transfer of the permit is contemplated	Section 3.2
	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. 7849.5530
	(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	1.2, Figure 1-3, Section 5 Figures 5-1 - 5-4 & 7.1
	(e) the environmental information required under 7849.5220, Subp. 3	See Minn. R. 7849.5220, subp. 3 (A)-(H) below
	(f) identification of land uses and environmental conditions along the proposed routes	Section 6
	(g) the names of each owner whose property is within any of the proposed routes for the high voltage transmission line	Section 10.2 & Appendix B
	(h) United States Geological Survey topographical maps or other maps acceptable to the chair showing the entire length of the high voltage transmission line on all proposed routes	Figure 6-1

Authority	Required Information	Where
	(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	Sections 8.1.1 & 8.1.2
Minn. R. 7849.5220, subpt. 2 (applicable per Minn. R. 7849.5530) (continued)	(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 7.1-7.5 & Figures 7-1 to 7-5
	(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 3.5
	(l) a description of possible design options to accommodate expansion of the high voltage transmission line in the future	Section 5.4
	(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 8.2 - 8.5
	(n) a listing and brief description of federal, state, and local permits that may be required for the proposed high voltage transmission line	Section 10.3
	(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.7849.5220, subpt. 3	**Environmental Information** (a) a description of the environmental setting for each site or route	Section 6.1
	(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 6.2
	c) a description of the effects of the facility on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining	Section 6.3
	(d) a description of the effects of the facility on archaeological and historic resources	Section 6.4
	(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 6.5 – 6.7
	(F) a description of the effects of the facility on rare and unique natural resources	Section 6.5.4
	(g) identification of human and natural environmental effects that cannot be avoided if the facility is approved at a specific site or route	Section 6
	(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 6
Minn. R. 7849.5240, subpt. 2 (applicable per Minn. R. 7849.5550)	**Notice of Project** Notification to persons on PUC's general list, to local officials, and to property owners	Will be mailed within 15 days of application submission

Authority	Required Information	Where
Minn. R. 7849.5140, subpt 4	Publication of notice in a legal newspaper of general cirulation in each county in which the route is proposed to be located.	Will be published within 15 days of application submission
Minn. R. 7849.5240. subpt. 5	Confirmation of notice by affidavits of mailing and publication with copies of the notices	Will be submitted within 30 days of notice being mailed and published
Minn. R. 7849.5910	**Factors to be Considered in Permitting a HVTL** (a) effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services	Section 11
	(b) effects on public health and safety	Section 11
	(c) effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining	Section 11
	(d) effects on archaeological and historic resources	Section 11
	(e) effects on the natural environment, including effects on air and water quality resources and flora and fauna	Section 11
	(f) effects on rare and unique natural resources	Section 11
	(g) application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity	Section 11
	(h) use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries	Section 11
	(i) use of existing large electric power generating plant sites	Section 11
	(j) use of existing transportation, pipeline, and electrical transmission systems or rights-of-way	Section 11
	(k) electrical system reliability	Section 11
	(l) costs of constructing, operating, and maintaining the facility which are dependent on design and route	Section 11
	(m) adverse human and natural environmental effects which cannot be avoided	Section 11
	(n) irreversible and irretrievable commitments of resources	Section 11
Minn. R. 7849.5930, subpts. 1 and 2	Prohibited Routes **Wilderness areas**. No high voltage transmission line may be routed through state or national wilderness areas **Parks and natural areas**. No high voltage transmission line may be routed through state or national parks or state scientific and natural areas unless the transmission line would not materially damage or impair the purpose for which the area was designated and no feasible and prudent alternative exists. Economic considerations alone do not justify use of these areas for a high voltage transmission line	Not Applicable

Authority	Required Information	Where
Minn. Stat. § 216E.03, subdiv. 4 (applicable per Minn. Stat. § 216E.04, subdiv. 8)	**Considerations in designating sites and routes** (1) Evaluation of research and investigations relating to the effects on land, water and air resources of large electric power generating plants and high voltage transmission lines and the effects of water and air discharges and electric and magnetic fields resulting from such facilities on public health and welfare, vegetation, animals, materials and aesthetic values, including base line studies, predictive modeling, and evaluation of new or improved methods for minimizing adverse impacts of water and air discharges and other matters pertaining to the effects of power plants on the water and air environment	Sections 6.2.1, 6.2.4, 6.2.5, 6.5 - 6.7 & 7.3
	(2) Environmental evaluation of sites and routes proposed for future development and expansion and their relationship to the land, water, air and human resources of the state	Sections 5.4 & 11(G)
	(3) Evaluation of the effects of new electric power generation and transmission technologies and systems related to power plants designed to minimize adverse environmental effects	Not applicable
	(4) Evaluation of the potential for beneficial uses of waste energy from proposed large electric power generating plants	Not applicable
	(5) Analysis of the direct and indirect economic impact of proposed sites and routes including, but not limited to, productive agricultural land lost or impaired	Sections 6.3.1, 6.6 & 6.7
	(6) Evaluation of adverse direct and indirect environmental effects that cannot be avoided should the proposed site and route be accepted	See all of the effects identified in Sections 6 & 11
	(7) Evaluation of alternatives to the applicant's proposed site or route proposed pursuant to subdivisions 1 and 2	Not applicable to alternative process
	(8) Evaluation of potential routes that would use or parallel existing railroad and highway rights-of way	Sections 8.1& 11(H)
	(9) Evaluation of governmental survey lines and other natural division lines of agricultural land so as to minimize interference with agricultural operations	Sections 6.3.1 & 11(H)
	(10) Evaluation of the future needs for additional high voltage transmission lines in the same general area as any proposed route, and the advisability of ordering the construction of structures capable of expansion in transmission capacity through multiple circuiting or design modifications	Sections 5.4 & 11(G)
	(11) Evaluation of irreversible and irretrievable commitments of resources should the proposed site or route be approved	Section 11 (N)
	(12) When appropriate, consideration of problems raised by other state and federal agencies and local entities	Sections 6 & 10.1

2.3 Certificate of Need Process Summary

Minnesota Statutes Section 216B.243 subdivision 2 (2007), states that "[n]o large energy facility shall be sited or constructed in Minnesota without the issuance of a certificate of need by the commission. . . ." A large energy facility is defined as "any high-voltage transmission line with a capacity of 100 kilovolts or more with more than ten miles of its length in Minnesota or that crosses a state line."[1] The proposed "CW-SS" 115 kV transmission line that is the subject of this Application is less than ten miles in length; therefore a certificate of need is not required.

2.4 Notice to the Minnesota Public Utilities Commission

The Commission was notified by a letter dated and eFiled 18 June 2008 that Great River Energy and Minnesota Power intended to utilize the alternative permitting process for the Project[2]. This notice complies with the requirement to notify the Commission at least ten days prior to submitting an application[3]. A copy of the notice letter is provided in Appendix A.

[1] Minn. Stat. § 216B.2421, subdiv. 2(3) (2006).
[2] Minn. Stat. § 216E.04 (2006) and Minn. R. 7849.5500 (2007).
[3] Minn. R. 7849.5500, subpt. 2 (2007).

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3. Project Information

3.1 Proposed Ownership

The Applicants will each own portions of the Project. Great River energy will own and operate Segments 1, 2 and 3 of the 9.3-mile "CW-SS" 115 kV transmission line. Minnesota Power will own and operate the Scearcyville 115 kV Breaker Station and the new short segments of 115 kV transmission lines necessary to connect the station to its existing "24" 115 kV transmission line. The segments are shown in Figure 3-1 and are described below.

3.1.1 Segment 1 – "CW-BS" 115 kV Transmission Line to CSAH 36

The proposed "CW-SS" 115 kV transmission line will connect to Great River Energy's existing "CW-BS" 115 kV line approximately 1.5 miles south of where it exits the Southdale substation. From the connection point the "CW-SS" line will then head west. Great River Energy will overtake Minnesota Power's existing 34.5 kV distribution line (designated "504") and will underbuild the 34.5 kV line on new 115 kV poles for a distance of 3.3 miles to CSAH 36.

In an effort to minimize landowner impact, Great River Energy will investigate individual opportunities with landowners whose property is currently severed by the existing Minnesota Power alignment. Where feasible, Great River Energy will relocate the proposed alignment to be adjacent to property lines instead of severing privately-owned property. These proposed areas can be seen in Figure 3-1. After construction, Great River Energy will own and maintain the new "CW-SS" 115 kV transmission line and Minnesota Power will continue to own and maintain the "504" 34.5 kV distribution line. If the line is relocated in the all of the illustrated areas shown in Figure 3-1, the distance of Segment 1 will increase to 3.5 miles.

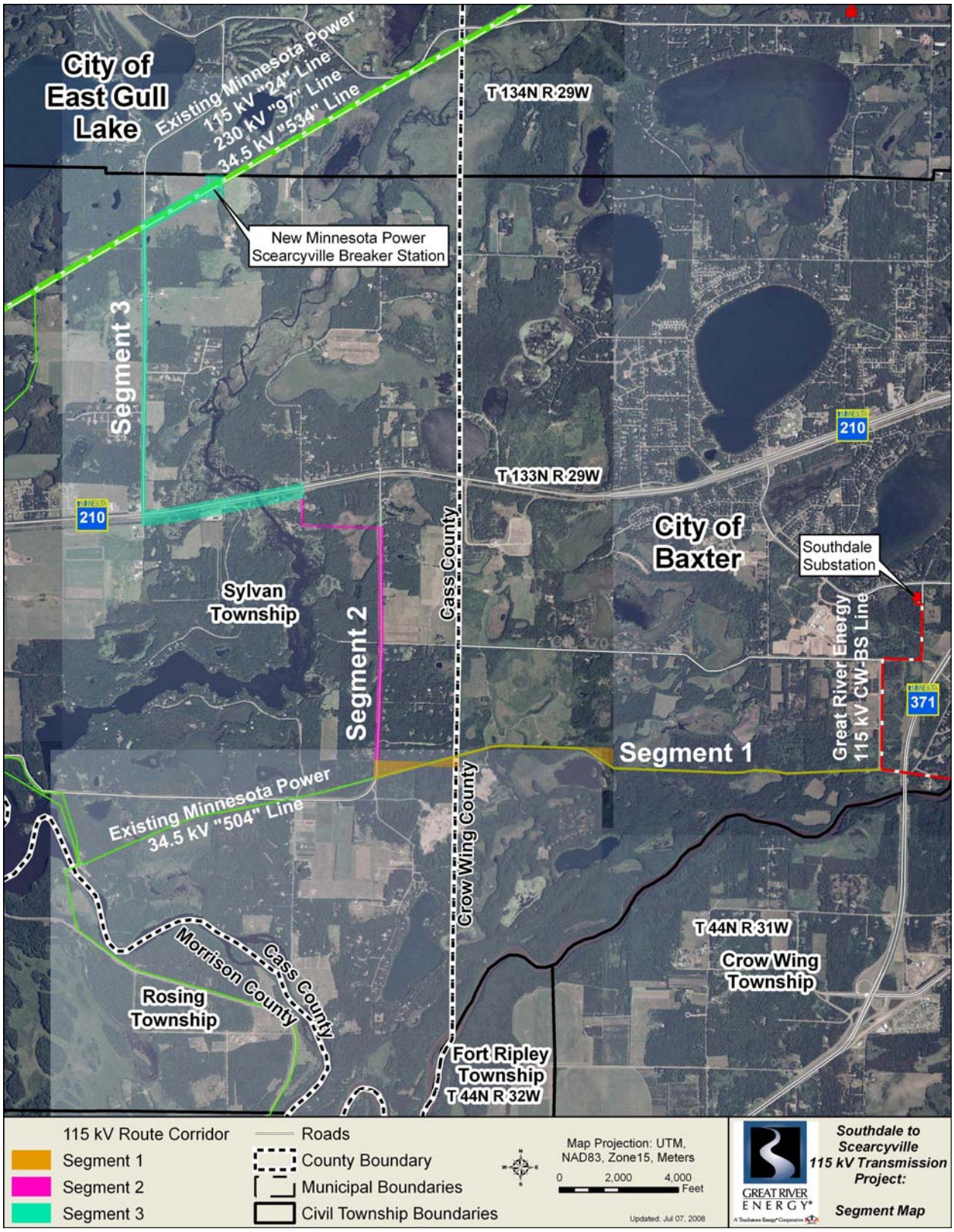
3.1.2 Segment 2 – CSAH 36 to Highway 210

At CSAH 36 the new "CW-SS" 115 kV transmission line will turn north and will no longer carry Minnesota Power's existing "504" 34.5 kV distribution line. The new "CW-SS" line will follow CSAH 36 north for 1.6 miles. The line will then turn west and cross the north edge of property owned by Minnesota Power, approximately 50 feet south of the north property line for approximately 0.5 miles. The Line will then turn northerly and travel along Little Pine Road approximately 0.3 miles to the Highway 210/Burlington Northern Santa Fe (BNSF) railway corridor. Crow Wing Power is evaluating this segment to meet its need for a future distribution substation that is discussed in more detail in 5.4.

3.1.3 Segment 3 – Highway 210 to Scearcyville 115 kV Breaker Station

At Highway 210 the line will travel one mile west along the Highway 210/BNSF railway corridor to CSAH 18. At this point the Line will turn north and follow CSAH 18 for 1.9

Figure 3-1 Proposed Project Segments



miles. Along CSAH 18, the existing Minnesota Power distribution line will be underbuilt on the new 115 kV structures where appropriate. The Line will then turn northeast and travel 0.6 miles and parallel Minnesota Power's existing "24" 115 kV transmission line and "97" 230 kV transmission line. The new "CW-SS" 115 kV transmission line will then connect with Minnesota Power's proposed Scearcyville 115 kV Breaker Station.

3.1.4 Scearcyville 115 kV Breaker Station

Minnesota Power proposes to purchase approximately ten acres of property near its existing "24" 115 kV transmission line, "97" 230 kV transmission line, and Pine Beach Distribution Substation for the new Scearcyville 115 kV Breaker station. Minnesota Power will construct a breaker station, which will be the termination point of Great River Energy's new "CW-SS" 115 kV transmission line. The Scearcyville 115 kV Breaker Station will connect the new "CW-SS" 115 kV transmission line to the existing Minnesota Power "24" 115 kV transmission line. Minnesota Power will construct approximately 0.1 miles of new115 kV transmission line to connect its new Scearcyville 115 kV Breaker Station to its existing "24" 115 kV transmission line.

Minnesota Power will construct, operate, and own the new 115 kV transmission line entering the Scearcyville 115 kV Breaker Station from the existing "24" 115 kV transmission line as well as the new 115 kV transmission line exiting the Scearcyville 115 kV Breaker Station to connect the station with the existing "24" 115 kV transmission line. Collectively, the new lines that will be constructed to connect the existing "24" 115 kV transmission line to the Scearcyville 115 kV Breaker Station will be approximately 0.1 miles long.

3.2 Permitees

The Applicants are the permittees for the Project. Transfer of the permit to any other person or organization is not anticipated.

Contact information for Great River Energy and Minnesota Power is provided below.

Permittee:	Great River Energy 12300 Elm Creek Boulevard Maple Grove, Minnesota 55369	**Permittee:**	Minnesota Power 30 West Superior Street Duluth, Minnesota 55802
Contact:	Kodi Jean Church	**Contact:**	Robert (Bob) Lindholm
Phone:	763.445.5211	**Phone:**	218.722.5642, x3342
Fax:	763.445.5242	**Fax:**	218.723.3916
Email:	kchurch@grenergy.com	**Email:**	rlindholm@allete.com

3.3 Project Location

The Project is located in Cass and Crow Wing counties. The project area encompasses the community in and around Baxter, Minnesota, and traverses through Sylvan Township. Table 3-1 identifies the political entities located within the Southdale project area.

Table 3-1 Political Entities in the Southdale Project Area

County	City/Township	Section	Township	Range
Crow Wing	City of Baxter	22, 22, 24	133N	29W
Cass	Sylvan Township	5, 6, 7, 8, 16, 17, 18, 21	133N	29W

3.4 Project Schedule

Construction of the Project is expected to begin in mid-2009 and be completed by 2010. The construction of transmission line Segments 1, 2, and 3 will be Great River Energy's responsibility; Great River Energy will own all three segments. Minnesota Power will construct, own and operate the Scearcyville 115 kV Breaker Station and the new 115 kV lines connecting the station to its existing "24" 115 kV transmission line.

3.5 Cost Analysis

Estimates for the proposed transmission line are divided into pre- and post-construction costs, construction costs, and operation and maintenance costs. Pre- and post-construction costs include expenditures for permitting, surveying (land and cultural resources, right of way acquisition, right of way clearing, and right of way restoration. Construction costs include transmission line and breaker station construction. Great River Energy and Minnesota Power also evaluate the operation and maintenance costs associated with the Project after it is placed in service.

3.5.1 Pre- and Post-Construction Costs

Preconstruction costs include labor and expenses for preparation and approval of the Application, public information meetings, public hearings, cultural resources surveys, licensing or permitting fees, easement and land acquisition for approximately 9.3 miles of transmission line right of way and ten acres for the breaker station, 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. These costs are estimated to be approximately $2,350,000.

3.5.2 Construction Costs

Transmission line costs for the various segments and three proposed design types vary based on the number of structures per mile (i.e. span length), the height and diameter of the wood poles, labor, and hardware costs. The Line construction costs include the cost of structures, insulators, conductor, bird flight diverters where necessary, and labor as well as any costs of equipment that will be used to construct the new line and breaker station.

The single pole with underbuild construction costs are approximately $370,000 per mile. This design is more expensive because of additional costs incurred by removing the

existing lower voltage circuit and reattaching it to the new poles. There are also more structures per mile because of the shorter average span length.
The H-Frame and the single pole (without underbuild) costs are approximately $290,000 per mile.

Also, it is estimated that approximately one mile of construction will be in difficult construction areas. These are typically cross-country segments that do not parallel or occupy an existing right of way or where greater span lengths must be employed to avoid sensitive features. In areas of difficult construction, the costs include the use of wooden mats, the Dura-Base Composite Mat System, or specialized construction vehicles to minimize environmental impacts during line construction. Difficult areas of construction increase costs by approximately $50,000 per mile.

For estimating purposes, Great River Energy assumes that there will be approximately 4.1 miles of single pole or H-Frame (without underbuild) construction and approximately 5.2 miles of single pole (with underbuild) construction (one mile of which was determined to be difficult construction). The estimated cost for construction of the approximately 9.3 miles of transmission line is $3,430,000. Minnesota Power estimates the costs for construction of the Scearcyville 115 kV Breaker Station will be $2,070,000. The estimated costs are shown in Table 3-2.

Table 3-2 Estimated Southdale Project Costs

Pre- and Post-Construction	H-Frame or Single Pole (no underbuild) 115 kV Line	Single Pole (with underbuild) 115 kV Line	Difficult Construction	Scearcyville 115 kV Breaker Station	Total Estimated Project Cost
$2,350,000	$1,190,000	$1,920,000	$50,000	$2,070,000	$7,580,000

3.5.3 Operation and Maintenance Costs

The estimated annual cost of right of way maintenance is between $400 and $500 per mile of transmission line at the time of application.

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. Alternatives Considered and Rejected

Minnesota permitting rules require that if any alternative routes or sites have been rejected ". . . the applicant shall include in the application the identity of the rejected sites or routes and an explanation of the reasons for rejecting them."[1]

The costs, landowner impacts, environmental impacts and length of all six Rejected Alternative Routes were compared and are summarized in Table 4-1.

Table 4-1 Route Impact Comparisons

Route	Estimated Pre- and Post-Construction Costs	Estimated Construction Costs	Total Project Cost	Number of Parcels Along Proposed Route (full Route width	Length of Line (miles)
Proposed Route	$2,350,000	$5,230,000	$7,580,000	107	9.3
Alternative A	$2,950,000	$5,190,000	$8,140,000	252	10.1
Alternative B	$2,150,000	$5,000,000	$7,150,000	127	9.2
Alternative C	$3,150,000	$5,920,000	$9,070,000	123	11.8
Alternative D	$3,350,000	$6,220,000	$9,570,000	142	12.7
Alternative E	$3,930,000	$7,230,000	$11,160,000	79	16.0
Alternative F	$4,050,000	$7,560,000	$11,610,000	102	16.7

The pre- and post-construction costs are considerably higher for Rejected Alternative Routes A and C thru F because those routes exceeded 10 miles in length and would require a Certificate of Need in addition to a Route Permit.

If any of the rejected alternatives had been chosen as the route for the Project, the Applicants would have requested a route of variable widths to allow alignment flexibility to locate the transmission line on either side of a roadway or property line. For this reason, the total number of parcels encompassed by each rejected alternative route was used in evaluating each scenario and is provided in Table 4-1.

[1] Minn. R. 7849.5530 (2007).

4.1 Rejected Alternative Routes Considered for the Transmission Line

4.1.1 Rejected Alternative Route A – Southdale Substation North to Highway 210

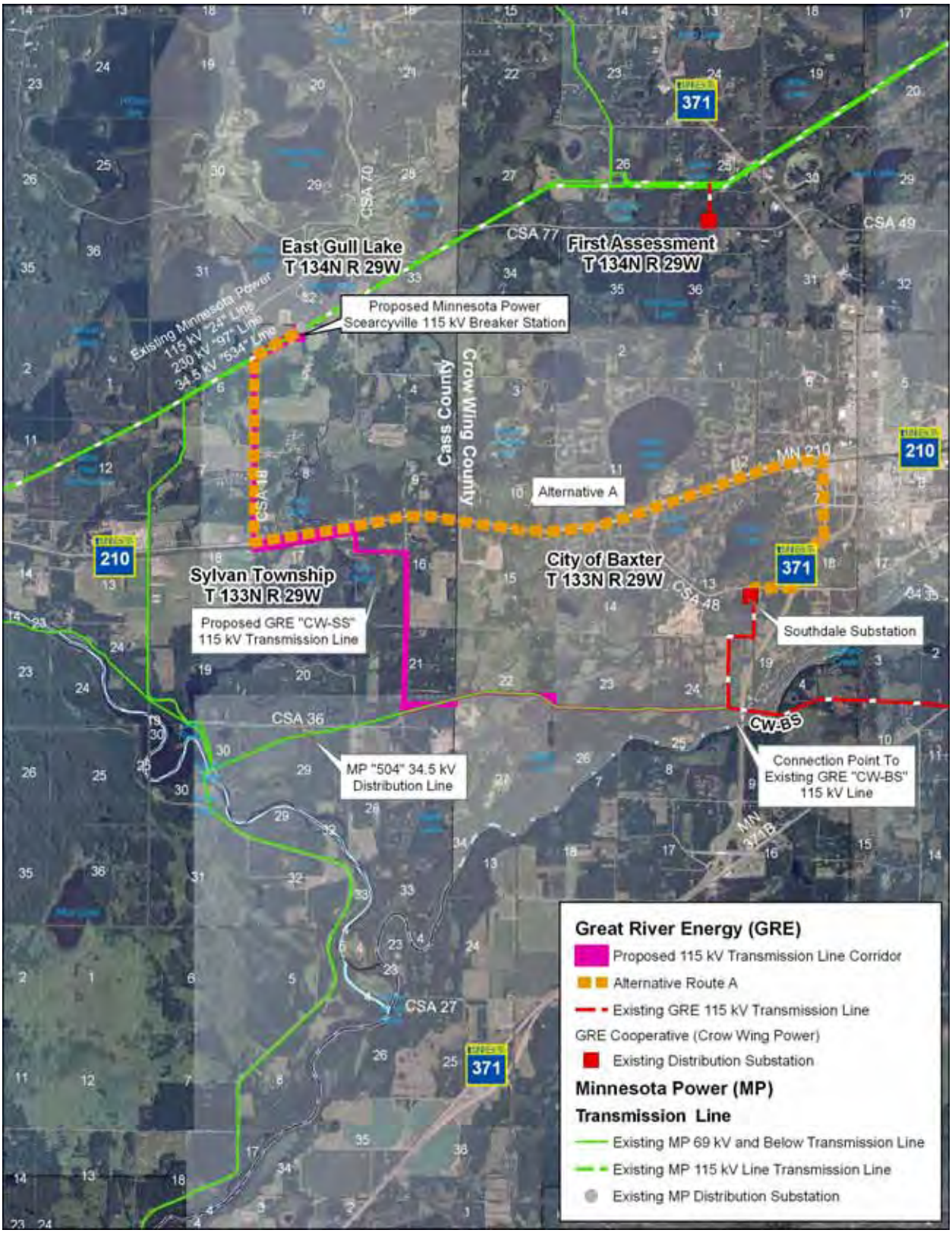
Rejected Alternative Route A ("Alternative A") is shown in Figure 4-1.

