BIENNIAL TRANSMISSION PROJECTS REPORT

Certification of a High-Voltage Transmission Line

BADOURA PROJECT

Public Document – Trade Secret Data Excised

November 2005

minnesota power
AN ALLETE COMPANY

GREAT RIVER ENERGY®
A Touchstone Energy® Cooperative

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ACRONYMS	
AC	Alternating current
ACEEE	American Council for an Energy Efficient Economy
ACSR	Aluminum conductor steel reinforced
AM	Amplitude-modulated
ATC	Available transmission capacity
BMPs	Best Management Practices
BWSR	Minnesota Board of Water and Soil Resources
CAP	Community Action Program
CFL	Compact fluorescent lights
C/I-A	Commercial/Industrial-Agriculture
Commission	Minnesota Public Utilities Commission
CIP	Conservation Improvement Program
CR	County Road
CWP	Crow Wing Power
dBA	Decibel
DC	Direct current
DNR	Minnesota Department of Natural Resources
DOC	Minnesota Department of Commerce
DSM	Demand Side Management
EMF	Electromagnetic fields
EMS	Energy Management System
ETS	Electric thermal storage
EQB	Minnesota Environmental Quality Board
ERO	Electric Reliability Organization
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FM	Frequency-modulated
Global	Global Energy Partners LLC
GRE	Great River Energy
GSHP	Ground source heat pump
HVAC	Heating, ventilation and air conditioning
HVTL	High voltage transmission line
Hz	Hertz
ICD	Implantable cardioverter/defibrillator
IEE&C	Integrated Energy Education and Communications
IOUs	Investor-Owned Utilities
IRP	Integrated Resource Plan
Itasca-Mantrap	Itasca-Mantrap Cooperative Electrical Association
kHz	Kilohertz

ACRONYMS	
kV	Kilovolt
kVA	Kilovolt-ampere
kV/m	Kilovolts per meter
kW	Kilowatt
kWh	Kilowatt hour
LCP	Lake Country Power
LGU	Local governmental unit
LRLF	Long-Range Load Forecast
ma	Milliamperes
MAPP	Mid-Continent Area Power Pool
MBS	Modeling Building Subcommittee
MISO	Midwest Independent Transmission System Operator
Mn/DOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MP	Minnesota Power
MP +/- 250 kV DC Line	Minnesota Power Direct Current Line
MRO	Midwest Reliability Organization
MVA	Megavolt ampere
MW	Megawatt
MWh	Megawatt hour
NAC	Noise area classifications
NERC	North American Electric Reliability Council
NESC	National Electric Safety Code
NIEHS	National Institute of Environmental Health Sciences
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
PSS/E	Power System Simulator Rev 29
PWI	Public Waters Inventory
R & D	Research and Development
ROW	Right-of-way
RUS	Rural Utilities Service
SHPO	State Historic Preservation Office
SNA	Scientific and Natural Areas
SPG	Sub-Regional Planning Group
TH	Trunk Highway
UPA	United Power Association
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WMA	Wildlife Management Area

Application for Certification of a Large High Voltage Transmission Line to Support Increased Load Growth in North Central Minnesota

Pursuant to Minn. Stat. 216B.2425 and Minn. Rules Chapter 7848, Minnesota Power (MP) and Great River Energy (GRE) (collectively "Applicants") hereby seek certification from the Minnesota Public Utilities Commission (Commission) of a high voltage transmission line ("the Project") through the Biennial Transmission Projects Report proceeding. The Project would be located in Crow Wing, Cass and Hubbard counties to meet the electrical needs of MP and GRE customers in north central Minnesota.

The Application is divided into 12 sections as follows:

1. **INTRODUCTION** – provides background information on MP and GRE, a brief project description, and the completeness checklist.

2. **TRANSMISSION INADEQUACIES** – describes the need for the Project as required by Minn. Rules pt. 7848.1400, subp. 2 (A, P).

3. **DETAILED PROJECT DESCRIPTION** – provides a detailed description of the Project as required by Minn. Rules pt. 7848.1400, subp. 2 (B, D, L, Q).

4. **COST ANALYSIS** – discusses costs of the Project and other information required under Minn. Rules pt. 7848.1400, subp. 2 (E), (F), (H) and (I).

5. **ANALYSIS OF ECONOMIC, ENVIRONMENTAL AND SOCIAL CONSEQUENCES OF THE PROJECT –** provides information on impacts of the Project and possible mitigative measures as required by Minn. Rules pt. 7848.1400, subp. 2 (G, J, K).

6. **SYSTEM CAPACITY** – provides information on the relationship between the Project and overall state energy needs, as required by Minn. Rules pt. 7848.1400, subp. 2(S).

7. **PEAK DEMAND/ANNUAL CONSUMPTION FORECAST** – contains data concerning energy forecasts and forecast methodologies as required by Minn. Rules pt. 7848.1400, subp. 2 (O).