Alternative A extends north from the existing Great River Energy Southdale Substation to Highway 210 and follows Highway 210 west where it then follows the Proposed Route.

Alternative A was rejected after a thorough review of Highway 210. It was determined that the pace and density of development along Highway 210 in Crow Wing County was not amenable to an HVTL. Alternative Route A would have potentially affected 252 parcels. High land values along Highway 210 also contributed to the rejection of this route.

Alternative A also increased the overall length of the Project to approximately 10.1 miles. It was estimated that the costs for Alternative A would exceed the proposed route costs by $560,000.

Figure 4-1 Rejected Alternative Route A



4.1.2 Rejected Alternative Route B – “CW-BS” 115 kV Transmission Line Tap to CSAH 36 along Mapleton Road

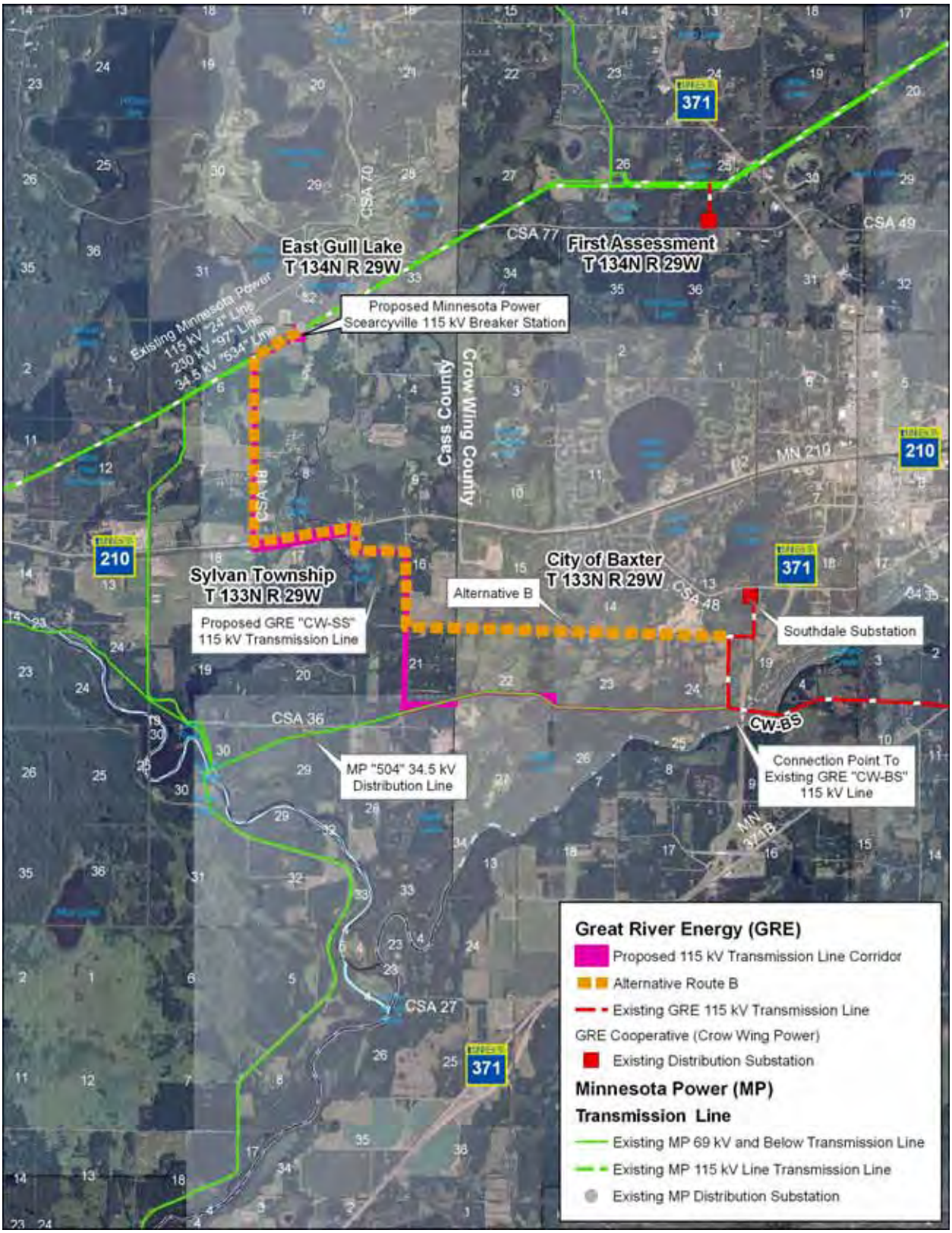
Rejected Alternative Route B (“Alternative B”) is shown in Figure 4-2.

Alternative B connects to the existing “CW-BS” 115 kV transmission line that exits the south side of the existing Great River Energy Southdale Substation and follows Mapleton Road west to CSAH 36 where it turns north and follows the Proposed Route.

This route was rejected after Crow Wing County recently assumed ownership and maintenance responsibilities of Mapleton Road located within the City of Baxter. The Crow Wing Country Highway Department plans to upgrade and widen Mapleton Road in the near future. The reconstruction of Mapleton Road will require significant road profile, cross-section, and alignment changes along its entire two-mile length. Presumably, some of the tight curves will be flattened out, which would necessitate relocation of the transmission line in only a few years.

There are also several single family residential dwellings very close to Mapleton Road, along with school property and a recreational trail. The school property has existing restrictions for removing trees along the north side of Mapleton Road. Alternative B would have potentially affected 127 parcels.

Figure 4-2 Rejected Alternative Route B



4.1.3 Rejected Alternative Route C – North Along Cass and Crow Wing County Line to Highway 210

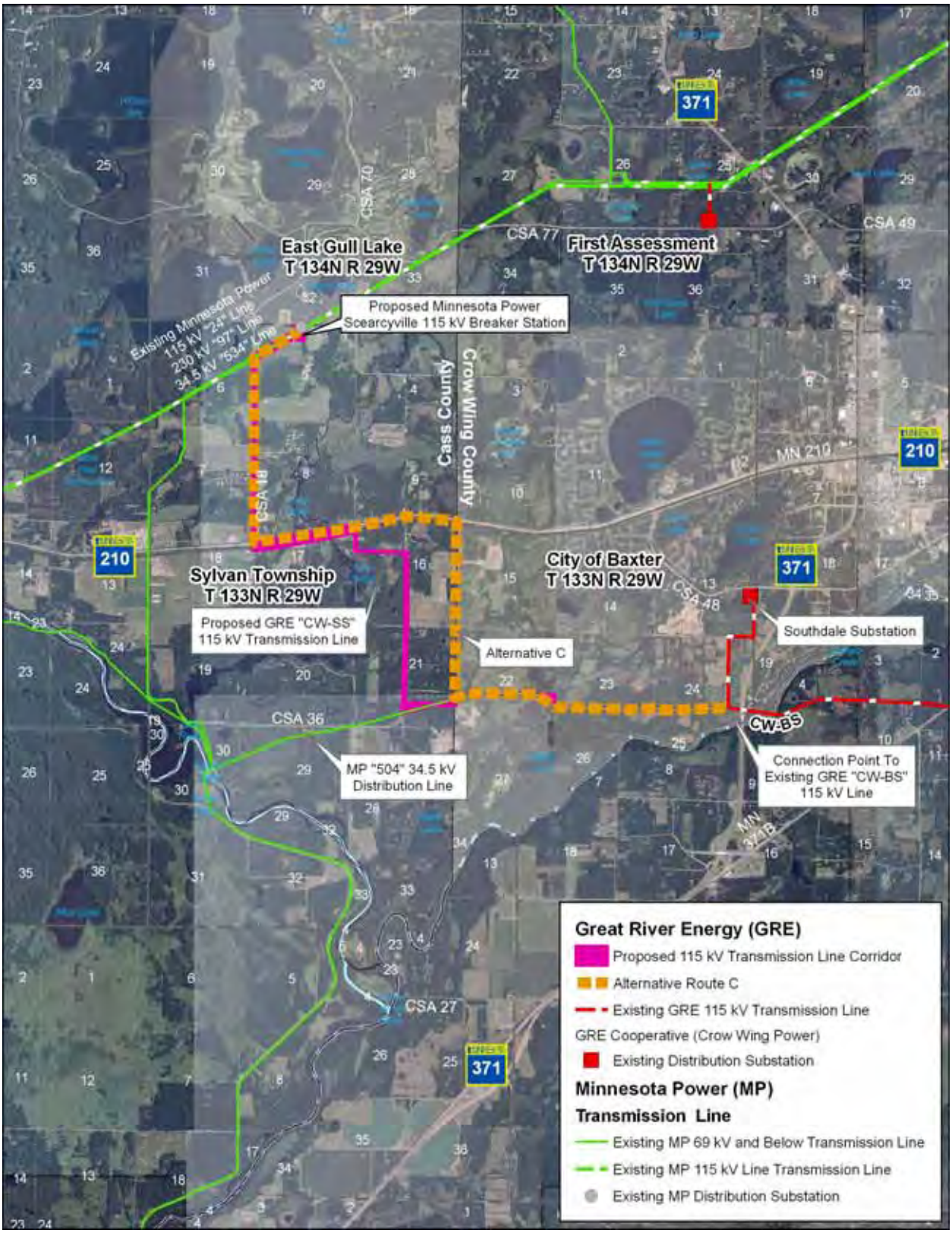
Rejected Alternative Route C ("Alternative C") is shown in Figure 4-3.

Alternative C connects the existing "CW-BS" 115 kV transmission line and extends west following the existing Minnesota Power 34.5 kV "504" line to the common boundary between Cass and Crow Wing counties. Alternative C then turns north and no longer carries the 34.5 kV distribution line. The 115 kV transmission line then extends north to Highway 210. Alternative C then follows the Highway 210/BNSF railway corridor west where it joins the Proposed Route. The area along the common county line is forested but has been previously logged for commercial purposes in some areas.

The property on the Crow Wing County side of the boundary is currently undeveloped, but is expected to be developed in phases over the course of the next five to ten years. With anticipated development being phased over several years, there will likely be dramatic changes to the existing ground elevations, thus necessitating relocation and/or reconstruction of a transmission line. Of greater concern are the single family homes and heavily wooded properties located along the Highway 210/BNSF railway corridor east of CSAH 36 making this route less desirable due to its impact to the residences as well as significant loss of trees that provide screening between the residences and this railway corridor. Potential access and maintenance issues made this route less desirable. The creation of an almost two-mile transmission right of way on undeveloped land also made this route less desirable.

Alternative C would have potentially affected 123 parcels. Preconstruction and construction costs exceed the costs of the proposed Project by almost $1,500,000.

Figure 4-3 Rejected Alternative Route C



4.1.4 Rejected Alternative Route D – “CW-BS” 115 kV Transmission Line to Highway 210 via CSAH 36

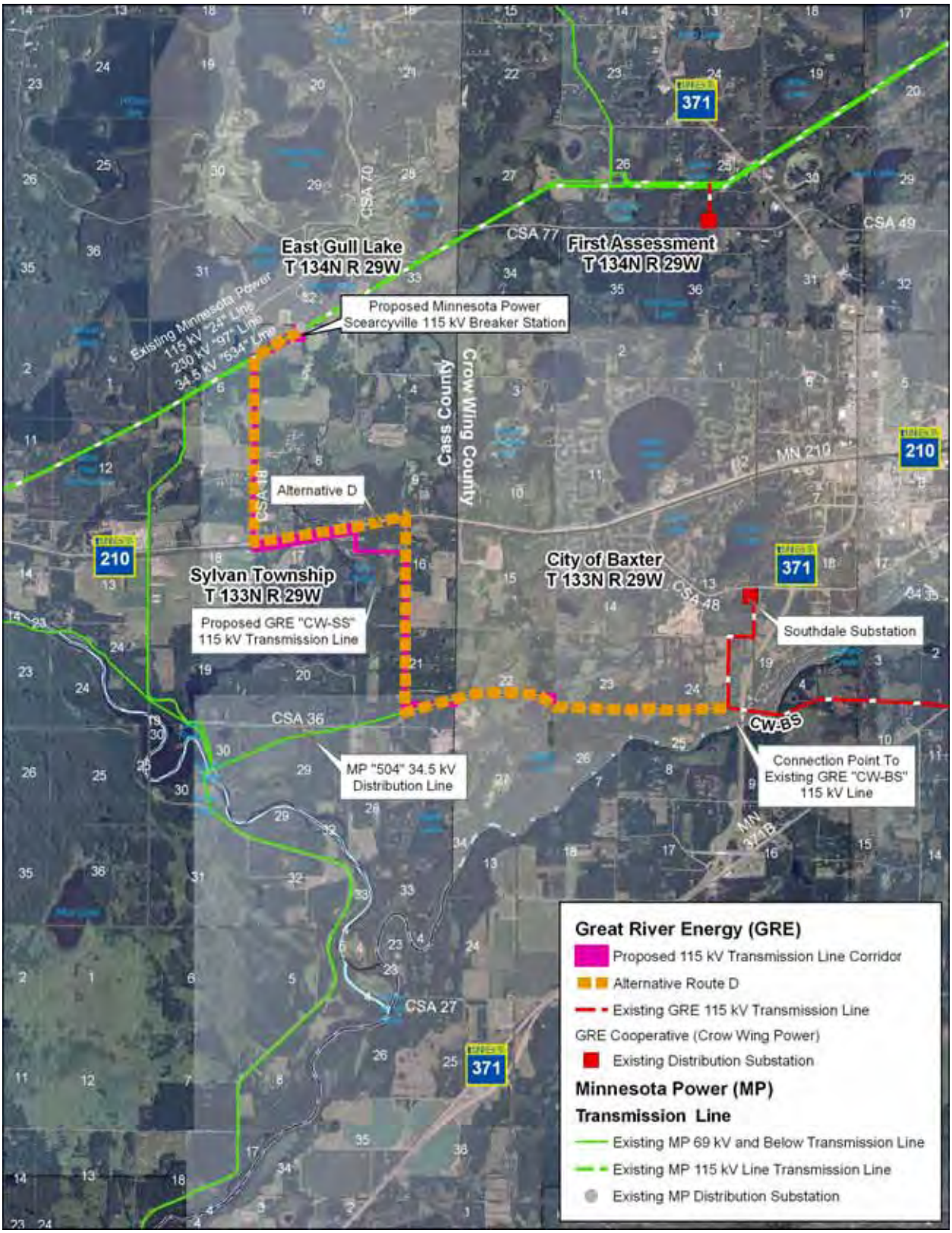
Rejected Alternative Route D (“Alternative D”) is shown in Figure 4-4.

Alternative D connects to the existing “CW-BS” 115 kV line approximately 1.5 miles south of where it exits the Southdale substation. Alternative D line then heads west and overtakes Minnesota Power’s existing “504” 34.5 kV transmission line to CSAH 36. It then turns north and no longer carries the 34.5 kV distribution line. Alternative D follows CSAH 36 northerly to Highway 210. It then turns west and follows the Highway 210/BNSF railway corridor to where it joins the Proposed Route.

In the area immediately south of the railroad right of way there are two single family homes located in very close proximity to CSAH 36. Both of these homes have large, mature trees in the front yards. The close proximity of these two homes presents a challenge for routing the transmission line in this area, as well as requiring a significant loss of trees in the front yards. Furthermore, there are currently plans to develop a new Sylvan Township frontage road along the south side of the railroad right of way for a distance of one-half mile west of CSAH 36.

The township does not anticipate beginning construction for at least one year. Concurrent construction of our transmission line and the construction of the frontage road would pose problems for all parties concerned. Preconstruction and constructions costs for Alternative D exceed the costs of the proposed project by almost $2,000,000.

Figure 4-4 Rejected Alternative Route D



4.1.5 Rejected Alternative Route E – Overtake Minnesota Power's 34.5 kV "504" Line in its Entirety

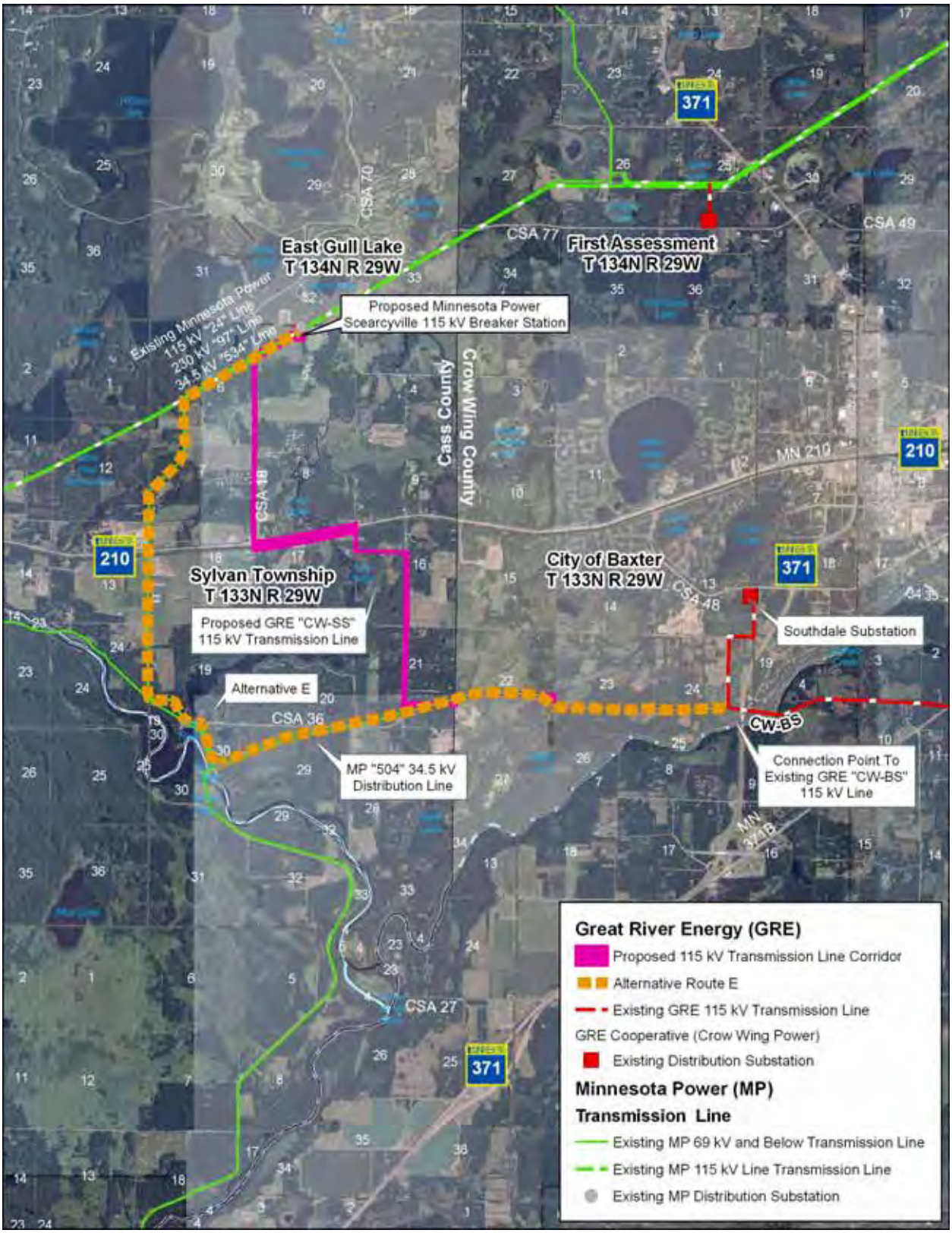
Rejected Alternative Route E ("Alternative E") is shown in Figure 4-5.

Alternative E overtakes all of Minnesota Power's existing "504" 34.5 kV distribution line from the "CW-BS" 115 kV transmission line tap point approximately 1.5 miles south of the Southdale Substation, west to the Sylvan Hydro Generating Station, then north to Minnesota Power's existing "24" 115 kV transmission line. It then follows the Minnesota Power transmission/distribution right of way where it joins the Proposed Route.

Costs for this route would be significantly higher because of additional permitting and construction costs resulting from nearly ten miles of double-circuit construction. Although this route is established by the "504" Line, it is not desirable because of its close proximity to sensitive environmental areas that consist of wildlife management areas, numerous recreational lakes, and the Crow Wing River near the Sylvan Dam. This route also does not lend itself well to future expansion needs in the area.

To accommodate the fast pace of growth in the area, it has been determined that a new 115/69 kV distribution substation will need to be built in the Baxter area within the next ten years to serve distribution needs. Alternative E does not provide a good location for a future substation. Furthermore, there are significant access and maintenance issues associated with this route. The estimated costs for Alternative E exceed the costs of the Proposed Route by nearly $3,600,000.

Figure 4-5 Rejected Alternative Route E



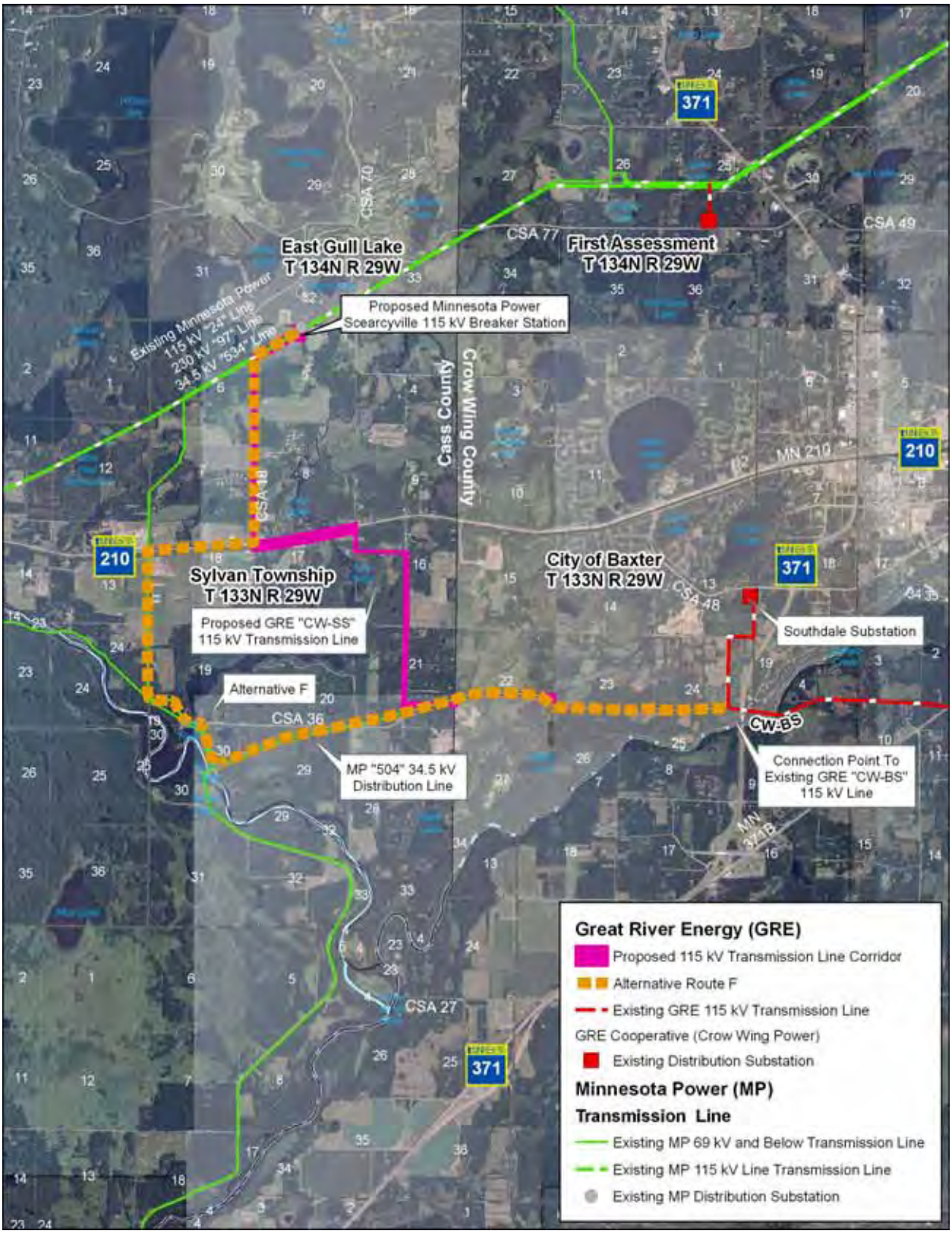
4.1.6 Rejected Alternative Route F – Overtake Minnesota Power's 34.5 kV "504" Line to Highway 210

Rejected Alternative Route F ("Alternative F") is shown in Figure 4-6.

Alternative F overtakes Minnesota Power's "504" line as described in 4.1.5 to the intersection with Highway 210. Alternative F then follows Highway 210 east to CSAH 18 and joins the Proposed Route.

Although this route lends itself to providing potential areas for future expansions needs, this alternative has many of the same issues associated with its location as Alternative E, which are described in 4.1.5. It is estimated that the costs of Alternative F would exceed the costs of the proposed Project by over $4,000,000.

Figure 4-6 Rejected Alternative Route F



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5. Description of the Proposed Project

5.1 Transmission Line

5.1.1 Route Selection Process

The proposed 9.3 miles of overhead 115 kV transmission line and proposed Scearcyville 115 kV Breaker Station were reviewed during the electrical planning process by a team comprised of transmission planning, right of way, environmental, and engineering design personnel. The 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. Route alternatives were identified using the process described below with one route selected for this Application in accordance with Minnesota Rules Chapter 7849.5530 (2007). Rejected route alternatives are discussed in Section 4.

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.) and input from local government representatives and the public. Preliminary route options were then identified based on opportunities to:

- Share right of way with existing transmission lines by double circuiting or underbuilding where practical;
- Reduce impacts to the reliability of existing transmission systems during construction;
- Parallel roads to help decrease the amount of right of way required;
- Minimize the length of the transmission line to reduce the impact area and costs for the Project; and
- Reduce the impact of double circuit construction on reliability of electric service to the area and region.

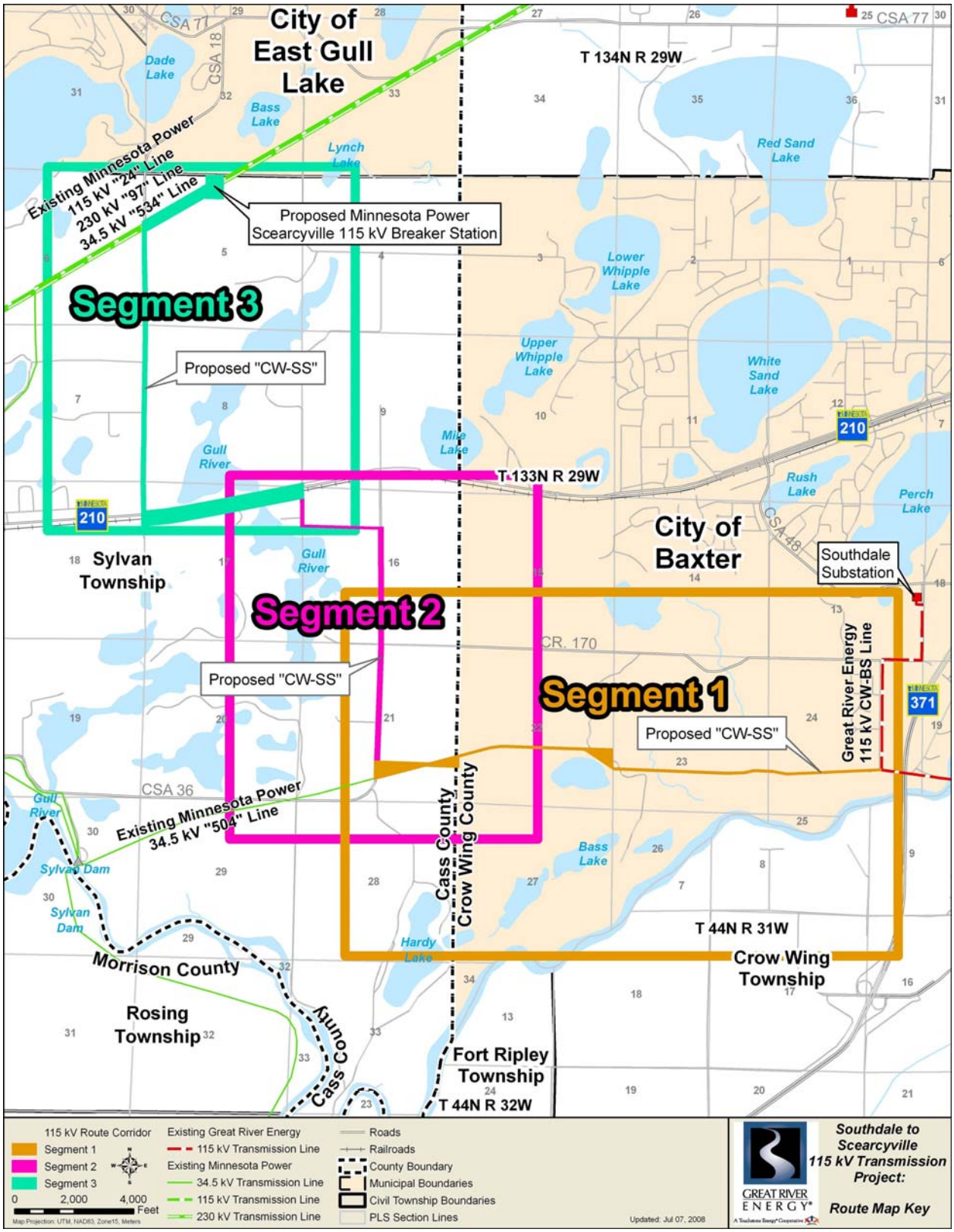
The routes were further refined by avoiding, to the extent possible, areas where an HVTL could create significant impacts such as:

- Existing and planned high-density residential areas;
- Agricultural areas where center pivot irrigation systems are used;
- Areas where horizontal clearances are limited because of trees or nearby structures; and
- Environmentally sensitive sites, such as wetlands, archaeologically significant sites, areas with threatened or endangered species/species of special concern, areas of significant biological or cultural significance, and state and federal lands.

5.2 Proposed Transmission Line Route

The Project and its proposed segments are shown in Figure 5-1 and described below.

Figure 5-1 Proposed Project Route Segments



The Applicants request that the Commission approve a route corridor of varying widths instead of a defined centerline. By approving a corridor, the Commission allows the Applicants to design the transmission line alignment and breaker station to minimize public and environmental impacts.

5.2.1 Transmission Segment 1 – "CW-BS" 115 kV Transmission Line to CSAH 36

Segment 1 is shown in Figure 5-2.

The proposed "CW-SS" 115 kV transmission line will connect to Great River Energy's existing "CW-BS" 115 kV line approximately 1.5 miles south of where it exits the Southdale substation. From the connection point, the "CW-SS" line will then head west. Great River Energy will overtake Minnesota Power's existing "504" 34.5 kV distribution line and will underbuild the 34.5 kV line on new 115 kV poles for a distance of 3.3 miles to CSAH 36.

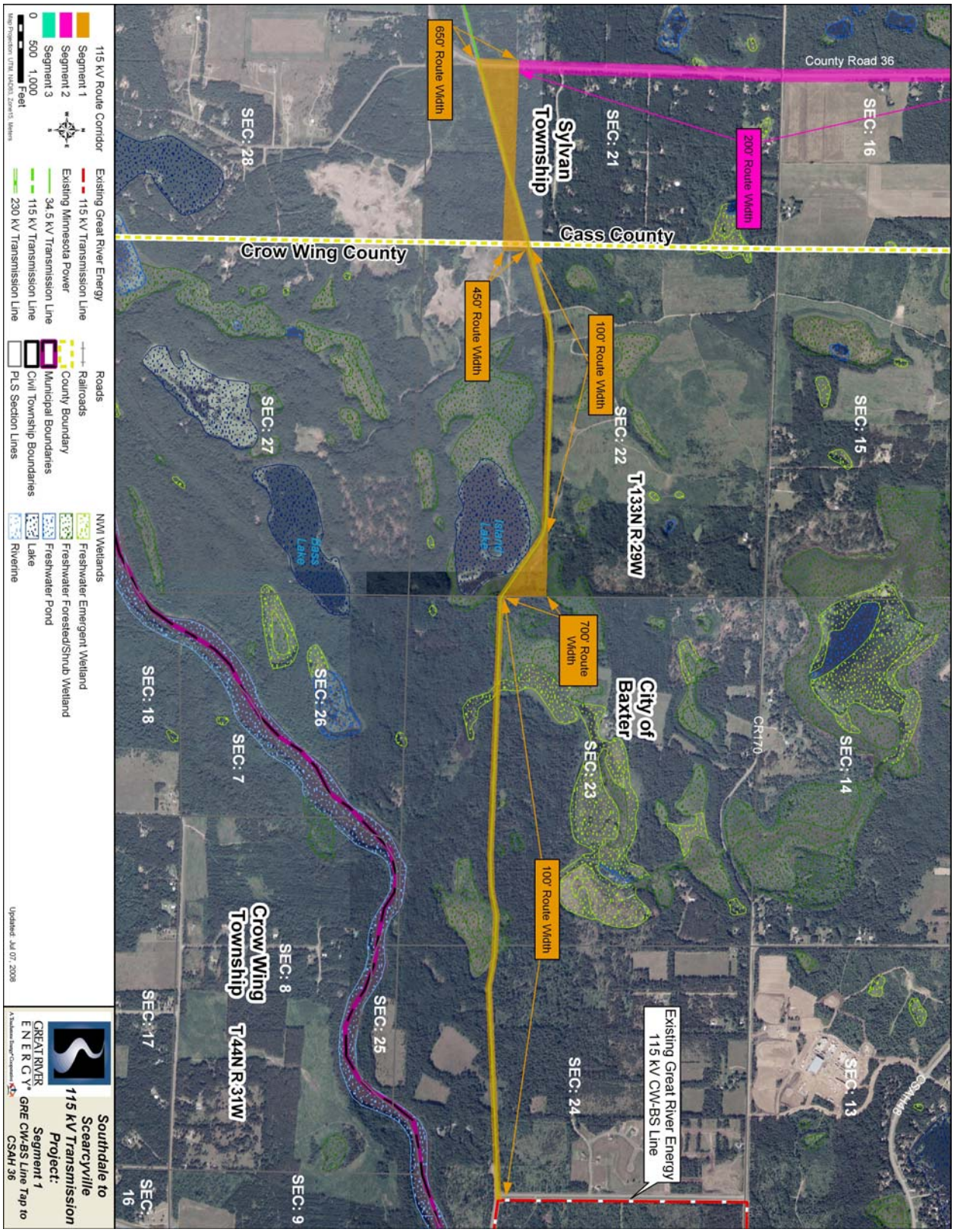
This segment will require 50 feet of clearing on each side of the new transmission centerline to meet reliability and access standards for north-central Minnesota. Great River Energy will obtain new easements from landowners for Segment 1. Minnesota Power currently maintains an 80-foot right of way in Segment 1.

The Applicants request the Commission approve a wider corridor in several areas along this segment to allow landowners, whose property is currently severed by Minnesota Power's "504" 34.5 kV distribution line, the opportunity to request that Great River Energy relocate the transmission line alignment along property lines. Relocations would not be done unless requested, reviewed, and approved by the landowner. Relocating portions of the Line would require clearing as much as 100 feet of new right of way in these areas and removing the existing "504" 34.5 kV distribution line structures after the line is underbuilt on the new "CW-SS" 115 kV structures.

There are two areas where the Applicants request the Commission approve a route wider than 100 feet in Segment 1.

In the northeast quarter of the southeast quarter of Section 22, T133N, R29W, the Applicants request approval of a triangular section, 700 feet at its widest point, around Island Lake to accommodate constructing the existing "504" 34.5 distribution line and the new "CW-SS" 115 kV transmission line to follow property lines, thereby shifting the Line away from Island Lake. The Applicants also request a variable width route in Section 21, T133N, R29W. In 2007, Great River Energy had conversations with a Potlatch representative and the parties discussed the possibility of relocating the existing "504" 34.5 kV distribution line to follow the north property line instead of bisecting parcels, as it currently exists. Although there has been no formal request by a landowner to follow property lines along this portion of the Proposed Route, the Applicants request that the Commission approve the proposed route widths to provide the Applicants and the landowners an opportunity to create a new alignment if the parties so desire. If the Line is relocated in the proposed areas, the distance of Segment 1 will increase to 3.5 miles and the overall project distance will increase to 9.5 miles.

Figure 5-2 Transmission Segment 1 – Southdale Substation to CSAH 36



5.2.2 Transmission Segment 2 – CSAH 36 to Minnesota Trunk Highway 210

Segment 2 is shown in Figure 5-3.

At CSAH 36 the Line will turn north and will no longer carry Minnesota Power's "504" 34.5 kV distribution line. The "CW-SS" transmission line will follow CSAH 36 north for 1.6 miles. The line will then turn west and cross the north edge of property owned by Minnesota Power, approximately 50 feet south of the north property line for approximately 0.5 miles. The line will then turn northerly and travel along Little Pine Road approximately 0.3 miles to the Highway 210/BNSF railway corridor.

Along CSAH 36, the proposed 115 kV transmission line will be located inside Cass County Highway Department right of way in accordance with the Cass County Comprehensive Plan.[1] Although the Cass County Comprehensive Plan does not mandate the placement of utilities in or along existing county road rights of way, the Comprehensive Plan states the county will support utility right of way in county road right of way.[2] The transmission line will be placed outside of the Cass County Highway Department required clear zone. Because CSAH 36 provides clear access to the transmission line in the event of required maintenance, tree clearing will only be required 35 feet on each side of the transmission centerline.

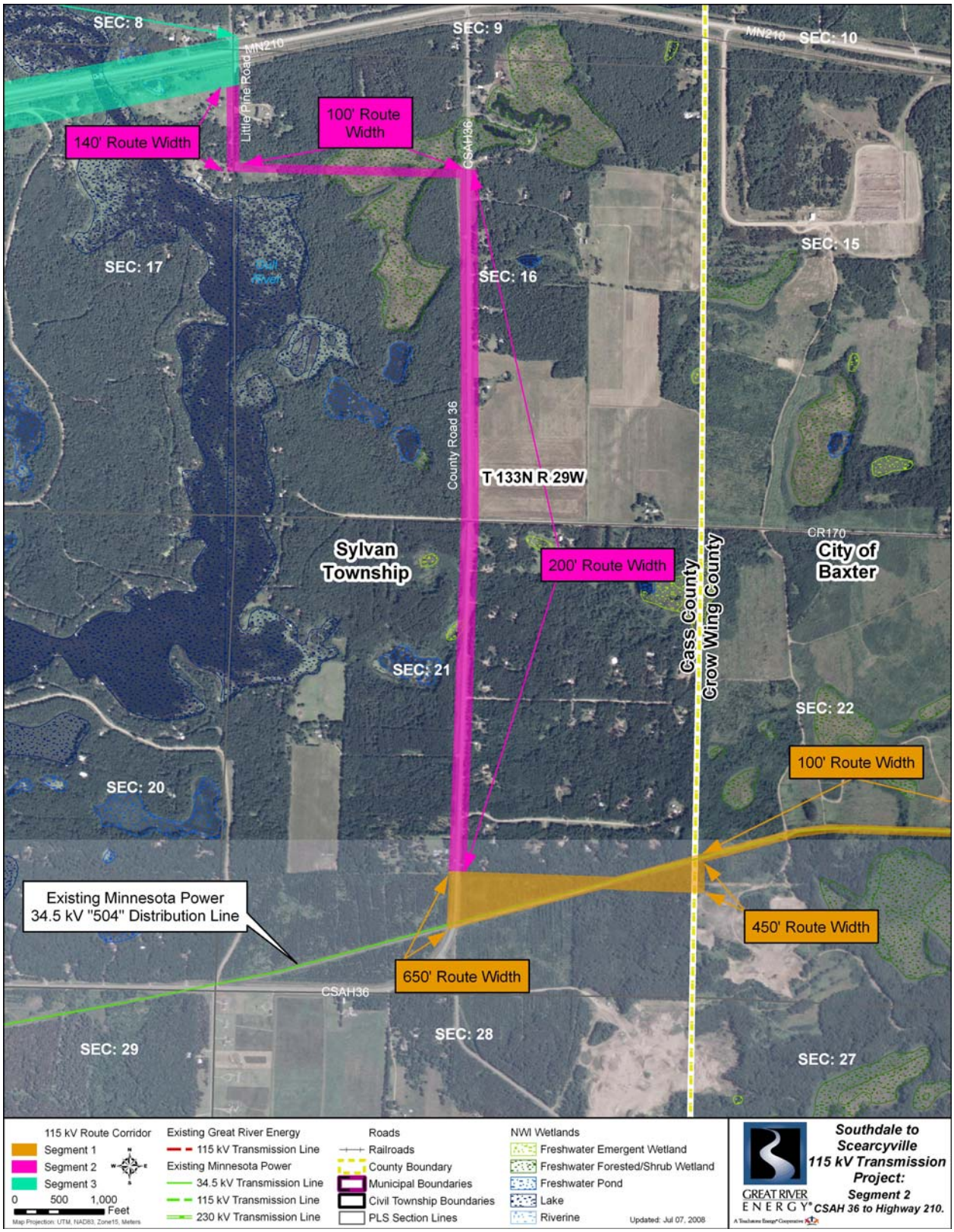
The Applicants request the Commission approve a 200-foot route width that extends 100 feet on either side of the CSAH 36 centerline to allow for flexible alignment of the transmission line on either side of the road to accommodate public and environmental concerns.

Where the Project turns and heads west across Minnesota Power's property, Great River Energy will clear trees to 50 feet each side of the transmission centerline. The proposed transmission line centerline will be located approximately 50 feet south of the northern Minnesota Power property line. The Applicants request that the Commission approve a 100-foot route width across the Minnesota Power property.

Along Little Pine Road, the transmission line centerline will be approximately 35 feet from the Little Pine Road centerline. Tree clearing will be required 35 feet on each side of the transmission centerline. The Applicants request that the Commission approve a 140-foot route width that equally encompasses the east and west sides of Little Pine Road to allow for transmission line design and alignment flexibility to minimize public and environmental impacts.

[1] *Cass County Comprehensive Plan*. Public Infrastructure Plan – Utility Plan, D(1). (2004).
[2] *Cass County Comprehensive Plan*. Public Infrastructure Plan – Utility Plan, D(1). (2004).

Figure 5-3 Transmission Segment 2 – CSAH 36 to Highway 210



5.2.3 Transmission Segment 3 – Highway 210 to Scearcyville 115 kV Breaker Station

Segment 3 is shown in Figure 5-4.

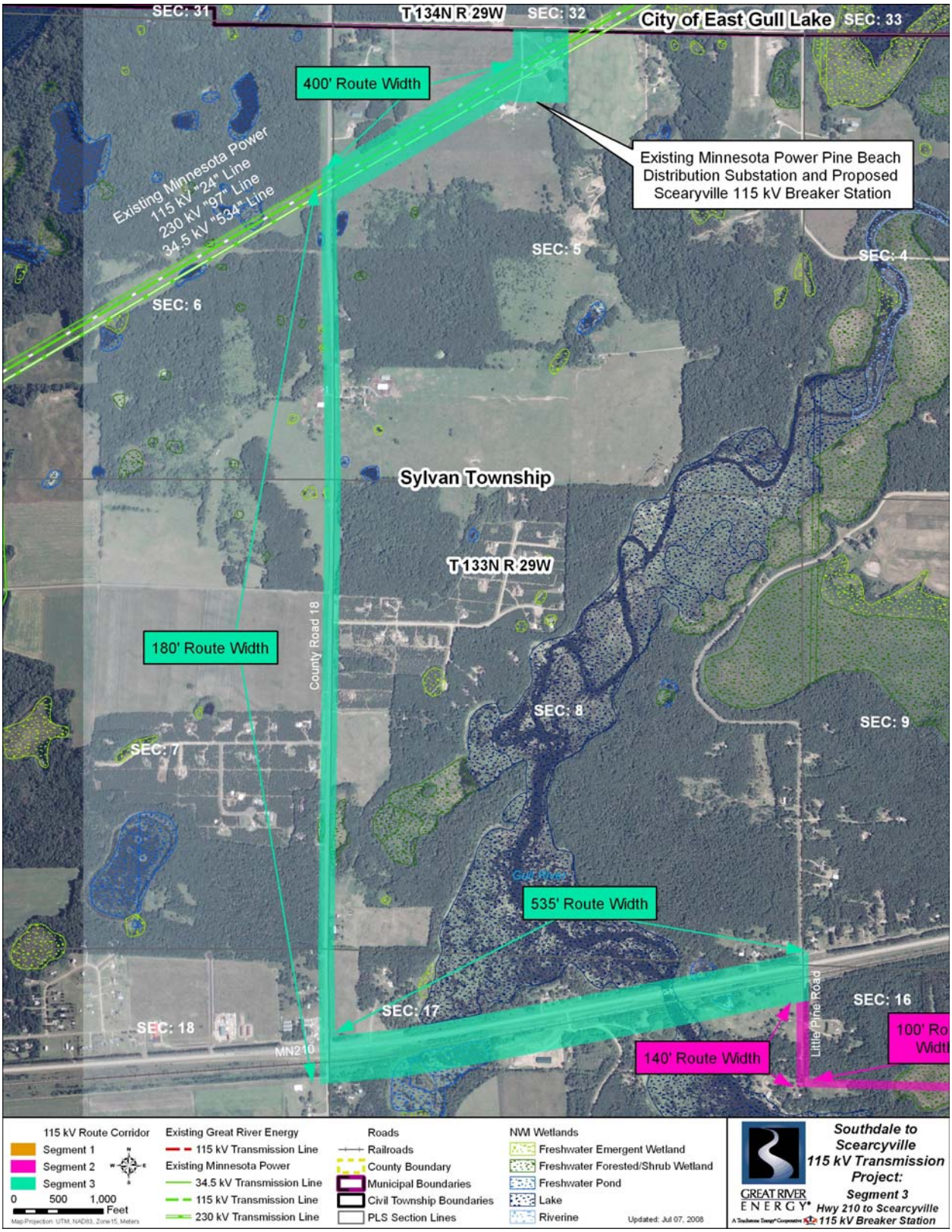
At Highway 210 the Line will travel one mile west along the Highway 210/BNSF railway corridor to CSAH 18. At this point the Line will turn north and follow CSAH 18 for 1.9 miles. Along CSAH 18, the existing Minnesota Power distribution line will be underbuilt on the new 115 kV structures where appropriate. The “CW-SS” 115 kV line will then turn northeast and parallel Minnesota Power’s existing transmission/distribution line right of way for 0.6 miles. The “CW-SS” 115 kV transmission line will then connect with Minnesota Power’s proposed Scearcyville 115 kV Breaker Station. Minnesota Power will construct two short 115 kV transmission line segments (0.1 miles total) to connect the Scearcyville 115 kV Breaker Station to its existing “24” 15 kV transmission line.