8. **ENERGY CONSERVATION AND LOAD MANAGEMENT PROGRAMS** – describes energy conservation and load management programs of MP, GRE and GRE's cooperatives as required by Minn. Rules pt. 7848.1400, subp. 2 (M, R).

9. **ALTERNATIVES TO THE PROJECT** – discusses transmission and non-transmission alternatives to the Project (Minn. Rules pt. 7848.1400, subp. 2 (N, T, U).

10. **DETAILED DESCRIPTION OF TRANSMISSION ALTERNATIVE** – provides information on a feasible transmission alternative to the Project as required by Minn. Rules pt. 7848.1500, A-K.

11. **SUMMARY** – summarizes the key elements of the Certification Application (Minn. Rules pt. 7848.1400, subp. 2 (V).

12. **REFERENCES** – a list of documents referenced in the Application.

1.0 INTRODUCTION

Minnesota Power (MP) and Great River Energy (GRE) propose to construct a 115 kilovolt (kV) electric transmission line, approximately 55 miles in length, that will connect the Pequot Lakes Substation located northeast of Pequot Lakes, the Pine River Substation located southwest of Pine River, the Badoura Substation, the Long Lake Substation located east of Park Rapids, and the Birch Lake Substation located east of Hackensack in north central Minnesota (Figure 1-1). This Minnesota Power and Great River Energy addition and upgrade to the area electric transmission/substation system would allow both utilities to maintain the necessary voltage and reliability requirements in the area.

1.1 Project Proposers/Contacts

MP is an investor-owned utility headquartered in Duluth, Minnesota. MP 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 (Figure 1-2). MP generates and delivers electric energy through a network of transmission and distribution lines and substations throughout northeastern Minnesota. MP's transmission network is interconnected with the regional transmission grid to promote reliability and MP is a member of the Midwest Independent Transmission System Operator (MISO).

GRE is a not-for-profit generation and transmission cooperative based in Elk River, Minnesota. GRE was created when Cooperative Power Association and United Power Association (UPA) formed a joint operating company on January 1, 1999. GRE provides electrical energy and related services to 28 member cooperatives, including Crow Wing Power (CWP), Itasca-Mantrap Cooperative Electrical Association (Itasca-Mantrap), and Lake Country Power (LCP), the distribution cooperatives serving the area that would benefit from this proposed transmission project (Figure 1-3). The distribution cooperatives, in turn, supply electricity and related services to more than 500,000 residential, commercial, and industrial customers in Minnesota and Wisconsin. GRE is also a member of MISO.

GRE’s 2,500-megawatt (MW) generation system includes a mix of baseload and peaking plants, including coal-fired, refuse-derived fuel, and oil plants as well as new wind generators. GRE owns approximately 4,405 miles of transmission line in Minnesota, North Dakota, South Dakota, and Wisconsin.