It is unclear at this time where the transmission centerline will be located within the 535-foot route width shown in Figure 5-5 along the Highway 210/BNSF railway corridor. Great River Energy is working with the BNSF to investigate opportunities to locate the transmission line within the railroad right of way. However, a 535-foot route width is requested to allow design and alignment flexibility along the Highway 210/BNSF railway corridor to accommodate potential landowner, environmental, railroad and highway concerns. Along the Highway 210/BNSF railway corridor, clearing will be required 35 feet on each side of the transmission centerline.

Along CSAH 18 the transmission line will be placed in Cass County Highway Department right of way. Thirty-five feet will be cleared on both sides of the transmission line centerline. The Applicants request approval of a 200-foot wide route width that extends 100 feet to the east and to the west of the CSAH 18 centerline to allow for flexible alignment of the transmission line to accommodate landowner and environmental concerns.

Up to 50 feet on each side of the “CW-SS” 115 kV transmission line will be cleared where the “CW-SS” 115 kV transmission line turns northeast and parallels the existing Minnesota Power transmission/distribution lines. This section is sparsely wooded. A 400-foot route width will allow for strategic alignment of the new “CW-SS” 115 kV transmission line to accommodate reliability and safety concerns associated with constructing an additional 115 kV transmission line in a parallel alignment with existing Minnesota Power transmission and distribution lines.

Figure 5-4 Transmission Segment 3 – Highway 210 to Scearcyville



5.3 Substations and Breaker Stations

Neither Great River Energy nor Minnesota Power will be making any substation modifications to accommodate the Project. However, Minnesota Power is proposing a new Scearcyville 115 kV Breaker Station to be located in the north portion of Sylvan Township near its “24” 115 kV transmission line. The proposed location for the Scearcyville 115 kV Breaker Station is shown in Figure 5-4.

Initially, Minnesota Power planned to modify its existing Dog Lake Substation, located to the west of the project area, to accommodate a new 115 kV breaker. With the Minnesota Power Dog Lake Substation modification, the “CW-SS” line would have required a three-way switch at the northern interconnection point near Minnesota Power’s existing “24” 115 kV transmission line.

After further investigation by Minnesota Power, it was determined that the initially planned modifications to the existing Dog Lake Substation were not feasible to accommodate a new 115 kV breaker and a new breaker station was required to maintain reliability of the transmission system in the Southdale project area.

The proposed Scearcyville 115 kV Breaker Station will be situated on privately-owned property located near Minnesota Power’s “24” 115 kV transmission line and its Pine Beach Distribution Substation. Minnesota Power proposes to purchase approximately 10 acres in this area to locate the new breaker station as far out of the view of neighboring properties as possible.

Minnesota Power’s proposed Scearcyville 115 kV Breaker Station will be the termination point for Great River Energy’s “CW-SS” 115 kV transmission line. Minnesota Power will construct two short 115 kV lines (0.1 miles) exiting the Scearcyville 115 kV Breaker Station that will connect to Minnesota Power’s “24” 115 kV transmission line.

5.4 Design Options to Accommodate Future Expansion

The Project is designed to upgrade the electric transmission system in and around the City of Baxter and Sylvan Township. The Project will allow both Great River Energy and Minnesota Power to maintain necessary voltage and reliability requirements in the Southdale project area. The proposed transmission line is projected to serve the area until 2030 with potential substations constructed to serve growing demand in the area. Unexpected growth may require additional transmission line construction sooner than projected.

Routing of the Project considered impacts to future regional transmission system needs. The selection of the proposed route considered the anticipated electric load growth and future needs to accommodate future facilities.

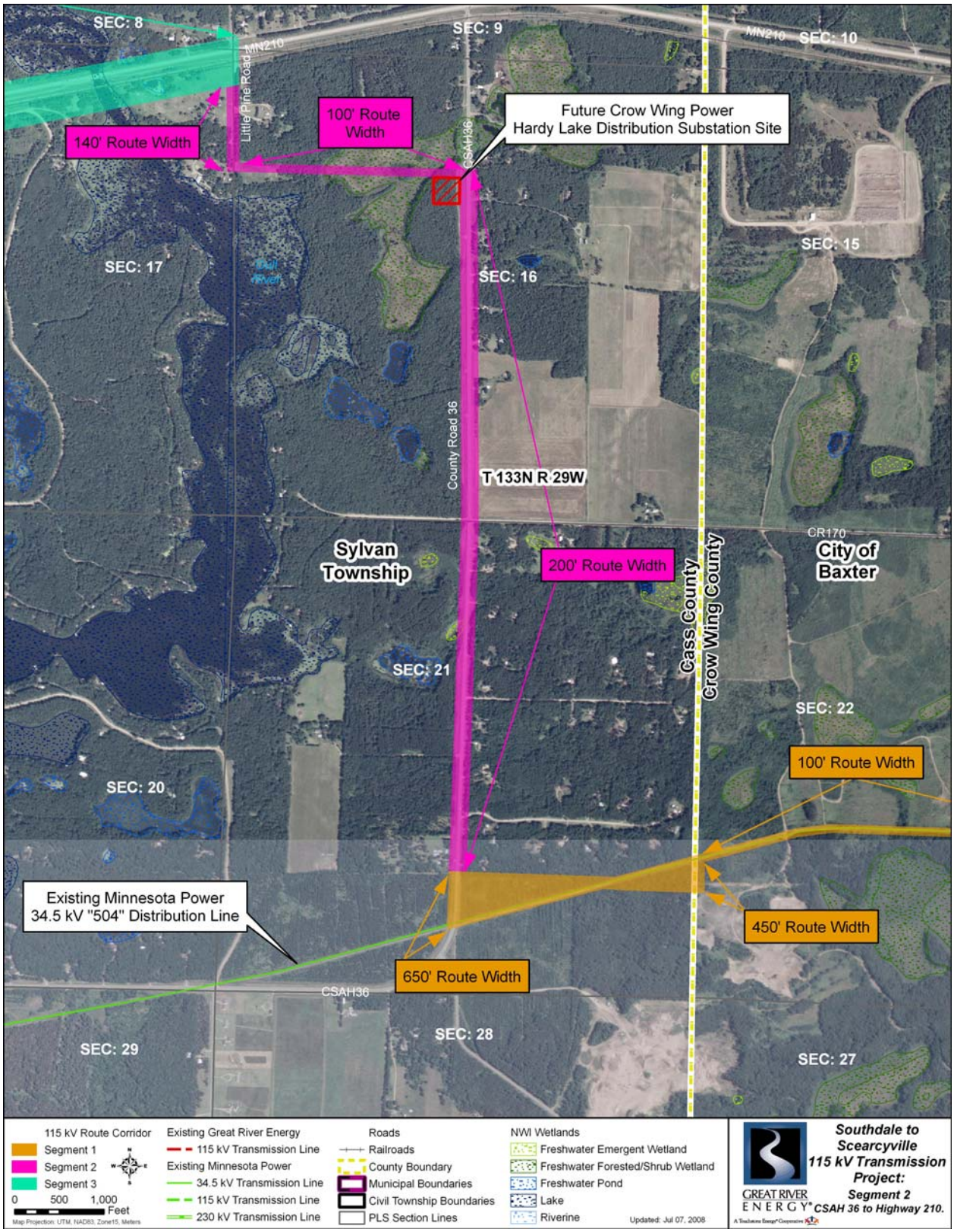
The Scearcyville 115 kV Breaker Station will be designed to accommodate a future 230/115 kV transformer. This is possible because the Minnesota Power 115 kV “24” line

is paralleled by the Minnesota Power 230 kV “97” line. As the cities of Brainerd and Baxter and their surrounding areas continue to grow, the Applicants project that a new 230/115 kV transformer will be necessary to provide this region support from the west. The existing sources to Baxter and Brainerd are served from the Riverton and Mud Lake substations that are located east of Brainerd. This 230/115 kV transformer is not projected to be constructed for at least ten years.

Also considered in the Project design is the need for an additional distribution substation in the area near Sylvan Township. Crow Wing Power’s long-range plans demonstrate a need for another distribution substation in the Southdale project area. It is likely that a location on or near the Minnesota Power property located west of CSAH 36 will be considered. The distribution substation is not needed for approximately five years according to long-range plans.

Figure 5-5 shows the potential location for the Crow Wing Power’s future expansion need in the Southdale project area.

Figure 5-5 Future Expansion Considerations



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6. Environmental Information

Great River Energy and Minnesota Power are required to provide environmental information on the Project.[1] This portion of the Application provides a description of the land use and environmental resources in the Southdale project area, potential impacts, and mitigative measures.

6.1 Description of Environmental Setting

Great River Energy proposes to construct approximately 9.3 miles of overhead 115 kV transmission line and Minnesota Power proposes to construct a 115 kV breaker station to meet the growing electrical load of the Southdale project area. The Proposed Route is located between the City of Baxter and the north side of Sylvan Township and traverses through Cass and Crow Wing counties.

The Project is located within the Pine Moraines and Outwash Plains Ecological Subsection of the Northern Minnesota Drift and Lake Plains Ecological Section of the Laurentian Mixed Forest Ecological Province.[2] The Pine Moraines and Outwash Plains Subsection is named for its mix of end moraines and outwash till plains. This area is heavily forested.[3] Sands and sandy loam soils overlay bedrock and vary in depth between 200 and 600 feet below ground surface.

Presettlement vegetation consisted primarily of mature conifer and northern hardwood forests interspersed with lake and wetland plant communities. Present day vegetation along the Proposed Route is made up of deciduous, mixed, and coniferous forests and grassland, with interspersed agricultural land, lakes, and wetlands.

The largest city in the vicinity of the Proposed Route is Baxter. Other communities near the Proposed Route are primarily townships. The Proposed Route crosses no State Forests, State Parks or Wildlife Management Areas. However, Pillsbury State Forest and Crow Wing State Park are within two miles of the Proposed Route.

6.2 Effects on Human Settlement

6.2.1 Public Heath and Safety

Proper safeguards would be implemented for construction and operation of the transmission facilities. The Project will be designed in compliance with local, state, National Electric Safety Code ("NESC"), NERC, Great River Energy and Minnesota Power standards regarding clearance to ground, clearance to crossing utilities,

[1] Minn. R. 7849.5220, subpts. 2(E-F), 3.
[2] MNDNR, *Ecological Classification System* (September, 2000), http://www.dnr.state.mn.us/ecs/index.html (2008).
[3] *Pine Moraines and Outwash Plains Subsection Profile*. MNDNR, 2006. *Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife*, Comprehensive Wildlife Conservation Strategy. Division of Ecological Services, Minnesota Department of Natural Resources.

clearance to buildings, 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. Great River Energy's established safety procedures as well as industry safety procedures would be followed during and after installation of the transmission line and breaker station, including clear signage during all construction activities.

The Project would be equipped with protective devices to safeguard the public if an accident occurs and a structure or conductor falls to the ground. Great River Energy and Minnesota Power's existing substations are already equipped with breakers and relays located where existing 115 kV transmission lines connect to the substations. The protective equipment is designed to de-energize the transmission line should such an event occur.

6.2.2 Displacement

The siting of the transmission line and new poles will be done in a manner such that no person shall be displaced from their residence or business.

6.2.3 Noise

Noise Measurement

Noise levels are measured on a logarithmic scale in units of decibels. Because human hearing is not equally sensitive to all frequencies of sound, it is customary to apply a weighting factor so the overall measured sound pressure level will relate as closely as possible to the ear's perception of the sound. The A-weighting network is typically used and the measured sound level is expressed in units of decibels A-weighted ("dB(A)"). In general terms, a noise level change of 3 dB(A) in imperceptible to human hearing. A 5 dB(A) change in noise level is clearly noticeable. A 10 dB(A) change in noise level is perceived as a doubling of noise loudness. Estimates of some common noise sources are presented in Table 6-1.[4]

[4] *A Guide to Noise Control in Minnesota*, Minnesota Pollution Control Agency (1999).

Table 6-1 Common Noise Levels

Sound Level db(A)	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

The Noise Control Requirement states that noise contributors shall comply with the noise area classifications ("NAC") established in Minnesota Rules Chapter 7030.0040,[5] which are shown in Table 6-2. The NAC is based on land use activity at the location of the receiver.[6] For example, household units are defined under NAC (1), bus passenger terminals are defined under NAC (2), and transportation rights-of-way are defined under NAC (3).[7] NAC (1) also includes other noise-sensitive areas such as medical and other health services, religious services, educational services, and camping areas.[8]

Table 6-2 Noise Area Classifications[9]

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

Minnesota Rules Chapter 7030 uses the decibel A-weighting network and applies statistical sound levels (L-Level Descriptors) to account for changes in sound levels over a period of time as shown in Table 6-2. The L_{10} is defined as the noise level exceeded 10 percent of the time; for example, six minutes in an hour. The L_{50} is the noise level exceeded 50 percent of the time, such at thirty minutes in an hour. The industry standard for utilities is calculated based on L_{50} and L_5 for audible noise

[5] Minn. R. 7030.0030 (2003).
[6] Minn. R. 7030.0050 (2003).
[7] Minn. R. 7030.0050 (2003).
[8] Minn. R. 7030.0050 (2003).
[9] Minn. R. 7030.0040 (2003).

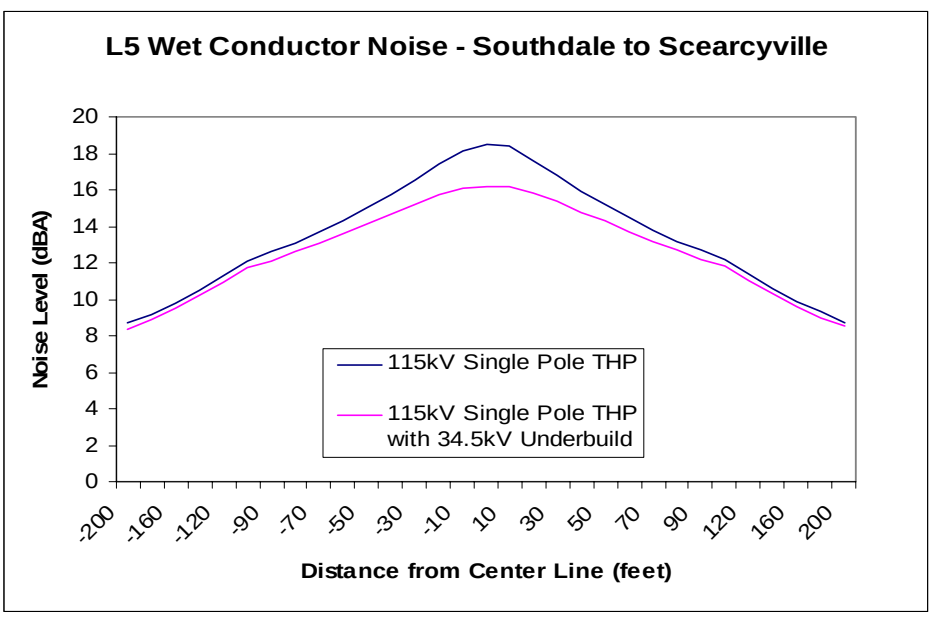
emissions. The L_5 is the noise level exceeded 5 percent of the time, or for three minutes in an hour.

Conductor Noise

Audible noise from conductors is due to point source corona formation (minor breakdown of air insulating a conductor), and is a function of conductor radius, surface condition, line geometry, weather conditions, and operating voltage. Noise from a transmission line reaches its maximum during heavy rain. However, during heavy rain the general background noise level is usually greater than the noise from the transmission line. As a result, people do not normally notice audible noise from a transmission line during heavy rain. During light rain, dense fog, snow, and other times when there is moisture in the air, transmission lines will produce an audible crackling noise at approximately household background levels due to the small amount of electricity ionizing the moist air near the wires. During dry weather, audible noise from transmission lines is barely perceptible.

The proposed "CW-SS" 115 kV line is expected to be essentially inaudible at the edge of the right of way during fair weather conditions. Anticipated levels for L_5 wet conductor conditions for the proposed "CW-SS" 115 kV line are shown in Figure 6-1. This figure was created using the Electric Power Research Institute's EMWORKSTATION: ENVIRO Software Version 3.0. Under the worst-case scenario (heavy rain-one inch per hour), the L_5 noise level may approach a maximum of 16 dB(A) directly under the conductors and 14 dB(A) or less at the edge of the right of way for the Line with 34.5 kV distribution underbuild (Segment 1 and a portion of Segment 3). For the rights of way without 35.4 kV underbuild (Segment 2), noise levels will be less than 18 dB(A) directly under the conductors and 14 dB(A) or less at the edge of the right of way.

Figure 6-1 Audible Noise – Southdale to Scearcyville Project Structures



Studies have indicated that complaints can be expected if the alternating current ("AC") transmission line audible noise exceeds approximately 59 dB(A) and that few complaints should be expected if the audible noise is below 52.5 dB(A).[10] The calculated values for the Project are below these thresholds and audible noise will be barely perceptible during fair weather.

In addition, Great River Energy is unaware of any complaints related to audible noise, radio, or television interference resulting from the operation of existing 115 kV transmission lines located near the project area and does not expect that audible noise or radio/television interference will be an issue along the Proposed Route.

Substation Noise

No new substations will be constructed as part of this project and Great River Energy does not expect audible noise to change at any existing substations in the Southdale project area.

Breaker Station Noise

The Scearcyville 115 kV Breaker Station is not expected to create significant noise impacts as noise from electric facilities originate from transformers, which will not be present at this site. Additionally, the Scearcyville 115 Breaker Station will be located in a rural area surrounded by wooded areas and agricultural uses.

6.2.4 Aesthetics

In general, aesthetic impacts are dependent on the response of the viewer. Viewer response is based on the sensitivity and exposure of the viewer to a particular viewshed. Sensitivity relates to the magnitude of the viewer's concern for the viewshed, while exposure is a function of the type, distance, perspective, and duration of the view. Sensitivity can be described in terms of levels of sensitivity, as shown in Table 6-3.

Table 6-3 Visual Sensitivity Levels

Level of Visual Sensitivity	Those Impacted
Low	Motorists viewing transmission lines from the perspective of the roads they traverse.
Moderate	Recereationalists, such as bird watchers, hikers, hunters and other individuals whose activity is specific to and who are sensitive to a finite geographic location, and who are sensitive to man-made structures and their impact on the natural environment.
High	Residential viewers who own property within 500 feet of the Proposed Route alignment and are concerned about the structures and how they impact the view of the natural environment.

[10] D.E. Perry, *An Analysis of Transmission Line Audible Noise Levels Based Upon Field and Three-Phase Test Line Measurements*, IEEE Transactions on Power Apparatus and Systems, Vol. PAS-91 at 857-865.

The Proposed Route crosses or parallels two CSAHs and one State Highway. None of these roadways are designated as Scenic Byways. Homes within 500 feet of the Proposed Route alignment will be the most likely to have their viewshed affected by the construction of a transmission line, and are therefore considered potentially high visual sensitivity resources.

There are 82 homes/businesses located within 500 feet of the Project.

6.2.5 Socioeconomics

The socioeconomic setting and potential impacts of the Proposed Route were evaluated on a regional basis, comparing data for Cass County and Crow Wing County with average data for the state of Minnesota.

Cass County

The Project crosses Cass County in Sylvan Township. According to the 2000 U.S. Census, Cass County had a year 2000 population of 27,150, and an estimated 2005 population of 28,910.[11] Between 1990 and 2000, Cass County's population grew by approximately 25 percent.[12]

General demographics for Cass County show that 50.5 percent of the population is male and 49.5 percent is female. Cass County is predominantly white with 86.5 percent of its residents in this category. This is slightly lower than Minnesota's 89.6 percent overall white population. The American Indian and Alaska Native population in Cass County accounts for 11.5 percent of its overall population, much higher than Minnesota's overall 1.5 percent American Indian and Alaska Native population.

Approximately 18 percent of Cass County's residents are sixty-five years of age and over. Median household income for the county in 2000 ($34,332) is approximately 27 percent less than the 2000 statewide average of $47,111 and is 33 percent lower than 2004 statewide average of $51,202.[13] Cass County's 2003 unemployment rate of 8.47 percent in 2003 is higher than the statewide average for 2003 of 4.7 percent.[14]

Crow Wing County

The proposed "CW-SS" 115 kV transmission line is located in southwest Crow Wing County in the City of Baxter. In 2000, the county had a population of 55,099, and an estimated 2005 population of 59,917.[15] Crow Wing County's population grew more than 25 percent between 1990 and 2000.[16]

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[11] Cass County Quick Facts, 2000 Census, U.S. Census Bureau, http://factfinder.census.gov (2007).
[12] Cass County Quick Facts.
[13] Cass County Quick Facts.
[14] Profiles of America, United States Department of Agriculture, http://www.ers.usda.gov (2007).
[15] Crow Wing County Quick Facts, 2000 Census, U.S. Census Bureau, http://factfinder.census.gov (2007).
[16] Crow Wing County, *Crow Wing County Comprehensive Plan 2003-2023*, 7 (2004).

The 2000 Census showed Crow Wing County to have a population comprised of 49.2 percent male residents and 50.8 percent female residents made up of a predominantly white population (97.2 percent). Approximately 17.1 percent of residents in Crow Wing County are 65 years of age and over.[17] The median household income of $37,589 is approximately 20 percent lower than the statewide average.[18] Crow Wing County's unemployment rate of 5.5 percent is slightly higher than the statewide average of 4.7 percent for the year 2004.[19]

6.2.6 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 (City of Baxter and Sylvan Township) appear to have cultural values corresponding with the economic activities of the region (agriculture, tourism, extraction and manufacturing). The major values within the region include individualism and appreciation of natural resources.

Most of the Project is within Cass County, where residents are predominantly of American Indian, German and Norwegian heritage. The Project includes portions of two counties that have experienced increasing populations that are expected to continue to grow. Traditional attitudes and uses of local resources have been changing as the area plays a larger role in recreational tourism. For example, accommodation and food services now rank as the largest of 20 sectors in Cass County. The communities along the Proposed Route also value their heritage and pioneer roots as settlers of the rivers and lakes within the Southdale project area. Community and county historical societies have embraced heritage tourism as an industry. Local museums provide excellent opportunities for recreation related to heritage interests.

Historically, the railroads that cross the region were important for gathering agricultural goods and transporting them to markets. Agriculture and farm-related business remains central to the regional economy. The area has a diversified economy that ranges from food processing operations to forest/timber product manufacturing to tourism. The residents along the Proposed Route likely value the natural environment and the opportunities natural resource-based industries bring to the region.

6.2.7 Public Services

The communities of Sylvan Township and Baxter provide typical public infrastructure to their residences (municipal water (in some areas), waste management, etc.).

[17] Crow Wing County Quick Facts.
[18] Crow Wing County Quick Facts.
[19] Profiles of America, United States Department of Agriculture, http://www.ers.usda.gov (2007).

6.2.8 Unavoidable Impacts

Public Heath and Safety
No impacts to public heath and safety are anticipated as a result of the Project.

Aesthetics
The Proposed Route follows existing state and county highways, county/township roads, transmission lines and distribution lines for the majority (approximately 95 percent) of its length. Most of the surrounding land use is forest or agricultural with several residential areas along the Proposed Route. Figure 6-2 and 6-3 show how Segment 1 of the Project currently appears from CSAH 36 and how the segment (115 kV line with 34.5 kV underbuild) would appear after installation, respectively. Figure 6-4 shows how the Minnesota Power property currently appears from CSAH 36 where the proposed "CW-SS" 115 kV transmission line turns west from CSAH 36 and cross the Minnesota Power property to Little Pine Road. Figure 6-5 illustrates how this area may appear after installation. Figure 6-6 illustrates the footprint and configuration of the proposed Scearcyville 115 kV Breaker Station.

The Proposed Route will impact the aesthetics in certain portions of the project area. Review of field data and aerial photography indicates that approximately 82 homes/businesses are located within 500 feet of the Project. However, due to the forested nature of the project area, many of these homes do not have a clear line of sight to the proposed Project.

Socioeconomics
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. It is not anticipated that the Project will create new permanent jobs, but it will create temporary construction jobs that will provide a one-time influx of income to the area.

Expenditures for equipment, energy, fuel, operating supplies and other products and services benefit businesses in the counties where the Project is located. 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.

There will also be some long-term beneficial impacts from the new transmission lines, including an increase to the counties' tax base resulting from incremental increase in revenue from utility property taxes. The availability of reliable power in the area will have a positive effect on local businesses and residents.

Public Services
No impacts to public services are expected as a result of the Project.

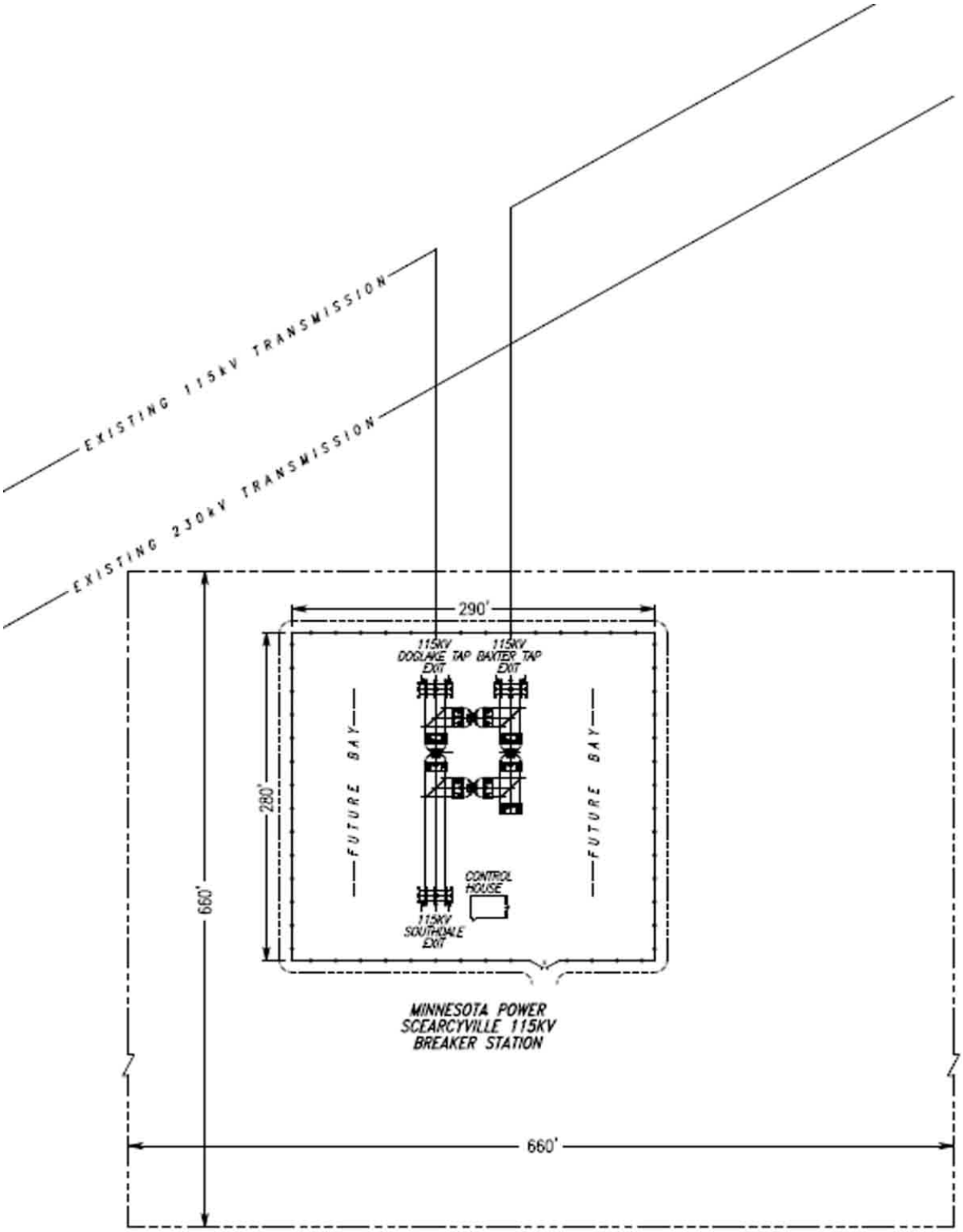
Figure 6-2 Segment 1 from CSAH 36 — Existing

Figure 6-3 Segment 1 from CSAH 36 — Proposed

Figure 6-4 Minnesota Power Property from CSAH 36 — Existing

Figure 6-5 Minnesota Power Property from CSAH 36 — Proposed

Figure 6-6 Scearcyville 115 kV Breaker Station — Proposed Layout



Cultural Values
The Project will provide the region with a stable power supply for years to come. As the urban centers of north central Minnesota continue to grow and the diverse economic base continues to expand, the available power supplied by upgraded and additional facilities may encourage this development and afford the residents a stable economic environment in which to live and work. In addition, these opportunities presented by the diverse economy may benefit tourism and continue to encourage civic pride.

6.2.9 Potential Mitigation

Public Health and Safety
The Applicants will ensure that safety requirements are met during the construction and operation of the facility. Additionally, when crossing roads or railroads during stringing operations, guard structures will be utilized to eliminate traffic delays and provide safeguards for the public.

Aesthetics
Although the "CW-SS" 115 kV transmission line will be a contrast to surrounding land uses, the Applicants will work with landowners to identify concerns related to the proposed transmission line and the Scearcyville 115 kV Breaker Station. In general, mitigation includes enhancing positive effects as well as minimizing or eliminating negative effects. Potential mitigation measures include:

- 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, new transmission lines will parallel existing transmission lines and other rights of way, to the extent that such actions do not violate sound engineering principles or system reliability criteria.
- Structures will be placed at the maximum feasible distance from highway and trail 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

Socioeconomics
Because no negative impacts are expected, no mitigation is necessary or proposed.

Public Services
Because no negative impacts are expected, no mitigation is necessary or proposed.

Cultural Values
Because no negative impacts are expected, no mitigation is necessary or proposed.

6.3 Effects on Land-Based Economies

6.3.1 Agriculture

Approximately four percent of the Proposed Route is presently used for agricultural-related activities.[20] Current land use is shown in Figure 6-7.

In 2002, Cass County reported 646 agricultural farms (197,153 acres) with a total market value of $14.3 million, including $3.9 million in crops and $10.4 million in livestock, poultry, and related products.[21] According to the 2002 Census of Agriculture, the number of farms in Cass County increased by 48 between 1997 and 2002, while the average farm size decreased by five percent.[22]

Crow Wing County's 755 agricultural farms (144,743 acres) produced products with a total market value of over $13.7 million in 2002, including $5 million in crops and $8.7 million in livestock, poultry, and related products.[23] Crops in Crow Wing County are primarily corn and forage, and livestock is primarily cattle.[24] The number of farms in Crow Wing County increased by 162 between 1997 and 2002, while the average farm size decreased by eight percent.[25]

Crops in Cass and Crow Wing County are primarily corn and forage, and livestock is primarily cattle.[26]

6.3.2 Forestry

Northern Minnesota contains economically important forestry industries. The Proposed Route crosses approximately 2.5 miles of Potlatch commercially managed forests in Cass and Crow Wing counties. The route also crosses approximately 0.25 miles of Cass County administered land.

6.3.2 Tourism

There is one large river along the Proposed Route (the Gull River) that is used for fishing and recreational boating, where it would be possible for recreationalists to view the transmission line structures that would span the river.

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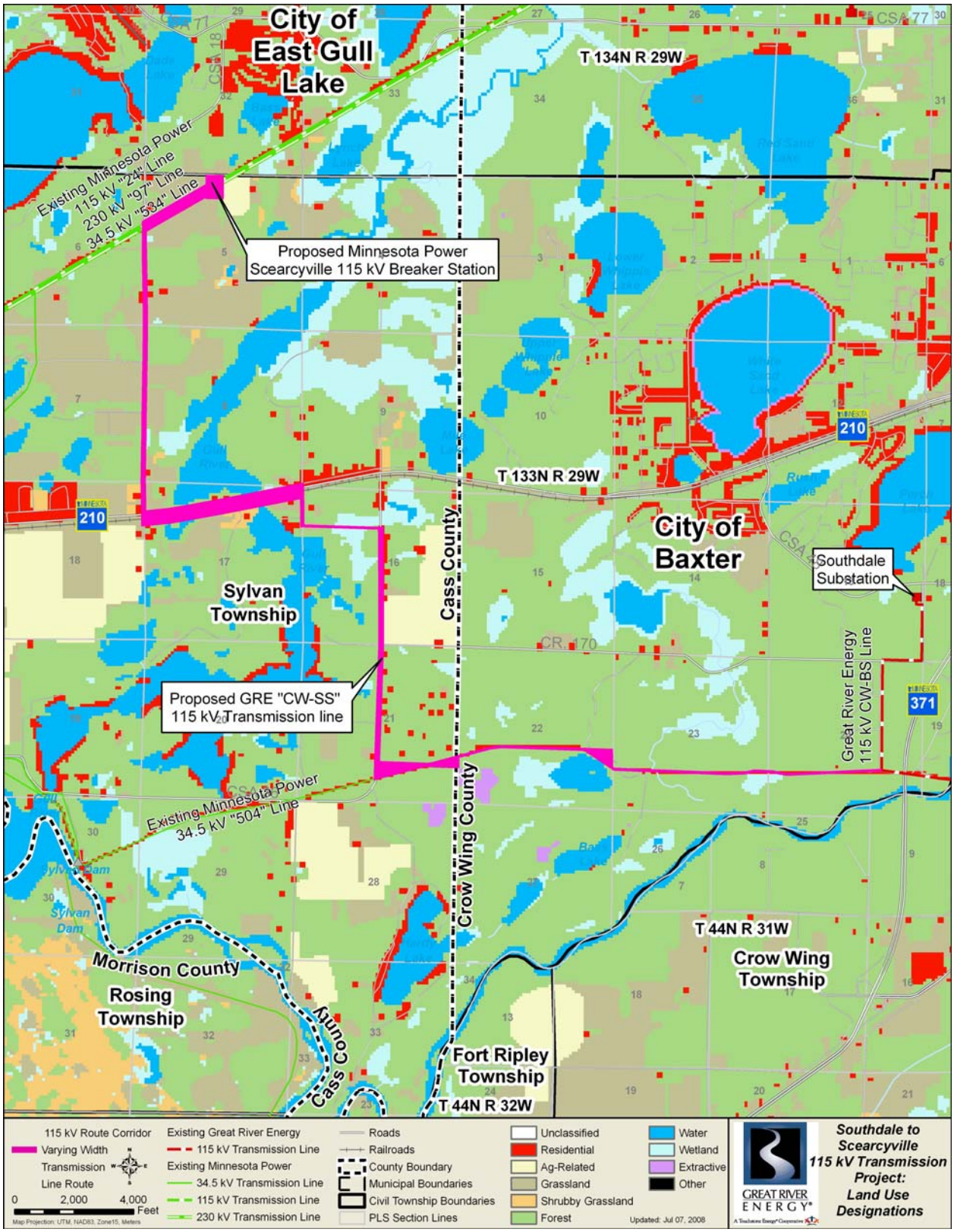
[20] MNDNR, Gap Analysis Program (GAP) Land Cover Data, 2002.
[21] United States Department of Agriculture, 2002 Minnesota County Level Data, Table 1. County Summary Highlights: 2002. http://www.nass.usda.gov/census/census02/volume1/mn/index2.htm (2007).
[22] United States Department of Agriculture, 1997 Minnesota County Level Data, Table 1: County Summary Highlights: 1997. http://www.nass.usda.gov/census/census97/volume1/mn-23/toc297.htm (2007). United States Department of Agriculture, 2002 Minnesota County Level Data, Table 1. County Summary Highlights: 2002. http://www.nass.usda.gov/census/census02/volume1/mn/index2.htm (2007).
[23] USDA, 2002 (2007).
[24] USDA, 2002.
[25] USDA, 1997. (2007). USDA, 2002. (2007).
[26] USDA, 2002.

Figure 6-7 Southdale Project Area Land Use



There is one resort along the Proposed Route (Little Pine Resort).[27] The Proposed Route follows Little Pine Road, which is used by the resort's visitors to access the resort from Highway 210.

The Proposed Route crosses and parallels one snowmobile trail that parallels Highway 210. [28]

6.3.4 Mineable Resources

Mines have been identified in Cass and Crow Wing counties. There are active gravel excavation sites in Crow Wing County adjacent to the Proposed Route (Section 22, T133N, R29W) and in Cass County (Section 5, T133N, R29W). Based on a review of existing information, the Proposed Route will not impact active mining or quarrying operations. Poles will be placed to avoid affecting entrances and exits to any operations adjacent to the Proposed Route.

6.3.5 Potential Impacts/Mitigation

<u>Agriculture</u>
Impacts to farmland may occur from pole placement in areas currently farmed. The area of impact will be the footprint of the pole itself. Most of the Proposed Route that traverses farmland will be located near existing roads, thus minimizing the impact to agricultural land. The permanent agricultural land conversion associated with Minnesota Power's Scearcyville 115 kV Breaker Station is estimated to be 1.9 acres. In general, agricultural areas surrounding transmission line structures will still be accessible to farming.

Mitigation measures include:

- The movement of crews and equipment will be limited to the right of way to the greatest extent possible, including access to routes. Contractors employed by the Applicants 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 if the landowner desires. Such ruts will be leveled, filled and graded or otherwise eliminated in an approved manner. In hay meadows, alfalfa fields, pastures and cultivated productive lands, compacted soils will be loosened and ruts will be leveled by scarifying, harrowing, disking, or by other approved methods. Damage to ditches, tile drains, terraces, roads and other features of the land will be corrected using approved methods and indigenous plants where necessary. The land and facilities will be restored as nearly as practicable to their original conditions.

[27] Little Pine Resort. http://www.littlepineresort.com (2008).
[28] MNDNR: *Snowmobile Trail Maps*. http://www.dnr.state.mn.us/snowmobiling/maps.html (2008).

- Right of way easements will be purchased through negotiations with each landowner affected by the Project and payment will be made for full value of crop damages or other property damage that occurs during construction or maintenance as negotiated.
- Construction will be scheduled during periods when agricultural activities will be minimally affected or the landowner will be compensated accordingly.
- Fences, gates, and similar improvements that are removed or damaged will be promptly repaired or replaced.

Forestry

The Proposed Route traverses commercially managed forests mostly along an established electrical system right of way. Mitigation measures are not anticipated to be necessary along the proposed transmission line route.

Tourism

No impacts to area tourism are anticipated from the presence of the transmission line; therefore, mitigation measures are not necessary.

6.4 Cultural Resources

The Minnesota Historical Society (MHS) was contacted with a request for information on the possible effects of the proposed Project on historic properties in the Southdale project area.[29] MHS indicated that the 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 (36CFR800).[30]

6.4.1 Archaeological and Historic Resources

The MHS indicated there was a good probability that unreported archaeological properties might be present in the Southdale project area, and recommended that either an archaeological survey be completed of the project area, or a survey assessment be completed by a qualified archaeologist regarding the need for a survey.

Great River Energy contracted Westwood Professional Services to conduct a Phase Ia Cultural Resources Evaluation of the Southdale project area. The report indicates there is one multiple component site within the Southdale project area that consists of a pre-contact lithic scatter and remains of the historic Village of Gull River.[31] This site stretches from the south side to the north side of the Highway 210/BNSF railway corridor

[29] Letter from Kodi Jean Church, Great River Energy, to Britta L. Bloomberg, MHS. 9 April 2007. *See* Appendix A.

[30] Letter from Dennis A. Gimmestad, MHS, to Kodi Jean Church, Great River Energy. 18 May 2007. *See* Appendix A.

[31] *Phase Ia Cultural Resources Survey and Preliminary Project Area Field Visit, Southdale to Scearcyville 115 kV Transmission line, Crow Wing and Cass Counties, Minnesota*. 24 June 2008. *See* Appendix A.

6.4.2 Potential Impacts/Mitigation

Should a Route Permit be granted by the Commission for the Project and before proceeding with line construction, Great River Energy will complete a Phase I survey in the area of the multiple component site to ensure that the project will not have any effects on the historic Village of Gull River. If any other archaeological sites are identified during placement of the poles along the proposed route, construction work will be stopped and MHS staff consulted to best determine how to proceed.

6.5 Natural Environment

6.5.1 Air Quality

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

Breakers containing SF_6 gas will be used at Minnesota Power's Scearcyville 115 kV Breaker Station. Although SF_6 is a greenhouse gas, new technology and smaller breaker capacity (breakers requiring less gas to operate) limit the possibility of gas leaking from these breakers into the environment. SF_6 breakers are used in breaker stations and substations throughout the state of Minnesota.

6.5.2 Water Resources

The United States Army Corps of Engineers ("Corps") was contacted requesting information on the possible effect of the proposed project on floodplains, waters, and wetlands along the Proposed Route.[32]

Through a follow-up phone call, it was determined the Project would need a Corps permit under Section 404 of the Clean Water Act if the work involves discharge of dredged or fill material into any water of the United States. The proposed project will not result in any such discharge. The project would require a Corps permit under Section 10 of the Rivers and Harbors Act if the work involves a navigable water of the United States. The Gull River is a navigable water from the dam near Gull Lake to the Mississippi River. Therefore, a permit under Section 10 of the Rivers and Harbors Act will be necessary for this project.

Should the Proposed Route Permit be granted by the Commission and the final route is determined, Great River Energy will consult with the Corps to ensure all work complies with Section 404 of the Clean Water Act. Also, Great River Energy will apply for a Corps permit under Section 10 of the Rivers and Harbors Act for the proposed Gull River crossing.

[32] Letter from Kodi Jean Church, Great River Energy, to Robert Maroney, Corps. 9 April 2007. *See* Appendix A.

Hydrologic features (lakes, streams, rivers, wetlands, riparian areas, etc.) along the Proposed Route are shown in Figure 6-8.

Ground Water

The Minnesota Department of Natural Resources ("MNDNR") divides Minnesota into six groundwater provinces. Crow Wing and Cass counties fall into the Central Province, which is described as sand aquifers in generally thick sandy and clayey glacial drift overlaying Precambrian and Cretaceous bedrock. Fractured and weathered Precambrian bedrock is used locally as a water source.[33]

Surface Water

The Proposed Route lies within the Crow Wing River watershed of the Upper Mississippi River Basin.[34] Water generally flows generally toward the Crow Wing River within the project area.[35]

Lakes

There are no lakes located in-line with the Proposed Route. The Proposed Route passes within a couple hundred feet of Island Lake in Section 22, T133N, R29W.[36]

Rivers and Creeks

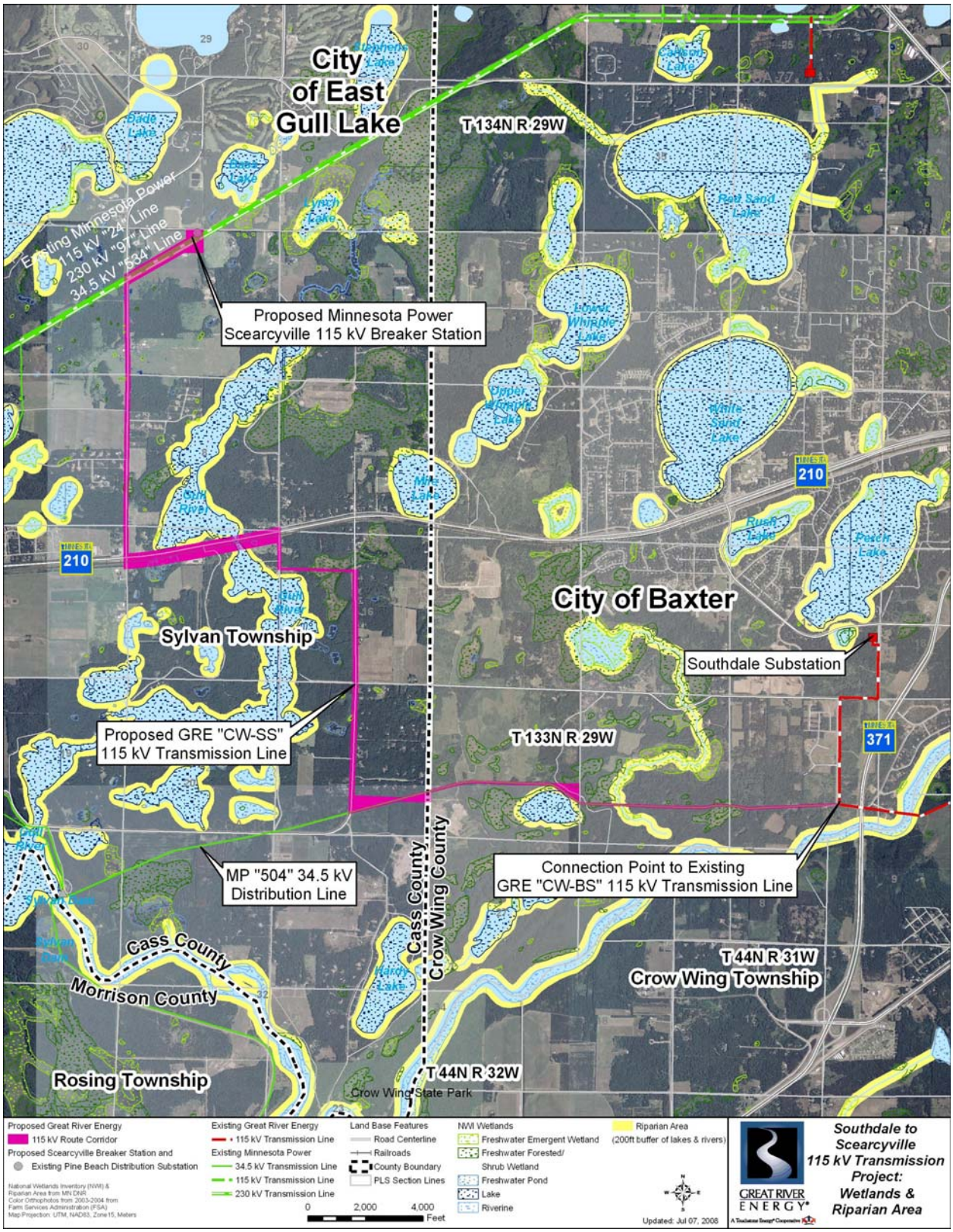
The Proposed Route crosses a small creek located east of Island Lake in Section 23, T133N, R29W. The unnamed creek flows into the Mississippi River to the south. The Proposed Route crosses the Gull River along Highway 210 in Section 17, T133N, R29W. The Gull River flows into the Crow Wing River, then into the Mississippi River.