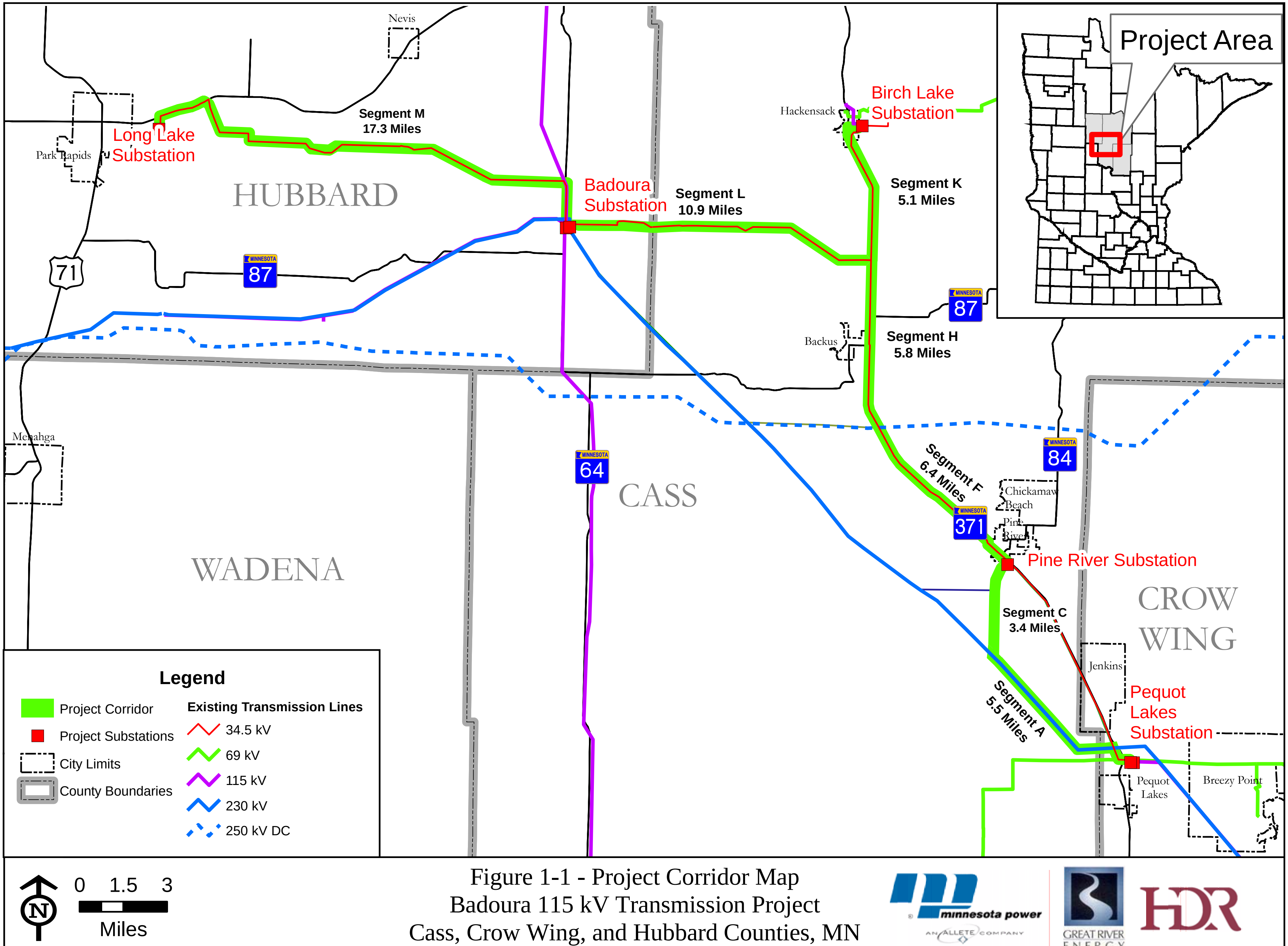

Figure 1-1 - Project Corridor Map
Badoura 115 kV Transmission Project
Cass, Crow Wing, and Hubbard Counties, MN