Riparian Areas

Riparian areas are ecosystems that occur along watercourses or at the fringe of water bodies. For the purposes of this application, the riparian areas are defined as the land within 200 feet inland from shorelines of streams, lakes and wetlands.[37] These distances are consistent with the definition of shoreland in the MNDNR Statewide Standards. Figure 6-9 shows that the Proposed Route crosses riparian areas in five locations. These areas include the riparian areas of lakes (named and unnamed) as well as stream and wetland crossings.

[33] MNDNR. *Minnesota Groundwater Provinces*. http://files.dnr.state.mn.us/natural_resources/water/groundwater/provinces/gwprov.pdf (2008).
[34] Minnesota Pollution Control Agency. *Upper Mississippi River Basin Information Document 2000*. http://www.pca.state.mn.us/water/basins/uppermiss/bid-uppermiss.pdf (2008).
[35] MPCA. *Upper Mississippi River Basin*.
[36] MNDNR: *Recreation Compass* http://www.dnr.state.mn.us/maps/compass.html (2008).
[37] MNDNR. Minnesota DNR 200-Foot Riparian Zone. http://jmaps.dnr.state.mn.us/mdreporter/dp_full_record.jsp?mpid=39000118&ptid=21&fcid=1&dsid=66 (2008).

Figure 6-8 Southdale Project Area Hydrologic Features



Potential impacts to the riparian areas along the Proposed Route would be limited to ground disturbances due to pole placement. If construction occurs during wet conditions, Great River Energy may use wooden mats, the Dura-Base Composite Mat System, or specialized construction vehicles to minimize impacts to riparian areas during construction. Due to the small area that would be disturbed and the flexibility to avoid placing poles in sensitive areas, the anticipated impacts to the riparian areas along the Proposed Route are minimal.

Public Waters

Public Waters are wetlands, water basins and watercourses of significant recreational or natural resource value in Minnesota as defined in Minnesota Statutes Section 103G.005. The MNDNR has regulatory jurisdiction over these waters.

The Proposed Route could cross up to four Public Waters, depending on the final alignment of the Route. The Proposed Route crosses one Public Water Inventory (PWI) wetland twice, one PWI river, and one PWI stream. Table 6-4 lists the PWI waters along the Proposed Route.

Table 6-4 PWI Waters[38]

County	Name	Type	Location
Cass	779W – 2 crossings	Wetland	T133N, R29W, Section 17 & 18
	Gull River	River/Stream	T133N, R29W, Section 17
Crow Wing	Unnamed tributary between 382P and Mississippi River	River/Stream	T133N, R29W, Section 23

Floodplains

The portion of the Proposed Route in Cass County has not been mapped for floodplains by the Federal Emergency Management Agency. It is possible that the Proposed Route crosses the 100-year floodplains associated with the Gull River. The portion of the proposed route in Crow Wing County does cross the floodplains of Island Lake.

Potential impacts to the floodplains along the Proposed Route would be limited to ground disturbances due to pole placement. Due to the small area that would be disturbed and the flexibility to avoid placing poles in sensitive areas, the anticipated impacts to the floodplains along the Proposed Route are minimal.

Wetlands

Wetlands are defined by the Corps as “Waters of the U.S.” and are subject to jurisdiction under Section 404 of the Clean Water Act (1973). Waters of the U.S. include both wetlands and non-wetlands that meet Corps criteria. In Minnesota, all wetlands are

[38] MNDNR: *Public Waters Inventory Maps*. http://www.dnr.state.mn.us/waters/watermgmt_section/pwi/download.html (2007).

regulated under the Wetland Conservation Act[39] and by the Corps under Section 404 of the Clean Water Act.

Wetland resources for the Proposed Route were identified by reviewing United States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) mapping. NWI wetlands are shown on Figure 6-13. There are 12 NWI wetlands along the Proposed Route (primarily palustrine scrub/shrub and palustrine emergent wetlands), as listed in Table 6-5.

Table 6-5 NWI Wetlands

Wetland Type	No. of Basins	% of Wetland Type in Route
Lacustrine	1	8.4%
Palustrine	—	—
--Emergent	2	16.7%
--Forested	1	8.3%
--Scrub/Shrub	7	58.3%
--Unconsolidated Bottom	1	8.3%
--Riverine	0	0.0%
Total	**12**	

The right of way that will be disturbed during construction of the transmission line varies in width from approximately 70 feet along roadways or cleared rights of way to 100 feet elsewhere. Potential impacts to the wetland features along the Proposed Route will be limited to ground disturbances due to pole placement. Wooden mats, the Dura-Base Composite Mat System, or specialized construction vehicles will be used in these areas to minimize impacts during construction. Also, where feasible, construction crews will access poles near/in wetlands from roadways to minimize travel through wetland areas. Due to the small area that would be disturbed and the flexibility to avoid placing poles in sensitive areas, the anticipated impacts to the wetlands along the proposed route are minimal.

Some minor impacts to surface water could occur to wetlands or Public Waters due to construction of the Project. However, Great River Energy and Minnesota Power anticipate that most wetland areas and surface water features along the Proposed Route will be avoided by spanning the transmission line over the water bodies. It is estimated that less than 10 structures will be placed in NWI wetlands, for a permanent impact of less than 125 square feet.

Construction of the transmission line is not expected to alter existing water drainage patterns or floodplain elevations due to the small cross section per pole and their relatively wide spacing. Although construction of the proposed Scearcyville 115 kV Breaker Station will involve a small increase in impermeable surfaces (from the control houses and structure footings), the change to local surface drainage patterns from this and any necessary grading is expected to be negligible. The small area of impermeable

[39] Minnesota Statutes §§ 103G.222-2373 (2007). (requiring coordination with the Minnesota Board of Water and Soil Resources (BWSR)).

surfaces created by the pole structures and breaker station outbuildings or foundations will not cause an increase in susceptibility of flooding in the region.

6.5.3 Natural Vegetation

The Proposed Route is located in the Northern Lakes and Forests Ecoregion, which is dominated by mature conifer and northern hardwood forests and interspersed with lake and wetland plant communities. Current vegetative communities found along the Proposed Route include upland deciduous forests, coniferous forests, shrubby grasslands, grasslands, and multiple types of wetlands.

6.5.4 Rare and Unique Natural Resources

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

The USFWS was contacted by Great River Energy in a letter dated 9 April 2007, requesting information on the possible effects of the proposed project on any listed or proposed threatened or endangered species and designated or proposed critical habitat that may be present in the project area.[40] The USFWS determined that the Proposed Route will have no effect on federally-listed threatened and endangered species or listed critical habitats.[41]

The Applicants are aware of an occupied Osprey nest on the Minnesota Power “24” 115 kV transmission line structure east of CSAH 18. Great River Energy and Minnesota Power will work with the MNDNR to ensure transmission line and breaker station construction schedules near this nest will not negatively impact Osprey nesting or fledgling.

Great River Energy also requested information from the MNDNR on the possible effects of the proposed project on rare and unique features in the project area.[42] A review of the MNDNR Rare Features map identified occurrences of *emydoidea blandingii* (Blanding’s Turtles) as the only rare feature near the Proposed Route. The Blanding’s Turtle habitat is located in wetlands and adjacent grasslands. It is not a federally listed species, but has been given an S2 state rank.[43] The MNDNR concurred with Great River Energy’s assessment.[44] Great River Energy proposed that to prevent sedimentation, silt fencing or other erosion control measures would be used near waterways and all construction

[40] Letter from Kodi Jean Church, Great River Energy, to Paul Burke, USFWS. 9 April 2007. *See* Appendix A.
[41] Email from Paul Burke, USFWS, to Kodi Jean Church, Great River Energy. 9 April 2007 (0922 CDT). *See* Appendix A.
[42] Letter from Kodi Jean Church, Great River Energy, to Lisa Joyal, MNDNR. 9 April 2007. *See* Appendix A. (Rare Features Map omitted per MNDNR request).
[43] State rank is assigned to species and terrestrial communities to reflect the extent and condition of that feature. Ranks range from S1 (in greatest need of conservation) to S5 (secure under present conditions).
[44] Letter from Lisa Joyal, MNDNR, to Kodi Jean Church, Great River Energy. 3 May 2007. *See* Appendix A.

personnel and contractors would be made aware of the rare feature's presence along the Proposed Route.[45] The MNDNR believes that these procedures will provide adequate protection for Blanding's Turtles.[46]

6.5.5 Potential Impacts/Mitigation

Air Quality

Because the Project is not expected to impact air quality, no mitigation is necessary or proposed.

Water Resources

The proposed Project will not result in discharge of dredged or fill material into any water of the United States. If necessary, Great River Energy will use wooden mats or the Dura-Base Composite Mat System to minimize impacts to wetlands during construction. Great River Energy will comply with any conditions imposed by the Corps regarding the Gull River water crossing.

The Proposed Route will cross the Gull River and potentially several other MNDNR public waters.[47] Great River Energy will obtain a license to cross those waters from the MNDNR and will follow any recommendations to minimize erosion or other impacts.

Potential impacts to riparian areas, floodplains and wetlands along the Proposed Route will be limited to ground disturbances due to pole placement and construction traffic. Great River Energy and Minnesota Power will use wooden mats or the Dura-Base Composite Mat System to minimize impacts to these areas during construction where appropriate. The anticipated impacts to these areas are minimal because of the small area that will be disturbed and the flexibility to avoid placing poles in sensitive areas.

To avoid impacting the known occurrences of Blanding's Turtles along the Proposed Route, Great River Energy and Minnesota Power will use silt fencing or other erosion control measures to prevent sedimentation when working near waterways. Also, construction crews and contractors will rarely deviate from the Project right of way in an effort to minimize disturbance of surrounding areas.

Minimal grading is expected to be necessary. Areas disturbed due to construction activities will be restored to pre-construction contours.

There is a potential for temporary displacement of wildlife, loss of habitat, and avian collisions with the new transmission line. Wildlife could be impacted within the immediate area of construction. The distance that animals will be displaced will depend on the species. Impacts to wildlife are anticipated to be short-term, as the transmission

[45] Letter from Kodi Jean Church, Great River Energy, to Lisa Joyal, MNDNR. 9 April 2007. *See* Appendix A. (Rare Features Map omitted per MNDNR request).
[46] Letter from Lisa Joyal, MNDNR, to Kodi Jean Church, Great River Energy. 3 May 2007. *See* Appendix A.
[47] MNDNR: *Public Waters Inventory Maps*. http://www.dnr.state.mn.us/waters/watermgmt_section/pwi/download.html (2007).

line will be constructed parallel to existing right of way or along existing electrical systems the majority of the Proposed Route. Additionally, these animals will be typical of those found in agricultural and forested settings, and will not incur population level effects due to construction. When possible, impacts to wooded areas along the Proposed Route will be avoided.

Raptors, waterfowl and other bird species may also be affected by the construction and placement of the transmission line. Avian collisions are a possibility after completion of the transmission lines and could potentially increase as a result of the proposed line. Waterfowl are typically more susceptible to transmission line collisions, especially if the line is placed between agricultural fields that serve as resting areas or along major migration flyways. The majority of the Proposed Route is along existing rights of way, thereby minimizing impacts to waterfowl.

Additionally, large birds, such as raptors are sometimes impacted by power lines through electrocution. This is primarily an electric distribution issue, as electrocution may occur when birds with large wingspans come in contact with either two conductors, or a conductor and grounding device. Great River Energy's 115 kV transmission line designs for this project will create greater separation between conductors and grounding devices to minimize electrocution hazards. The Applicants will address other avian issues by working with the MNDNR to identify any areas that may require marking transmission line shield wires to reduce the likelihood of collisions.

The following measures can be used to help avoid or minimize impacts to area vegetation and wildlife resources during and after the completion of the proposed Project:

- Utilize best management practices to prevent erosion of the soils in the areas of impact.
- Implement sound water and soil conservation practices during construction and operation of the project to protect topsoil and adjacent water resources and minimize soil erosion. Practices may include containing excavated material, protecting exposed soil, and stabilizing restored soil.
- Minimize tree felling and shrub removal that are important to area wildlife.
- Implement raptor protection measures, including placement of bird flight diverters on the line at water crossings after consultation with local wildlife management staff.
- Revegetate disturbed areas with native species and wildlife conservation species where applicable.

6.6 Physiographic Features

6.6.1 Topography

The Project is located within the Pine Moraines and Outwash Plains Ecological Subsection of the Northern Minnesota Drift and Lake Plains Ecological Section of the

Laurentian Mixed Forest Ecological Province.[48] The area is generally flat to gently rolling. Kettle lakes and lakes greater than 160 acres are common throughout. Elevations generally range between 1,200 and 1,300 feet above mean sea level across the project area. The lowest elevation is 1,198 feet near Island Lake, and the highest elevation is approximately 1,300 feet near the Scearcyville 115 kV Breaker Station.[49]

6.6.2 Geology

The Pine Moraines and Outwash Plains Subsection is named for its mix of end moraines and outwash till plains. This area is heavily forested.[50] Sands and sandy loam soils overlay bedrock and vary in depth between 200 and 600 feet below ground surface. Precambrian bedrock is generally granite, gneiss and slate.[51]

6.6.3 Soils

Soils found along the Project are generally moderately well drained to excessively drained loamy sands with poorly-drained muck soils found in the large wetland depressions. USDA Natural Resource Conservation Service ("NRCS") Soil Survey data were reviewed to describe the soil resources along the Project. The Menahga-Mahtomedi soil association is the primary soil association along the Proposed Route.[52] Figure 6-9 shows the Menahga-Markey-Hubbard soil association is also found along the Project.[53]

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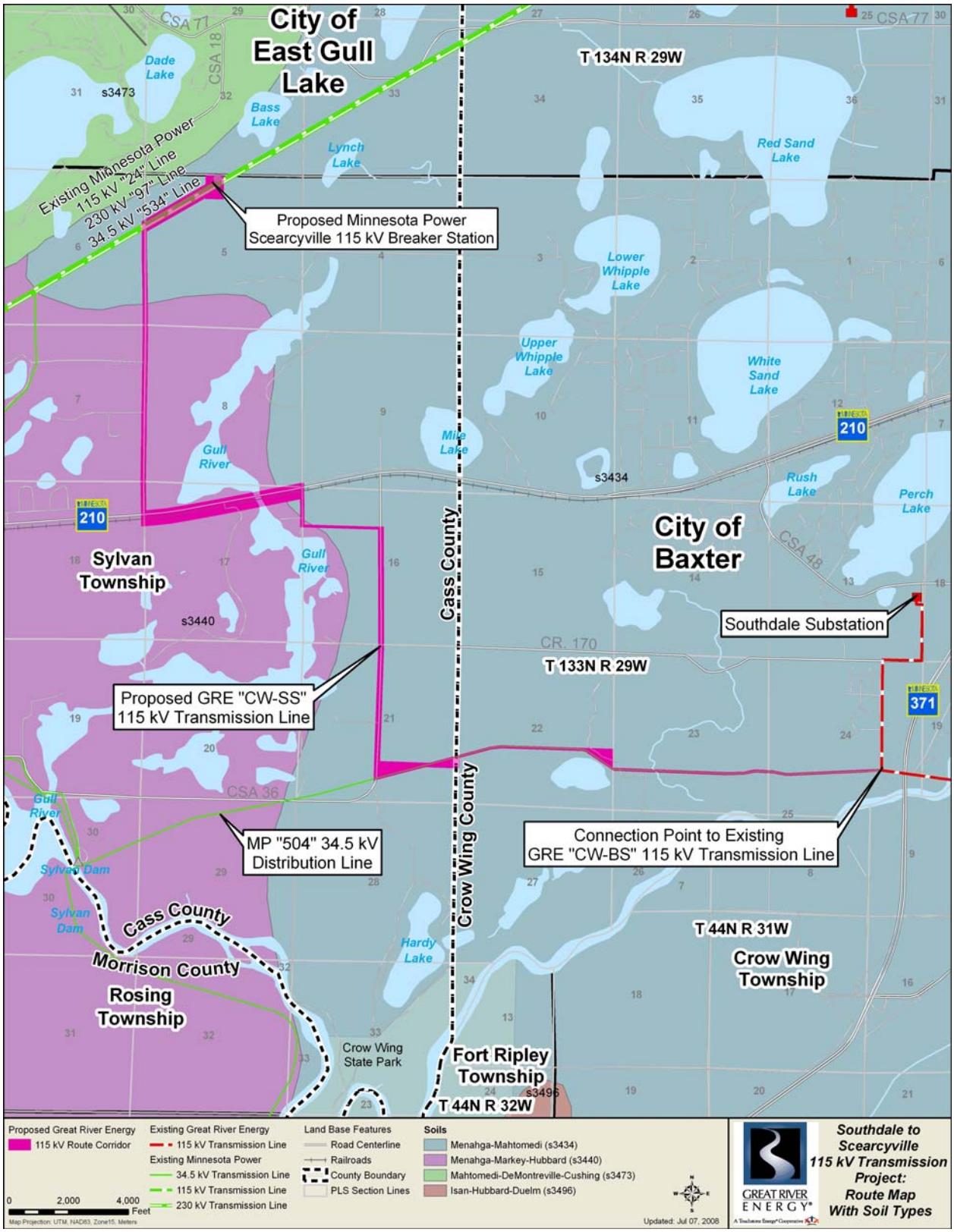
[48] MNDNR, *Ecological Classification System* (September, 2000), http://www.dnr.state.mn.us/ecs/index.html (2008).
[49] United States Geological Survey (USGS), *24k Topographic Quadrangle Maps*. http://deli.dnr.state.mn.us (2008).
[50] *Pine Moraines and Outwash Plains Subsection Profile*. Minnesota Department of Natural Resources, 2006. *Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife*, Comprehensive Wildlife Conservation Strategy. Division of Ecological Services, MNDNR.
[51] *Water Resources of the Crow Wing River Watershed, Central Minnesota*. USGS. Washington, D.C. 1972. *Water Resources of the Mississippi Headwaters Watershed, North-Central Minnesota*. USGS. Washington, D.C. 1968.
[52] *State Soil Geographic Database for Minnesota*. USDA, NRCS. http://datagateway.nrcs.usda.gov/GatewayHome.html (2008).
[53] Map Data: *State Soil Geographic Database for Minnesota*. USDA, NRCS. http://datagateway.nrcs.usda.gov/GatewayHome.html (2008).

Figure 6-9 Project Area Soil Associations



6.6.4 Prime Farmland and Additional Lands of Statewide Importance

Great River Energy contacted the NRCS and requested information on the possible effects of the proposed project on important or prime farmlands in the project area.[54] The NRCS indicated there are areas of prime farmlands and farmlands of statewide importance at the north end of the Project near CSAH 18.[55] The NRCS indicated "the construction of overhead . . . utilities is not considered as farmland conversion or hydric soil conversion for USDA farm programs."[56]

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

6.6.5 Potential Impacts/Mitigation

Great River Energy and Minnesota Power will work with the NRCS to identify and minimize potential impacts to Prime Farmlands and Farmlands of Statewide importance along the Proposed Route once pole and breaker station locations are known.

Potential impacts of construction are compacting 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 Line structures and installation of the Scearcyville 115 kV Breaker Station; these impacts will be short term. There should be no long-term impacts resulting from the Project.

Soils will be revegetated as soon as possible after construction is completed to minimize erosion. Various stabilization methods will be used to prevent soil erosion during construction.

6.7 Land Use

6.7.1 General

Land use along the Proposed Route consists of mainly forest, grassland, rural residential uses, wetlands, water, and agricultural-related uses.[57]

6.7.2 Undeveloped/Agricultural Land

Undeveloped land and agricultural land occur in patches across the northern portion of the Proposed Route. These areas consist mainly of pastureland. After construction of

[54] Letter from Kodi Jean Church, Great River Energy, to Richard Schossow, NRCS, and Mary Reetz, NRCS. 9 April 2007. *See* Appendix A.
[55] Letter from Rodney B. Heschke, NRCS, to Kodi Jean Church, Great River Energy. 24 April 2007. Cass County & Crow Wing County Prime Farm Land Map. *See* Appendix A.
[56] Letter from Rodney B. Heschke, NRCS, to Kodi Jean Church, Great River Energy. 24 April 2007. *See* Appendix A.
[57] *See* Figure 6-12 Southdale Project Area Land Use

the Project is complete, soils will be stabilized with native vegetation as soon as possible.

6.7.3 Public Lands and Recreational Areas

Parks and Recreational Areas
There are no regional parks or recreational areas within the Proposed Route.

Regional Trails
There is a regional snowmobile trail that runs parallel to Highway 210 within the Proposed Route.

State-Owned Lands
There are no state-owned lands within the Proposed Route. However, there is one parcel of Cass County Administered Land along Segment 1 in Section 21, T133N, R29W. The Minnesota Power "504" 34.5 kV distribution line already traverses this parcel.

6.7.4 Zoning

The 2007 Cass County Preliminary Zoning Map for Sylvan Township shows that the Proposed Route crosses areas of Rural Residential, Shoreland Residential, Commercial, and Agricultural/Forestry.[58]

The Crow Wing County Comprehensive Plan only covers the unincorporated areas of Crow Wing County.

The City of Baxter Zoning Map shows that the Proposed Route crosses areas designated Commercial Forestry and Special Residential.[59] Typically, the installation of transmission facilities would require a Conditional Use Permit from the City of Baxter. However, a Route Permit issued by the Commission supersedes any local zoning, building and land use regulations.[60]

6.7.5 Airports

There are two publicly accessible airports in the vicinity of the Project the Brainerd Regional Airport and the East Gull Lake Municipal Airport.

Great River Energy contacted the Minnesota Department of Transportation (MNDOT) Office of Aeronautics and requested information on the potential effects of the Project

[58] Cass County Environmental Services Department. Zoning Maps by Township: Sylvan Township. http://www.co.cass.mn.us/pdfs/esdzoningmaps/Sylvan.pdf (2008).
[59] City of Baxter. Zoning Map. http://www.ci.baxter.mn.us/maps/zoning.pdf (2008).
[60] Minn. Stat. § 216E.10, subdiv. 1.

on airports in the vicinity of the Project.[61] MNDOT determined the Project was clear of impacts on these airports.[62]

6.7.6 Potential Impacts/Mitigation

Potential land use impacts along the Proposed Route due to the construction of the 115 kV transmission line will be limited. The Proposed Route for the "CW-SS" 115 kV transmission line will be approximately 9.3 miles long and will overtake a portion of Minnesota Power's existing "504" 34.5 kV distribution line, will parallel road rights of way, and parallel existing transmission line corridors as much as possible.

The new "CW-SS" 115 kV transmission line does not represent an incompatible land use with those that exist in the corridor. Therefore, anticipated impacts of the proposed project on land use are minimal and no mitigation measures are anticipated.

[61] Letter from Kodi Jean Church, Great River Energy, to Tracy Schmidt, MNDOT. 20 July 2007. *See* Appendix A. Email from Kodi Jean Church, Great River Energy. 19 June 2008 (11:02 CDT). *See* Appendix A.
[62] Email from Michael Ferry, MNDOT, to Kodi Jean Church, Great River Energy. 19 June 2008 (17:41 CDT). *See* Appendix A.