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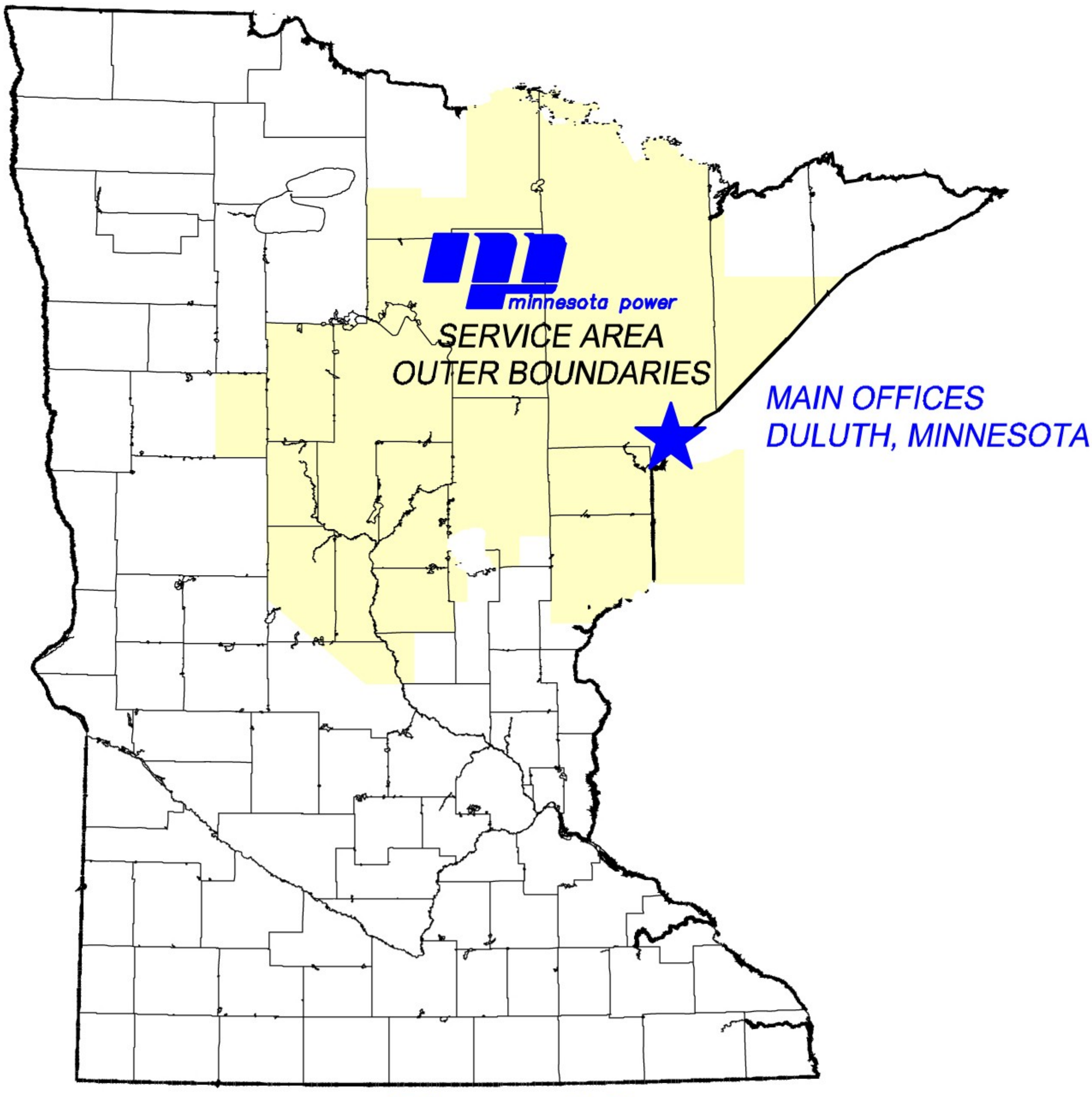
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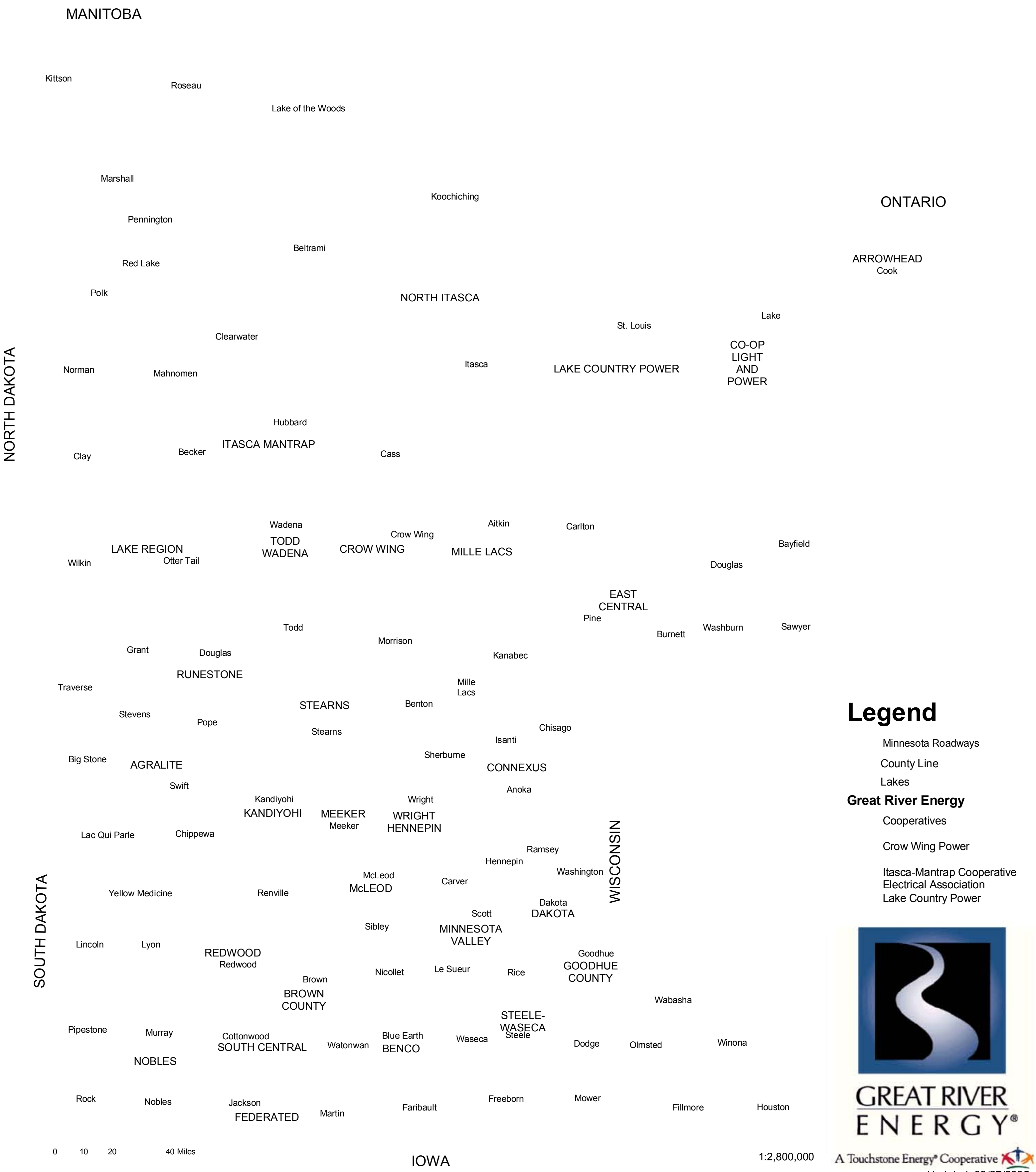
SERVICE AREA
OUTER BOUNDARIES
MAIN OFFICES
DULUTH, MINNESOTA

Figure 1-2

Figure 1-3

GRE Service Territory



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Updated: 09/27/2005

The contacts for the Project will be:

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1.2 Project Description

The Applicants are evaluating transmission alternatives within identified study corridors shown on Figure 1-4, with the ultimate goal of constructing a 115 kV transmission line connecting the Pequot Lakes Substation located northeast of Pequot Lakes, the Pine River Substation located southwest of Pine River, the Badoura Substation, the Long Lake Substation located east of Park Rapids, and the Birch Lake Substation located east of Hackensack.

The Applicants proposed corridor is shown on Figure 1-1. Portions of the route will likely consist of rebuilding 34.5 kV lines to 115 kV, and some portions may include distribution underbuild. Substation improvements required would include transformer additions at the Long Lake, Pine River, and Birch Lake substations and conversion of the distribution service at the Pine River and Tripp Lake substations to 115 kV service.

1.3 Completeness Checklist

A completeness checklist is provided in Table 1-1. This checklist directs the reader to the portion of the Application that addresses the requirements of each rule.

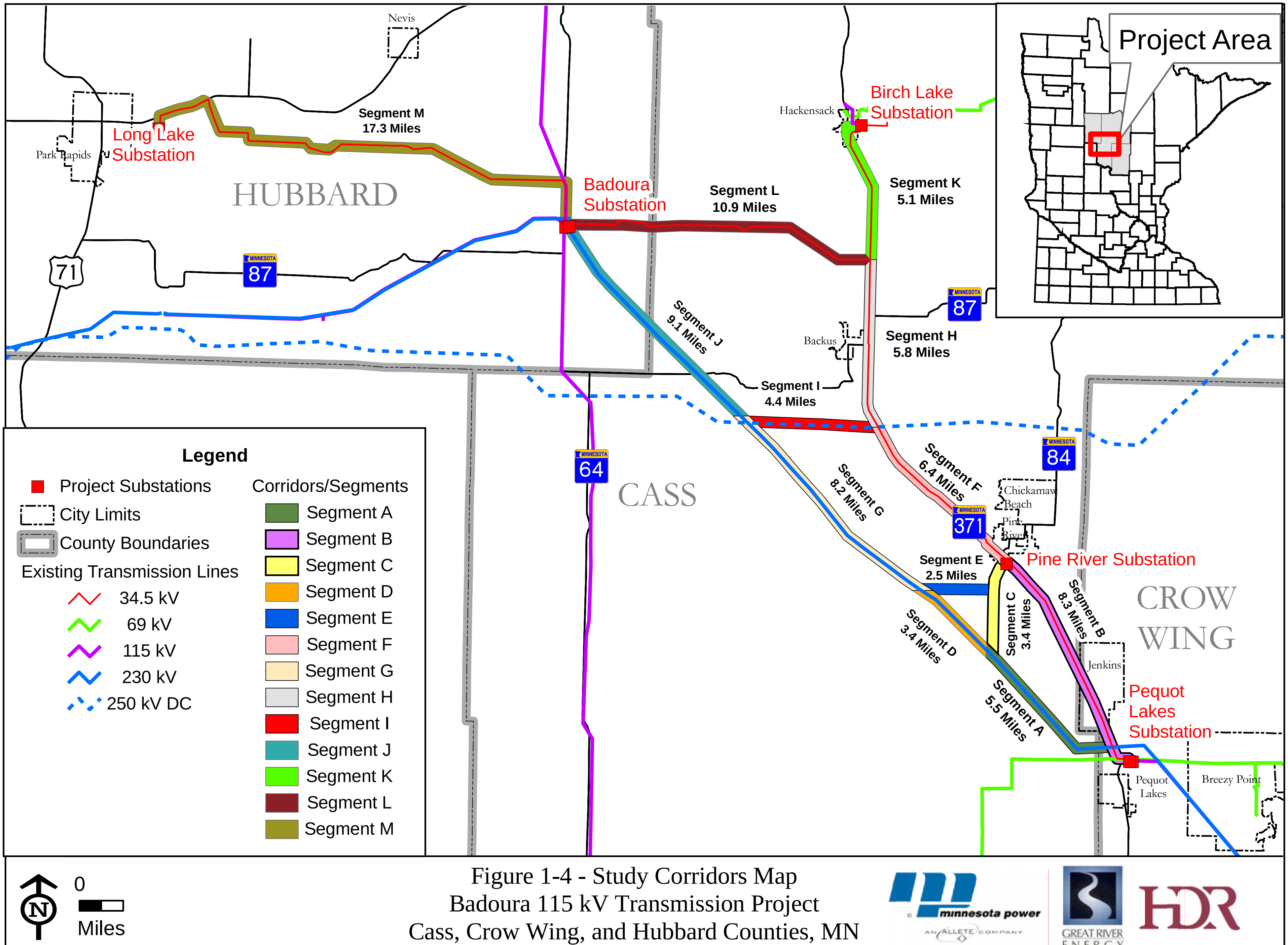

Figure 1-4 - Study Corridors Map
Badoura 115 kV Transmission Project
Cass, Crow Wing, and Hubbard Counties, MN