7. Engineering and Operational Design of the Proposed HVTL and Breaker Station

7.1 Transmission Structures

Design voltage of the proposed “CW-SS” transmission line is 115 kV. The project will have a total length of approximately 9.3 miles, with slight variations depending on the final alignment chosen. The “CW-SS” 115 kV transmission line will traverse Cass and Crow Wing counties, Minnesota.

The transmission line will be constructed with 795 aluminum conductor steel supported (“ACSS”) conductors. These provide greater load capacity with less sag than other traditional conductors, including 795 aluminum conductor steel reinforced (“ACSR”) conductors. ACSS provides more current carrying capability than ACSR with comparable structures, poles and appearance. The line will use three single conductors (not bundled).

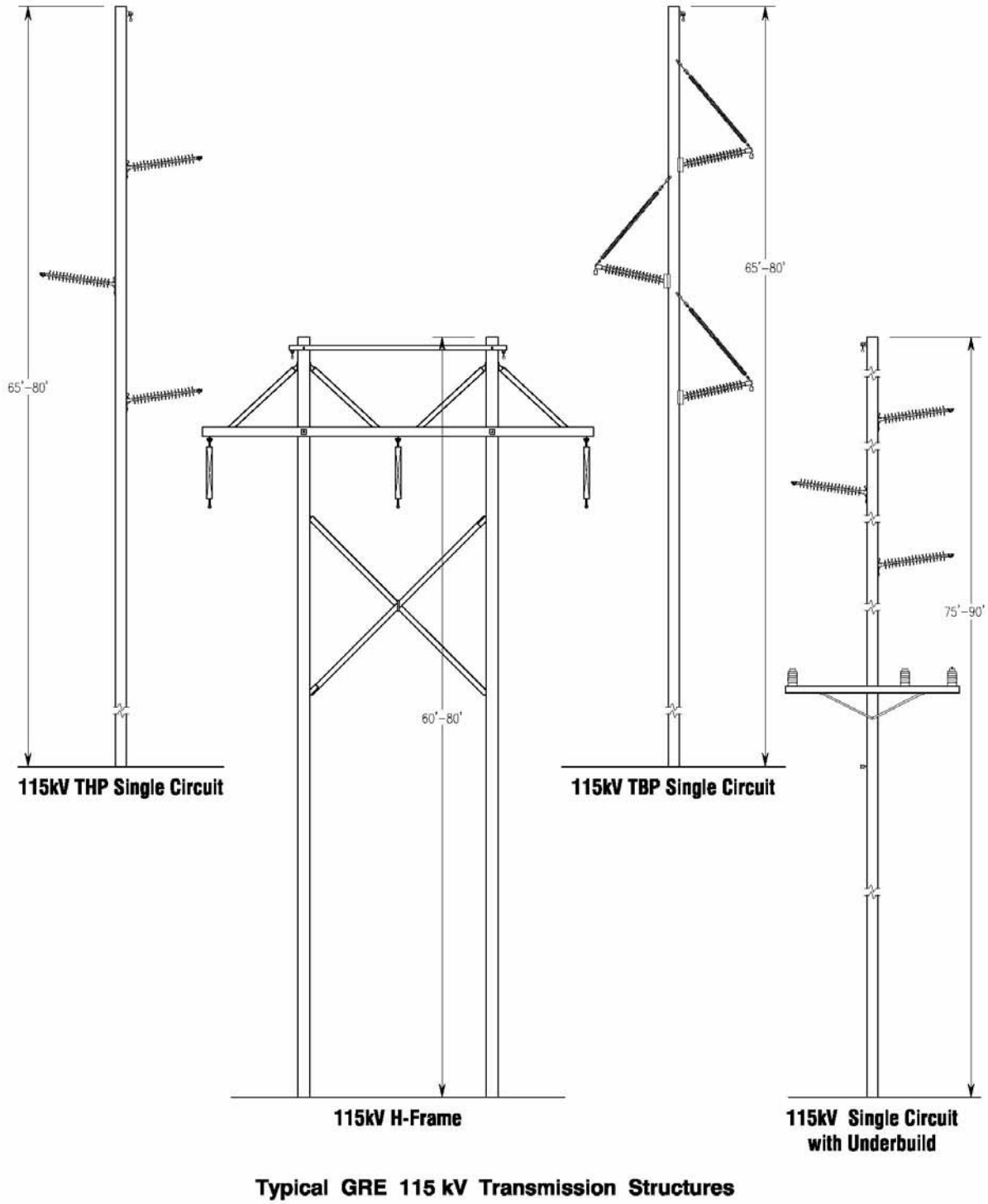
Typical Great River Energy transmission line structures are shown Figure 7-1.

Single pole with underbuild design is used in areas where existing land use development restricts the placement of two separate power line circuits. The advantage of this design is that less right of way is required; however, there are significant operating, maintenance, and cost factors to consider. The higher voltage circuit is “stacked” on top of the lower voltage circuit, resulting in a taller pole that averages 75 to 90 feet in height. This pole design will likely be used along Segment 1 (overtaking the Minnesota Power “504” 34.5 kV line) and along CSAH 18 where the new “CW-SS” line shares right of way with existing distribution lines. Span lengths average 250 to 350 feet.

Single pole wood structures with horizontal post insulators (“THP”) and no underbuild will be used for Segments 2 and 3 where no above-ground distribution lines already exist. Horizontal post insulators will be used unless design requires longer spans beyond the capability of the insulators, in which case, a braced post design (“TBP”) will be utilized to accommodate the increased loadings. Angles in the transmission line will require the use of anchors and support cables (guying) or specialty structures. Where guying is not practicable, direct embedded laminated wood poles or steel poles on drilled pier foundations will be utilized. Span lengths average 300 to 400 feet and heights will range from 65 to 80 feet.

H-Frame design structures may be used in areas with rugged topography and where longer spans are required to avoid or minimize impacts to wetlands or waterways. Span lengths average 600 to 700 feet, with 1,000-foot spans possible with certain topography. Structure heights range from 60 to 80 feet with taller structures required for exceptionally long spans and in circumstances requiring additional vertical clearance exceeding the NESC requirements.

Figure 7-1 Schematic Diagrams of Typical Great River Energy Structures



7.2 Breaker Station

7.2.1 Scearcyville 115 kV Breaker Station

The proposed "CW-SS" 115 kV transmission line will terminate at the new Minnesota Power Scearcyville 115 kV Breaker Station. The station will be built using a "low-profile" or "lattice box structure" design with 115 kV apparatus generally less than 22 feet above grade, except for the 115 kV transmission line termination towers. The highest point of these terminals may be as high as 45 feet above grade. The total fenced area of the Scearcyville 115 kV Breaker Station will be approximately 290 feet by 290 feet.

The breaker station will contain 115 kV switch structures, capacitors, breakers, a control building, and other steel structures to support the necessary 115 kV apparatus. The station will allow for the termination of the new Great River Energy "CW-SS" 115 kV transmission line as well as a "loop" or "in and out" of the existing Minnesota Power "24" 115 kV transmission line.

The Scearcyville 115 kV Breaker Station will be laid out to accommodate additional equipment (additional transmission line terminations, capacitor banks, transformers, and related feeders) should significant load growth occur in the area. Although there are no specific plans, construction of the site to accommodate future growth will eliminate the need for a new substation site in the future.

7.3 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. This will typically occur with frequencies in the range of 10^{16} to 10^{22} Hz.

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.[1]

A sample of magnetic field calculations is provided in Figures 7-2 to 7-5. These figures illustrate magnetic field exposure along the line with and without underbuild distribution during normal (average loading) and single contingency conditions with the system intact.

[1] 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.

Figure 7-2 Magnetic Field Profile – No Underbuild; Average Loading

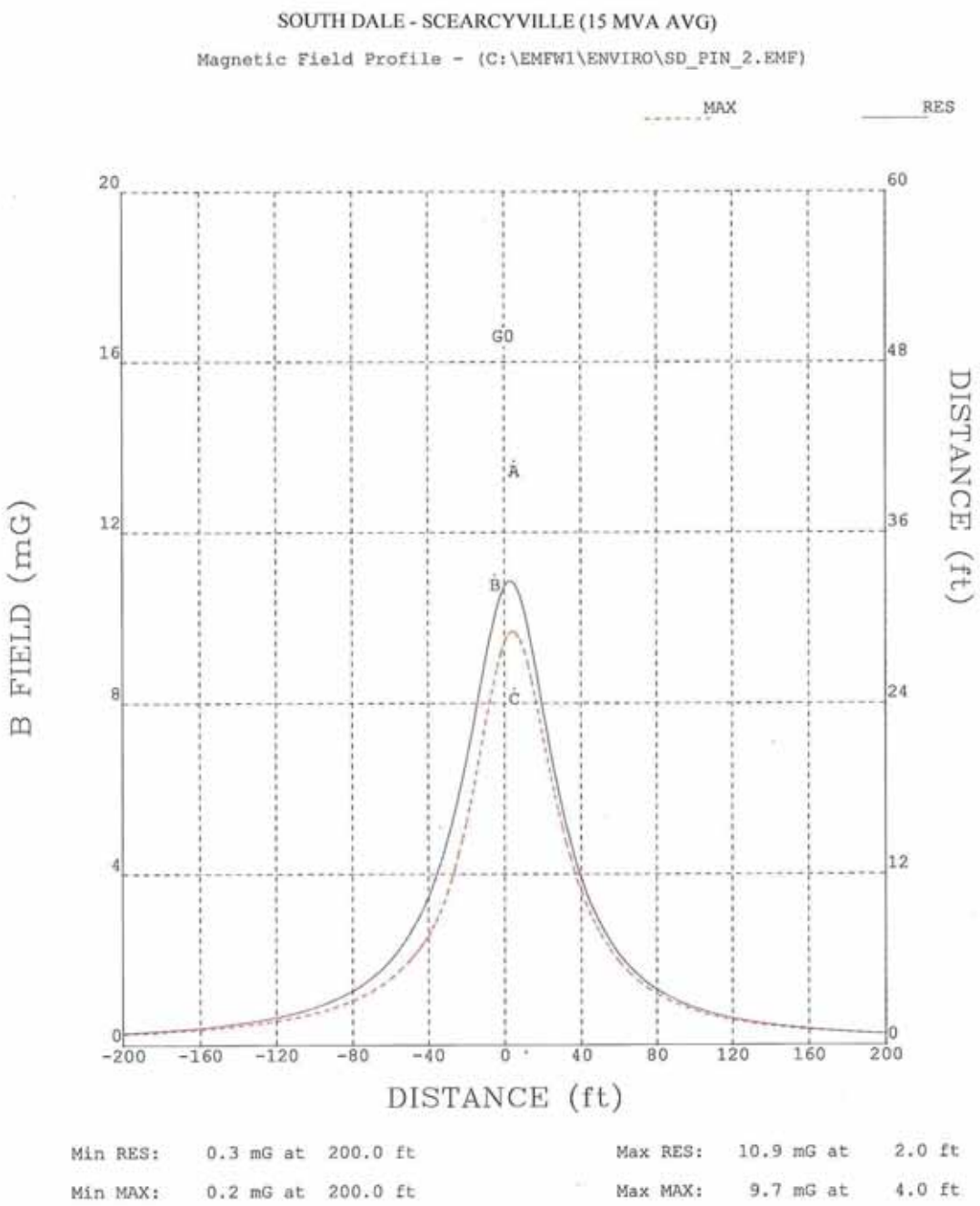
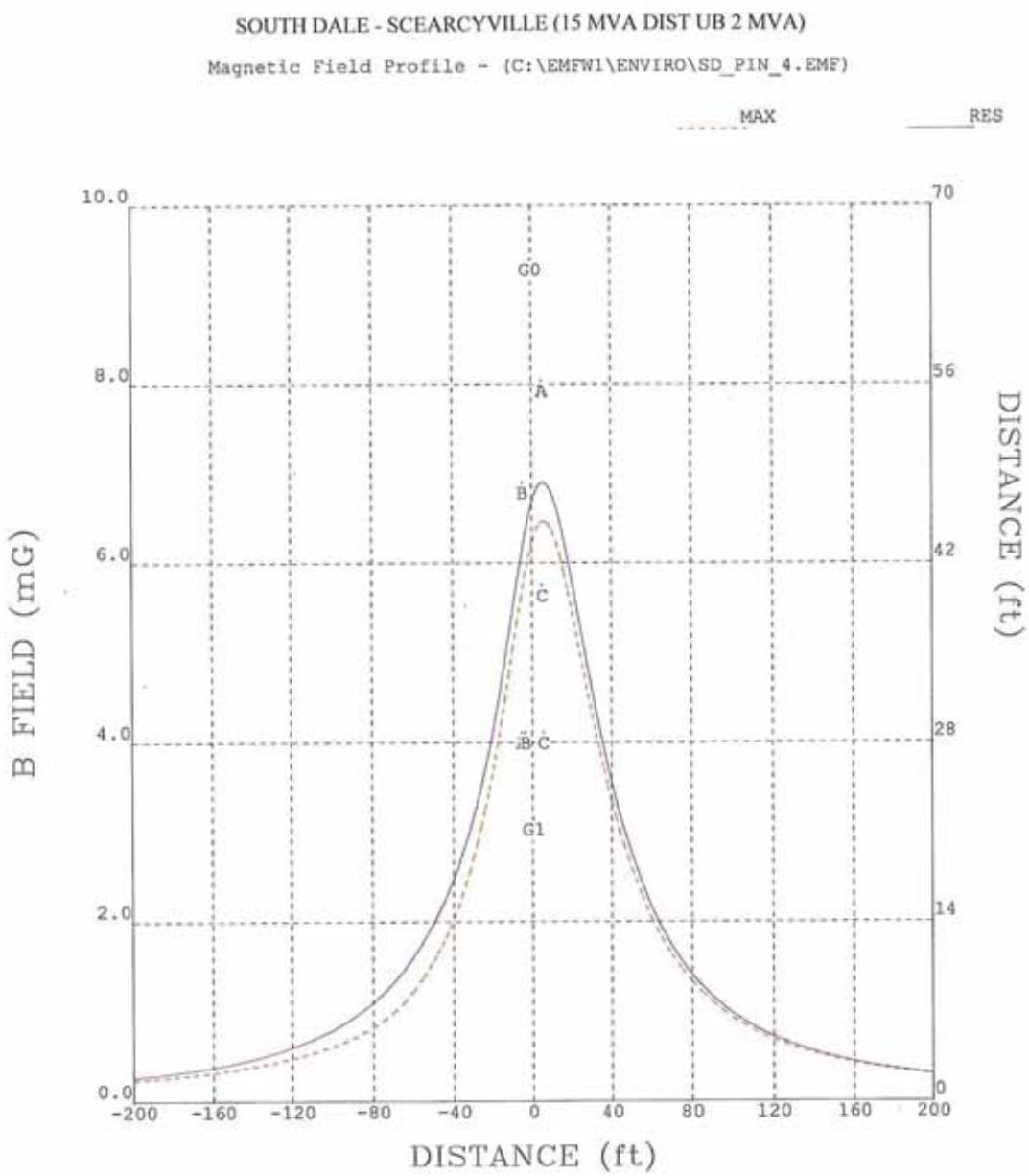


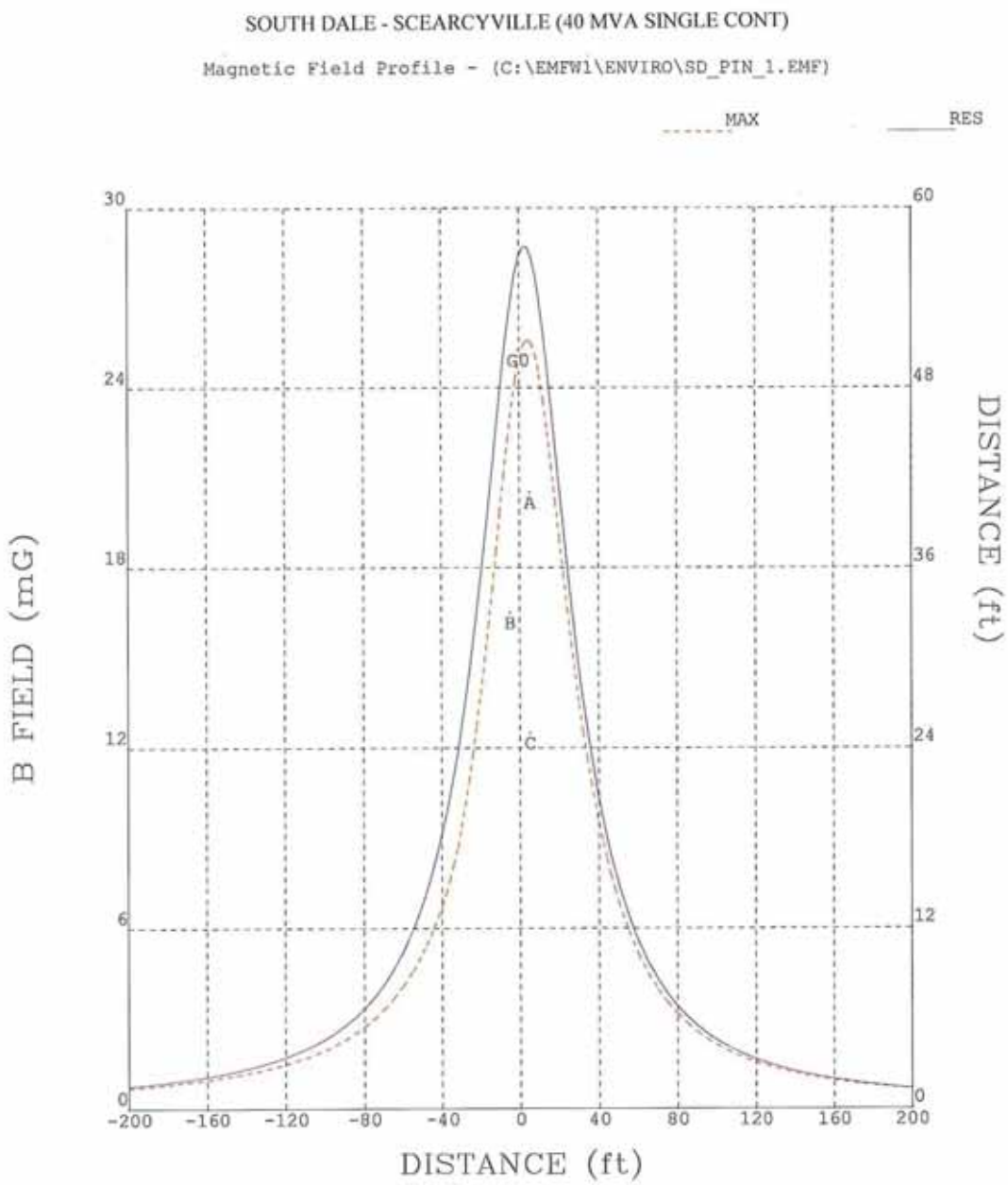
Figure 7-3 Magnetic Field Profile – Underbuild; Average Loading



Min RES: 0.3 mG at -200.0 ft Max RES: 6.9 mG at 6.0 ft

Min MAX: 0.2 mG at -200.0 ft Max MAX: 6.5 mG at 6.0 ft

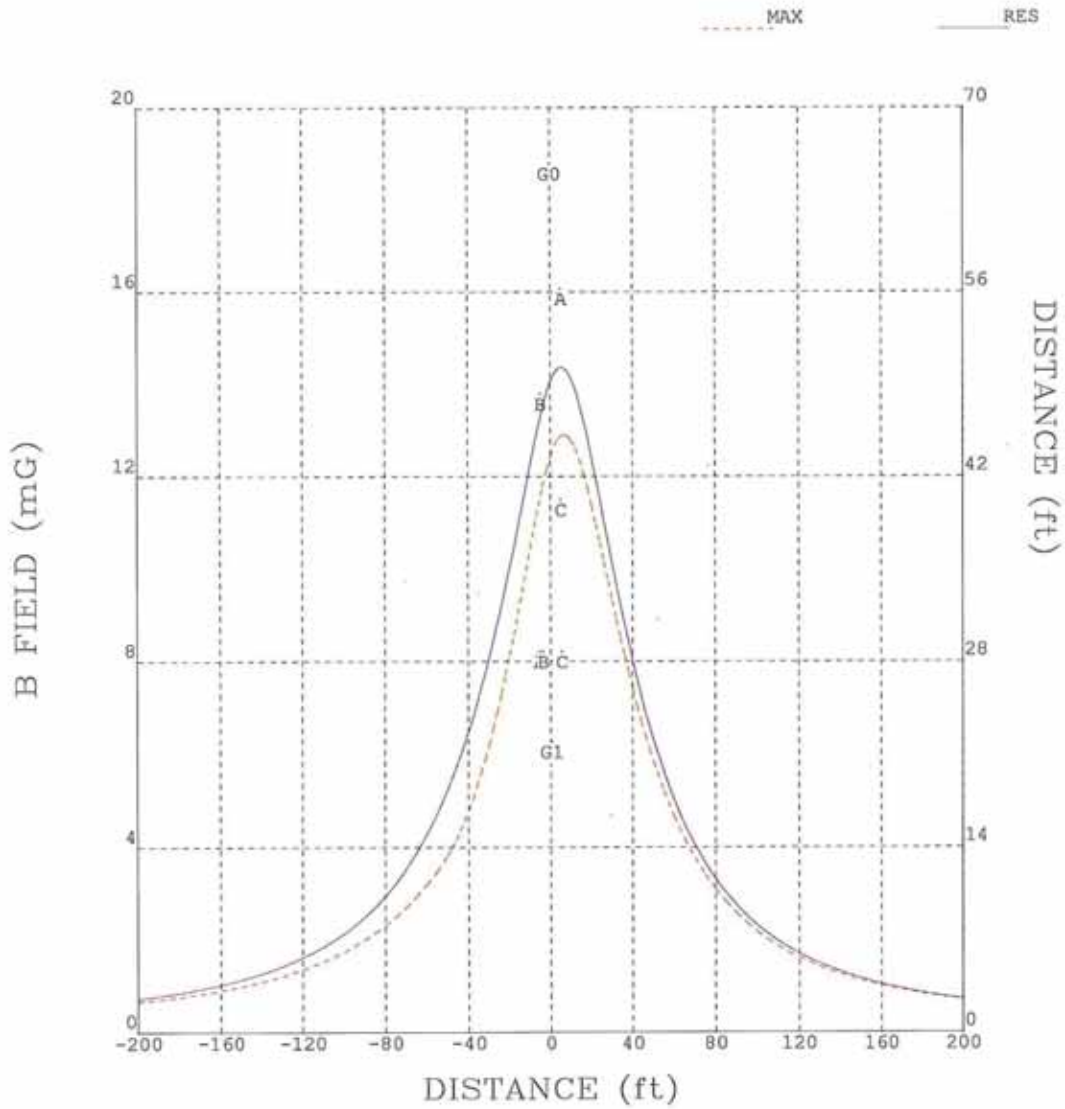
Figure 7-4 Magnetic Field Profile – No Underbuild; Single Contingency



Min RES: 0.7 mG at 200.0 ft Max RES: 28.7 mG at 2.0 ft

Min MAX: 0.6 mG at 200.0 ft Max MAX: 25.6 mG at 4.0 ft

Figure 7-5 Magnetic Field Profile – Underbuild; Single Contingency



Min RES: 0.7 mG at 200.0 ft Max RES: 14.4 mG at 6.0 ft

Min MAX: 0.7 mG at -200.0 ft Max MAX: 12.9 mG at 6.0 ft

Transmission conductors are identified as the staggered “A,” “B,” “C,” and “GO” on Figures 7-2 thru 2-5. These represent the phases at their respective elevations from the ground. The right y-axis, graphs the distance in feet above grade. The underbuild distribution conductors are identified as the “A,” “B” and “C” in line at approximately 28 feet and “G1” just below. The negative and positive distances on the x-axis represent the feet from the centerline (0 feet) of the new “CW-SS” 115 kV transmission line.