Table 1-1 Completeness Checklist - Satisfaction of Minn. Rules 7848

Citation	Information	Location
1300 (E)	Alternative Means of Addressing Badoura Inadequacy	9.0
1300 (F)	Tower Studies	2.0
1300 (G)	Economic, Social and Environmental	5.0, 10.0
1300 (H)	Summary of Input	2.3, 5.1
1400 (A)	Transmission Inadequacies	2.0
1400 (B)	Detailed Description of Line	3.1, 3.2
1400 (C)	Line Map	Figure 1-1
1400 (D)	Narrative of Corridor	3.1
1400 (E)	Construction Cost and Rate Effect	4.1, 4.4, Table 4-2
1400 (F)	Operational Cost and Rate Effect	4.2, 4.4, Table 4-2
1400 (G)	Summary of Input	5.1, Appendix A
1400 (H)	Depreciation and Service Life	4.3
1400 (I)	Reliability Effect of Line	4.5
1400 (J)	Economic, Social and Environmental	5.0
1400 (K)	Mitigation	5.0
1400 (L)	ROW, Land Use and Routing	3.1
1400 (M)	Energy Conservation and Load Management	8.0
1400 (N)	No Build Alternative	9.1
1400 (O)	Energy Forecasts	7.0
1400 (P)	Promotional Activities	2.6
1400 (Q)	Permits and Approvals	3.5

Citation	Information	Location
1400 (R)	Future Energy Conservation	8.0
1400 (S)	State Energy Needs	6.6
1400 (T)	Feasible Alternatives	2.4.2
1400 (U)	Non-Feasible Alternatives	9.0
1400 (V)	216B.243 Factors Not Addressed Above	11.1
1500 (A)	Feasible Alternative Description	10.1
1500 (B)	Economic, Social and Environmental	10.2 (5.0)
1500 (C)	Alternative Locations	10.1
1500 (D)	Construction Cost and Rate Effect	10.3 (4.1, 4.4) Table 9-1
1500 (E)	Operational Cost and Rate Effect	10.3 (4.2, 4.4)
1500 (F)	Summary of Input	10.1.2 (5.1), 2.3
1500 (G)	Depreciation and Service Life	10.3 (4.3)
1500 (H)	Reliability Effect of Line	10.3.1
1500 (I)	Mitigation	10.2 (5.0)
1500 (J)	Right-of-Way and Existing Land Use	3.1, 5.8
1500 (K)	Permits and Approvals	10.4 (3.5)

2.0 TRANSMISSION INADEQUACIES ADDRESSED BY THE PROJECT

2.1 Planning History of the Badoura Project

MP and GRE have been evaluating and addressing voltage support and line capacity issues in the Park Rapids and Pequot Lakes area over the last decade. Because economic growth has greatly exceeded expectations, these areas have been reviewed annually to evaluate the need for high voltage transmission capacity. Capacitors have been added extensively throughout the MP 34.5 kV system and GRE 69 kV system to maintain appropriate voltage levels during a single line failure event. These capacitors increased the load serving capability of the system, but only for a short period of time. Installation of additional capacitors is planned for GRE’s Pine River, Mantrap, Pine Point, and Salem Switch sites in 2005 and 2006 to maintain the voltages during a line contingency, until additional transmission capacity is required in the 2008-2009 timeframe. Due to capacitor switching coordination issues, adding more capacitors to further delay the need for a new source to the area beyond those planned is not practical.

GRE completed construction of the Long Lake 115/34.5 kV Substation in the Park Rapids area in 2005. This substation is supplied by a single 115 kV line from the Hubbard Substation. The Long Lake Substation was designed for the addition of a second 115 kV line to provide full redundancy when area loads reached the level where the existing 34.5 kV ties to the Hubbard, Badoura and Akeley substations could no longer reliably serve as a redundant supply during loss of the substation’s only 115 kV source. The load served out of this substation has already reached the point where if the existing 115 kV line is out of service, multiple switching events are required to relieve overloading on the 34.5 kV system and to restore electric service to all customers served by the Long Lake Substation.

These past and planned additions have delayed, but did not eliminate the need for a significant upgrade to the electric system serving the area. Service concerns include the time to re-sectionalize the transmission grid after a contingency due to the multiple, coordinated switching events that need to occur before the total load can be picked up to avoid line overloads.

The 34.5 kV and 69 kV loop inadequacies and alternatives under consideration were discussed during the 2003, 2004 and 2005 State Transmission Plan meetings, and in the 2003 Minnesota Biennial Transmission Projects Report (*2003 Biennial Report*)(Minnesota Transmission Operators, 2003). Alternatives that have been considered include increasing the operating voltage of existing lines serving the area, new 115 kV transmission, and local area diesel generation.

2.2 Past Biennial Filings and Planning Reporting

The need for the Badoura Project was first identified in the *2003 Biennial Report*. The inadequacies and alternative solutions leading to the need for this Project are presented in the *2003 Biennial Report* in both the Northwest and Northeast Transmission Planning Zone sections. However, the additional transmission facilities required to address the inadequacies associated with the Badoura Project are located within the Northeast Transmission Planning Zone and are presented on pages 45 through 47 of the *2003 Biennial Report.*

Discussion in the *2003 Biennial Report* focused principally on inadequacies related to the need for improvements to serve the Pequot Lakes-Badoura area. The report stated that transmission upgrades to support this area would be needed by 2008 and that both Minnesota Power and Great River Energy would work together to determine the best solution for solving the inadequacies of the electrical system serving this area. The plan was to address both the Badoura and Pequot Lakes long-term inadequacies with one project. In the short term, the report stated that capacitor banks would be added at two substations—Birch Lake and Pine River.

The report identified a recommended alternative for improving system reliability in the Badoura-Pequot Lakes area. This alternative was to build a new 115 kV line between the Badoura and Pequot Lakes substations, a distance spanning about 30 miles. This option would convert portions of the existing 34.5 kV feeder (#507 Line) located between Badoura and Pequot Lakes to 115 kV operation. This upgrade would allow the load at Tripp Lake (located near Badoura) to be converted to 115 kV and would provide for a 115 kV source to be extended to the GRE Birch Lake Substation. A 115/69 kV transformer would be added at Birch Lake to support the Wabedo and Walker areas. The remaining loads between Badoura and Pequot Lakes would continue to be served at 34.5 kV.

The *2003 Biennial Report* concluded that MP and GRE would work together to determine the best option to increase the electric service reliability of the Badoura-Pequot Lakes area. Furthermore, the report stated that a request for certification of this Project would be made in the 2005 Minnesota Biennial Transmission Projects Report.

2.3 Summary of Project Information – Zonal Meetings

2.3.1 General

Zonal meetings are held annually in response to Commission requirements. A public input segment is provided at the end of the meetings to solicit questions and/or comments from the attendees about proposed solutions and alternatives that address transmission needs in the zone. Attendees are also asked to submit any additional questions and/or comments they may have after the meeting directly to the utilities using an on-line form available on the website at www.minnelectrans.com. Members of the public can also use this website to request to be placed on the utilities transmission planning mailing list.

2.3.2 2003 Zonal Meeting

The 2003 Northeast Zonal public meeting was held on August 20, 2003 at 7:00 p.m. at Central Lakes College in Brainerd, Minnesota. Six members of the general public attended this meeting.

Minnesota Power representatives presented information on the Badoura-Pequot Lakes Project. Copies of the presentations were available to the public.

There were no questions asked about this Project by the public at the meeting. Additionally, no questions, comments or public input have been submitted to the www.minnelectrans.com link about the Badoura-Pequot Lakes Project since the 2003 meeting.

2.3.3 2004 Zonal Meeting

The 2004 Northeast Zonal public meeting was held on October 13, 2004 at 7:00 p.m. at the Blackwoods Banquet and Conference Center in Proctor, Minnesota. Over 30 individuals attended the meeting including members of the public, representatives from area utilities, a St. Louis County Commissioner, and representatives from the Minnesota Department of Commerce (DOC), the Commission, and the Minnesota House of Representatives.

Minnesota Power and Great River Energy representatives presented information about the Badoura-Pequot Lakes Project. Information about a new addition to the Badoura Project, a Badoura to Long Lake (located near Park Rapids) 115 kV line, was included in the presentation. During the presentations it was noted by the Applicants that Hubbard County has moved to the Northeast Zone beginning with the 2004 transmission planning process. This explained why the Badoura Project is now addressed in its entirety under the Northeast Zone.

Copies of the presentations were available to the public.

Questions asked about the Badoura Project at the meeting are summarized below. No questions, comments or public input have been submitted to the www.minnelectrans.com link about the Badoura-Pequot Lakes Project since the meeting.

Zonal Meeting Public Input Summary

The following comments and questions were received related to the Badoura Project during the meeting's public input segment. The comments/questions are in bold followed by the utilities response.

It has been mentioned during these presentations, especially with the Wrenshall-Mahtowa area, that utilities must conduct studies to determine solutions to the transmission needs. Who conducts these studies?

Studies are typically conducted in-house by the utilities. Minnesota Power and Great River Energy will work together on that specific line. Our staff will perform the modeling, run the analysis and provide a report of the results at a Sub-regional Planning Group (SPG) meeting, which is held every few months.

At what point does the public get to participate in the process?