The figures also show the magnetic field strength measured in mG on the left y-axis. These figures show that the strength of the field increases as it is measured closer to the center of the transmission line. The left and right distance bounds are 200 feet because the field strength from the line is essentially equivalent to other magnetic field background sources at that distance.

The magnetic fields for the “CW-SS” 115 kV transmission line with no underbuild at average (Figure 7-2) and contingency (Figure 7-4) loads are estimated to be 10.9 mG and 28.7 mG respectively. At 35 feet from the center of the transmission line, the average load magnetic field is estimated to be 4 mG and the contingency load magnetic field is estimated to be 12 mG.

The magnetic fields for the “CW-SS” 115 kV transmission line with underbuild at average (Figure 7-3) and contingency (Figure 7-5) loads are estimated to be 6.9 mG and 14.4 mG respectively. At 35 feet from the center of the transmission line, the average load magnetic field is estimated to be 3 mG and the contingency load magnetic field is estimated to be 7 mG.

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 developed a standard of a maximum electric field limit of 8 kV per meter at one meter above ground. That standard, which is used by the Commission in routing assessments, was implemented to mitigate serious hazard from shocks when touching large objects parked under transmission lines with voltages of 500 kV or greater.

The proposed 115 kV line will have a maximum magnitude of electric field density of approximately 1.3 kV per meter underneath the conductors, one meter above grade. Research on the biological effects from electric fields on animals and humans has shown no significant association with disease in humans.

7.4 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 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 18 July 1997 the Environmental Protection Agency ("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 *Corona and Field Effects Program Ver. 3*[2] 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.

7.5 Radio and Television Interference

Corona discharges from the conductors of a transmission line can occur when the voltage gradient in the vicinity of the conductors exceeds the breakdown strength of air and can result in audible noise. In addition, the discharges can also result in radio frequency ("RF") noise. Corona becomes more of an issue as the line operating voltage increases; the most significant factor with respect to radio and television interference is not the magnitude of the transmission line-induced RF noise, but how the transmission line-induced RF noise compares with the strength of the broadcast signal. Very few radio noise problems have resulted from existing 115 kV transmission lines, as broadcast signal strength within a radio station's primary coverage area is great enough that adequate signal to noise ratios are maintained.

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

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 (MHz)), 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 non-existent and the technology used by these devices is superior to that used in two-way mobile radio.

As in the case with AM radio interference, corona-generated noise could cause interference with TV picture reception because the picture is broadcast as an AM signal. The level of interference depends on the TV signal strength for a particular channel (TV audio is an FM signal typically not impacted by transmission line RF noise).

Due to the higher frequencies of the TV broadcast signal (54 MHz and above), 115 kV transmission lines seldom result in reception problems within a station's primary coverage area. In the rare situation that the proposed transmission line would cause TV interference within a broadcast station's primary coverage area where good reception is presently obtained, the Applicants will work with the affected party to correct the problem. Usually any reception problem can be corrected with the addition of an outside antenna.

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 is the cause of reception problems. Reception problems can usually be corrected with the addition of an outside antenna, an amplifier, or both.

Loose and/or damaged hardware may also cause television or radio 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, Great River Energy 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. Property/Right of Way Acquisition and Restoration

8.1 Identification of Existing Utility and Public Rights of Way

8.1.1 Utility Rights of Way

The first 3.3 miles of the Proposed Route from the existing Great River Energy "CW-BS" 115 kV transmission line west to CSAH 36 will overtake the existing Minnesota Power "504" 34.5 kV distribution line right of way.

Existing distribution lines along CSAH 18 will be removed, upgraded and attached to the new "CW-SS" structures where appropriate. The centerline will be inside the road right of way.

The 0.6 miles of the Proposed Route that travels northeast from CSAH 18 to the Scearcyville 115 kV Breaker Station will follow Minnesota Power's existing distribution and transmission line right of way. Great River Energy and Minnesota Power will continue to research the best alignment of the "CW-SS" 115 kV transmission line within the proposed 400-foot route width.

8.1.2 Public Rights of Way

Approximately 4.5 miles of the proposed transmission line will parallel public rights of way (CSAH 36, Highway 210/BNSF corridor, Little Pine Road, and CSAH 18). Along CSAH 36 and CSAH 18 the transmission centerline will be inside the road right of way.

8.2 Right of Way Requirements

Along CSAH 36, Little Pine Road, CSAH 18 and Highway 210 the "CW-SS" 115 kV transmission line will be constructed on a 70-foot right of way; 35 feet on either side of the transmission line. These rights of way are smaller than the Proposed Route width as the alignment will only use a portion of the Proposed Route.

Where the Proposed Route overtakes the Minnesota Power "504" 34.5 kV distribution line and where the Proposed Route heads west from CSAH 36 to Little Pine Road, the "CW-SS" 115 kV transmission line will be constructed on a 100-foot right of way (50 feet on either side of the transmission centerline).

The cleared right of way will be limited to 70 feet within 100 feet of a PWI water crossing unless H-Frame construction is necessary to span the PWI water body. If H-Frame or horizontal configuration is necessary at this location, the cleared right of way will need to be 100 feet.

Additional right of way may be required for longer spans or special design requirements based on final survey. Right of way width depends on conductor blowout and the recommended clearances to obstructions along the Proposed Route.

8.3 Property/Right of Way Acquisition Procedures

Should a Route Permit is issued by the Commission, land rights acquisition will commence. Land rights include easement acquisition in the case of the transmission line, or acquisition of a fee interest in the case of the breaker station. As a general practice, landowners will be contacted to review project details and to discuss the initial phase of the transmission project, including survey and soil investigation. Upon completion of the survey and preliminary design, landowners will be contacted and easement/fee acquisition negotiations will commence.

During the acquisition phase of the project, landowners are given a copy of the conveyance documents, generally including easements, deeds, structure design or photos, offer sheets, and a plan showing the proposed transmission line or facility relative to the landowner's property. Additional information may also be give to each landowner explaining power line safety, easement acquisition procedures, and damage settlement information. In addition to permanent easements necessary for the construction of the line, temporary easements 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 certain soil characteristics may require special transmission structure design.

8.3.1 Breaker Station Property Acquisition

Minnesota Power will work with landowners in close proximity to its existing "24" 115 kV transmission line and Pine Beach Distribution Substation on the north end of Sylvan Township to secure a fee interest in a parcel of at least 10 acres.

During breaker station construction, any nearby property owners will be advised of construction schedules or needed access to the site. To construct, operate and maintain the proposed breaker station, all vegetation will be cleared from the Scearcyville 115 kV Breaker Station footprint area, from the station driveway area, and from a buffer area of approximately 15 feet outside the proposed station fence. Vegetation on the property outside of the station footprint, driveway, and buffer will be left undisturbed, except where it must be impacted to allow for transmission line access to the Scearcyville 115 kV Breaker Station.

Minnesota Power will acquire easement rights as necessary for the construction of the two short segments of 115 kV transmission line necessary to connect the Scearcyville 115 kV Breaker Station to the existing "24" 115 kV transmission line.

8.3.2 Transmission Line Easement Acquisition

Great River Energy will acquire easement rights for the new "CW-SS" 115 kV transmission line. Great River Energy Land Rights Field Representatives will be available to discuss easement issues and questions with all property owners.

8.4 Project Clearing and Staking

After land rights have been secured, landowners will be contacted to discuss the initial construction phase of the project, including schedule, ingress and egress to and from the Project, tree and vegetation removal, damage mitigation, and other related construction activities.

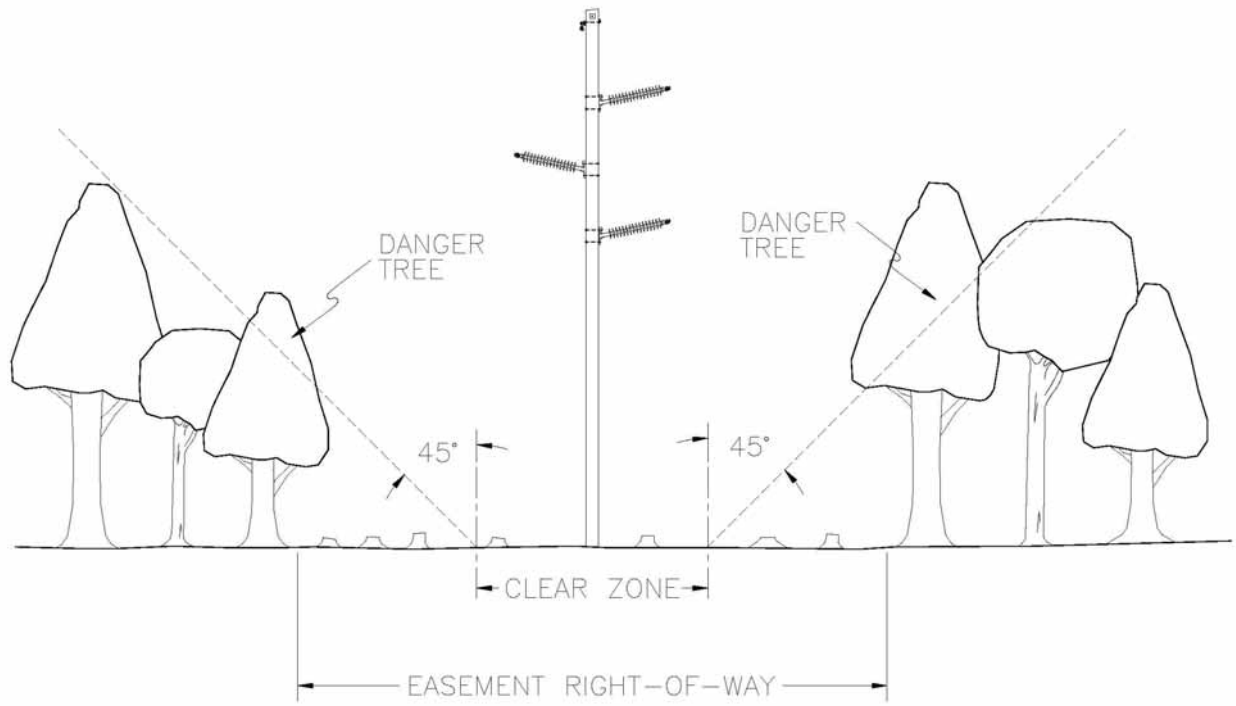
The first phase of construction activities will involve surveying the centerline of the new "CW-SS" 115 kV transmission line, followed by removal of trees and other vegetation from the right of way. As a general practice, low-growing bush or tree species are allowable at the outer limits of the easement area. Taller tree species that endanger the safe and reliable operation of the transmission facility are removed. In developed areas and to the extent practical, existing low-growing vegetation that will not pose a threat to the transmission facility (new 115 kV transmission line and Scearcyville 115 kV Breaker Station) or impede construction will remain in the easement area.

The NESC states that "trees that may interfere with ungrounded supply conductors should be trimmed or removed."[1] Standard practice per internal guidance indicates total removal of trees within the easement area. Trees beyond the easement area that are in danger of falling into the energized transmission line should be removed or trimmed to eliminate the hazard as shown in Figure 8-1. In special circumstances, tree trimming agreements may be possible to minimize tree removal based on negotiations with individual landowners.

The second phase of construction will involve staking the location of structures, followed by structure installation and stringing of conductor wire. During this phase, work preparing the Scearcyville 115 kV Breaker Station site and construction of the Scearcyville 115 kV Breaker Station will commence.

[1] *National Electric Safety Code*. IEEE. 2006.

Figure 8-1 Standard Tree Removal Practices



8.5 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 issue related to 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.

9. Construction Practices and Operation and Maintenance of the HVTL and Scearcyville 115 kV Breaker Station

9.1 Construction Practices

9.1.1 Transmission Line

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

Great River Energy and Minnesota Power design and construct 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 permit conditions.

Great River Energy and Minnesota Power typically utilize outside contractors for construction activities on large transmission line projects. The specifications used are developed by Great River Energy and Minnesota Power Engineering and Project Management Departments. A copy of the Applicants’ easement restriction list, environmental restriction lists, and any required local permits are given to the awarded contractor prior to construction.

Typical tangent structures will be wood, laminated wood, or steel direct-embedded poles. The structures will require a hole dug 10 to 15 feet deep with a three to four foot diameter for each pole. Any excess soil will be removed from the site unless requested by landowners or others. The poles may be backfilled with native soils, crushed rock or concrete depending on design conditions. In lowland areas, a galvanized steel culvert may also be inserted for pole stability due to poor soil capacity.

Angle structures will typically be guyed. In some instances, an angle structure may consist of a self-supporting steel pole that will require a drilled pier foundation. The pier will typically have a diameter of four to eight feet. The hole may require a typical depth of 15 to 30 feet deep depending on design requirements. The pier will be filled with concrete delivered to the site via concrete trucks from a local batch plant. Direct-embedded laminated wood poles can also be used for angle structures.

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 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 or other sensitive areas, or to comply with required crossing permits. A pre-construction conference will outline any special requirements for the contractor 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. Great River Energy or Minnesota Power 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.

9.1.2 Breaker Station

Construction at the new Scearcyville 115 kV Breaker Station will begin once Minnesota Power has acquired a fee interest in a parcel, has received necessary permits, and has finished final design. 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.

Approximately two acres of land will be graded to construct the breaker station. The concrete foundation will be poured to support the breaker station equipment and control house. Once the site is graded, a perimeter fence will be installed to secure the site and breaker station erection will commence.

The Applicants will apply for a National Pollution Discharge Elimination System (“NPDES”) construction stormwater permit from the Minnesota Pollution Control Agency (“MPCA”) for the Project will prepare the required Stormwater Pollution Prevention Plan (“SWPPP”). The Applicants will utilize erosion control methods to minimize runoff during breaker station construction. Minnesota Power construction crews or a Minnesota Power contractor will comply with local, state, NESC, Great River Energy, and Minnesota Power standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, right of way widths, erection of power poles (to connect the station to the existing Minnesota Power “24” 115 kV transmission line), and stringing of transmission line conductors.

Upon completion of construction activities, Minnesota Power will restore the site. 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. Where appropriate, Minnesota Power will incorporate methods to screen the final site.

9.2 Operation and Maintenance

Great River Energy 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 transmission line 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.

Great River Energy Transmission Construction & Maintenance Department 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.

Minnesota Power will perform periodic inspections, maintain equipment, and make repairs over the life of the Scearcyville 115 kV Breaker Station. Minnesota Power will also conduct routine maintenance as required to remove undesired vegetation that may interfere with the safe and reliable operation of the breaker station or the lines connecting the breaker station to the existing “24” 115 kV transmission line.

9.3 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.

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

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10. Agency Involvement, Public Participation, Permits/Approvals Required

10.1 Agency Contacts/Public Participation

Great River Energy contacted the following agencies for input on the proposed project:

- Minnesota Department of Transportation – Office of Aeronautics
- Cass County Highway Department (in-office meetings)
- Minnesota Historical Society (letter)
- United States Army Corps of Engineers (letter and phone)
- Minnesota Department of Natural Resources (letter)
- United States Fish and Wildlife Service (letter and email)
- United States Department of Agriculture, Natural Resources Conservation Service (letter)
- Crow Wing County (e-mail)
- Cass County (in-office meetings and phone)
- City of Baxter (in-office meetings)
- Sylvan Township (in-office meetings and board meeting)

Available correspondence to and from these agencies is provided in Appendix A.

Great River Energy met with City of Baxter staff and Sylvan Township officials to describe the proposed project in 2006. Great River Energy presented the Project at a Sylvan Township board meeting in 2006. Great River Energy also held a public information meeting on 31 May 2007, to solicit public input on the project. Landowners along the Proposed Route, state agencies, county officials/staff, city officials/staff, and township officials were notified by mail of the public meeting.[1] Great River Energy published an announcement of the 31 May 2007 public meeting in the Brainerd Dispatch on 22 and 29 May 2008.[2]

Cass and Crow Wing counties as well as City of Baxter and Sylvan Township officials and staff were all notified and invited to the public meeting. Approximately 15 people attended that meeting. Attendees included city, county, and township officials/staff, MNDOT staff, MNDNR staff, as well as private landowners.

Although the Leech Lake Band of Ojibwe tribal lands are located almost 100 miles north of the proposed Project, the Tribe was contacted regarding the Project and requested to be copied on further cultural resource surveys along the Proposed Route.

[1] Copy of Letter Sent to Landowners and Officials available in Appendix A.
[2] Affidavit of Publication and Published Public Notice available in Appendix A.

10.2 Identification of Landowners

The names of each owner whose property is within the Proposed Route are provided in Appendix B.[3]

10.3 Required Permits and Approvals

10.3.1 Local

- **City and County Road Crossing Permits** are required to cross or occupy city and county road rights of way.
- **City or County Land Permits** may be required to occupy city or county land such as parklands, watershed districts, and other city/county-owned property.
- **Wetland Conservation Act** approval of exemption application for the Project.

10.3.2 State

- **A Route Permit** from the Commission is required to construct an HVTL.
- **A License to Cross** public waters and wetlands must be obtained from the MNDNR.
- **Road Crossing Permits** from MNDOT are required to cross or occupy state trunk highway road right of way.
- **Railroad Crossing Permits** from the BNSF are required to cross or occupy BNSF railroad right of way.
- **A State Section 401 Water Quality Certification** may be required from the MPCA.
- **An NPDES permit (for construction stormwater discharges)** from the MPCA will be required for the breaker station.

10.3.3 Federal

- **A Permit to Cross** a Section 10 (navigable) water must be obtained from the Corps for the Gull River crossing.
- **A Section 404 Approval** may be required for Corps.
- **An Approval** from the Federal Electric Regulatory Commission must be obtained for crossing the Minnesota Power property located along Segment 2 of the Proposed Route.

[3] Minn. R. 7849.5220 subpt. 2(G).

11. Summary of Factors to Be Considered in Evaluating this Application

The Applicants have applied for a Route Permit for a 115 kV HVTL and associated 115 kV breaker station that are needed to meet the energy needs of their customers located in the Southdale project area. The HVTL's endpoints are the existing Great River Energy "CW-BS" 115 kV transmission line in Baxter, Minnesota, and the new Minnesota Power Scearcyville 115 kV Breaker Station in Sylvan Township, Minnesota.

The role of the Commission is to determine the best route to follow to accomplish those requirements, and to determine what mitigation efforts the Applicants should employ to reduce any environmental consequences. Minnesota Rules Chapter 7849.5910 lists 14 factors to consider in determining whether to issue a permit for the Project. 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 Project on human settlement are discussed in Section 6.2 of this Application. The Proposed Route and associated breaker station construction would result in no displacement of existing residences. The noise from the HVTL and breaker station will be minimal (Section 6.2.3). A majority of the proposed line is along existing transmission line and roadway corridors and will have minimal aesthetic effects. The proposed HVTL and associated breaker station will have no impact on cultural values, recreation or public services. Impacts to socioeconomics would be primarily of a short-term, beneficial nature.

B. Effects on public health and safety.

The Project will be constructed to comply with NESC standards. Questions often arise about EMFs, 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 the earth's magnetic field or fields produced during thunder storms, as well as man-made fields produced by electric transmission lines, radio/TV stations, etc. The electric and magnetic fields associated with the Southdale Project are discussed in Section 7.3 of this Application.

The transmission line meets the EQB standard imposing a maximum electric field limit of 8 kV per meter 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. The proposed 115 kV line will have a maximum magnitude of electric field density of just over 1.3 kV per meter underneath the conductors one meter above ground level. Research on the biological effects from electric fields on animals and humans has shown no significant association with disease in humans.

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.

Because the magnetic field strength is dependent on current flow, it will continually change as electric use 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 line's conductors.

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

Effects on land-based economies are discussed in Section 6.3 of this Application. No impacts to tourism or active sand and gravel mining operations will occur as a result of the Project. The Scearcyville 115 kV Breaker Station will impact less than 1.9 acres of agricultural land.

Approximately 42 acres of forested land/shelterbelts will be cleared along the right-of-way. Impacts to agricultural land and shelterbelts will be minimized by using existing rights of way and locating poles adjacent to roadway right of way where practicable. The Applicants will work with landowners to alleviate temporary impacts such as soil compaction following construction.

D. Effects on archaeological and historic resources.

The Project is not expected to impact any archaeological sites or historic standing structures (Section 6.4 of the Application). Avoidance of archaeological and historic architectural properties is the preferred mitigative measure. The Applicants will work with the State Historic Preservation Office during its review process to determine what areas may require surveys for the Project, and the Applicants will carry out the appropriate field identification and/or construction monitoring.

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

Effects of the Project on the natural environment are discussed in Sections 6.5 to 6.7 of this Application.

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

Short-term impacts to water quality resources could occur due to soil disturbance during construction. There is the possibility of sediment reaching surface waters during construction, as the ground is disturbed by grading (primarily at the breaker station site) and construction traffic. The Applicants will implement Best Management Practices (BMPs) such as silt fences to prevent sediment from entering surface waters.

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 Proposed Route. 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 sites.

F. Effects on rare and unique natural resources.

No impacts to special status species are expected as a result of this Project (Section 6.8 of the Application). Approximately 95 percent of the Proposed Route uses or parallels existing electric facilities and/or road right of way; impacts to previously undisturbed habitat (where the majority of the known occurrences of rare species exist) will be minimized.

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 Applicants will work with affected landowners to use a design that mitigates the impact on them and the right of way.

The Scearcyville 115 kV Breaker Station will be laid out to accommodate additional equipment (such as additional transmission line terminations, capacitor banks, transformers, and related feeders) should significant load growth occur in the area. Although no specific plans have been made, construction of the site to accommodate future growth will eliminate the need for a new substation site in the future.

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

The Proposed Route uses or parallels existing rights of way where possible.

The Proposed Route follows existing roads (CSAH 36, CSAH 18, Little Pine Road and Highway 210) and Minnesota Power electric facility right of way for the majority of the Proposed Route. The section of the Proposed Route that does not follow existing rights of way crosses 0.5 miles of property owned by Minnesota Power (Segment 2).

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.

The Project will improve the electrical system reliability for the local distribution systems as well as for the transmission system. This will provide needed voltage support and ensure that voltage can be maintained within acceptable levels. In addition, the Project will result in shorter distribution feeders. This will improve reliability by reducing exposure and providing the ability to back up substations or other breaker stations during unplanned or planned outages. The Project will also provide a much needed second 115 kV transmission source to the area around Baxter and Brainerd. This will improve transmission reliability and allow continued service to all electrical customers served in this area if a 115 kV transmission line is out of service.

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

The cost of constructing, operating, and maintaining the facility along the proposed Project is less expensive than all but one rejected alternative. The rejected alternative that is less expensive than the Project is not feasible because of future road relocation work and proximity of the school to the road (Section 4.1.2). The Proposed Route relies on 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 breaker station. If any archaeological sites are identified during placement of the poles along the Proposed Route or construction of the breaker station, the particular site will be evaluated to determine if the Project will affect the archaeological site. Native vegetation will be maintained along the Proposed Route that is compatible with the operation and maintenance of the transmission line. If necessary, native species will be planted or seeded in areas that are devoid of native species.

Soils will be revegetated 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 Proposed Route does not require any irreversible or irretrievable commitment of resources. If the “CW-SS” 115 kV transmission line and/or Scearcyville 115 kV Breaker Station are 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.