Proposed projects are presented at transmission planning meetings, like this meeting tonight, and they are outlined in the Biennial Transmission Projects Report, which will be published next fall, November 1, 2005. We encourage members of the public to provide input and comments during the early phase of the transmission planning process. Comments, questions and input from the public will be addressed at these meetings, through the utilities website, or by contacting the utilities directly. In addition, the SPG meetings are open to the public.

During the in-house studies, how much consideration is given to alternative energy sources, alternative generation?

There are a number of different cases where generation options are reviewed. We will take a look at those options and if they work, great - otherwise we have to look at the transmission alternatives.

How are these meetings advertised to the public?

Display ads were published in local newspapers and written notices were mailed. Extensive efforts were made by the utilities to provide notice of the transmission planning meetings to members of the public, local and tribal government officials, county officials, and legislators.

2.3.4 2005 Zonal Meeting

The 2005 Northeast Zonal public meeting was held on May 10, 2005 at 7:00 p.m. at the Hawthorn Inn and Suites in Baxter, Minnesota. Twenty individuals attended the meeting including two members of the public, utility representatives, and representatives from the Minnesota Department of Commerce and the Minnesota Public Utilities Commission.

Minnesota Power and Great River Energy representatives presented information about the Badoura Project. Minnesota Power discussed voltage and other load-serving issues related to the Pequot Lakes-Birch Lake (Hackensack) area. Great River Energy provided information about the Long Lake-Badoura area. Both presentations provided data pertaining to reliability matters and proposed solutions. The presentations included a PowerWorld software simulation showing load-serving issues and provided information about alternatives to solve the various electrical problems.

There were no questions asked about the Badoura Project by the public at the meeting. Additionally, no questions, comments or public input have been submitted to the www.minnelectrans.com link about this Project since the meeting.

2.4 Project Need – Park Rapids to Badoura

Continuing economic growth in the Park Rapids area has caused a considerable increase in electrical use in the region. The addition of new electrical services and the increase in demand from existing services are creating electricity delivery concerns in this area. The existing electrical system, consisting of transmission lines and substations, is approaching its physical limit. Loss of a facility may result in potential long-term outages. This situation has become a concern for summer and winter peak periods, and 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 insure that the transmission grid operates efficiently and reliably. In severe cases the transmission grid could collapse, which could result in regional blackouts. 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.

MP and GRE are responsible for meeting these mandates by constructing, operating and maintaining a reliable transmission system in north central Minnesota.

2.4.1 Existing Transmission System

GRE recently constructed the Long Lake Substation that serves MP and Itasca-Mantrap loads in Park Rapids and the surrounding rural areas. The peak load served by the new Long Lake Substation is approaching 40 MW. The Long Lake Substation is supplied with electric energy by a single 115 kV line. When this line is out of service, the area is supplied by 34.5 kV lines from the Badoura, Akeley and Hubbard substations. Multiple switching events are required to restore electric service to the customers served by Long Lake to maintain acceptable voltage and insure no circuit is overloaded. As load continues to grow, it is expected that by 2009, some load would need to be shed during unplanned outages of the single 115 kV line supplying the Long Lake Substation at peak load periods to maintain voltage. Although the new Long Lake Substation did not create additional transmission capacity to the Park Rapids area (it replaced an existing line), this Project was the beginning of what eventually will be a reliable 115 kV looped system to serve the Park Rapids area.

2.4.2 Proposed Transmission System Additions to Resolve Problem

MP and GRE studies have determined that new electrical facilities are needed to meet existing and future electric load requirements. The facilities proposed to maintain and improve the electric power service to this region are:

- Rebuild an existing Badoura (MP)-Long Lake (GRE) 34.5 kV line to 115 kV with some 34.5 kV underbuild in the Park Rapids area.
- Install a second 115/34.5 kV transformer at the Long Lake Substation.
- Move Itasca-Mantrap's Park Rapids Substation to the Long Lake Substation.

These proposed transmission system improvements will provide a much needed second 115 kV source to the Park Rapids area, resulting in continued service to all electrical customers if one of the two 115 kV lines or transformers is out of service.

2.5 Project Need - Pequot Lakes-Birch Lake-Badoura

The addition of new electrical services and increase in demand from existing services are causing electricity delivery concerns along the TH 371 corridor from Pequot Lakes to Pine River to Walker. The existing electrical system--consisting of transmission lines and substations--is approaching its physical limit. Loss of a facility may result in potential long-term outages. This situation has become a concern for summer and winter peak periods, and with continued growth, the number of critical hours during the year will continue to increase.

2.5.1 Existing Transmission System

Electrical energy for MP customers and GRE cooperative customers in Backus, Pequot Lakes, Pine River, and the surrounding rural area is provided by a 34.5 kV line between MP's Pequot Lakes and Badoura substations. The Pine River and Pequot area loads are normally supplied from the Pequot Lakes Substation with the Badoura Substation serving as an alternate source. These loads have steadily grown and are expected to reach levels where the voltage will fall below acceptable levels during peak load periods while being served from the Badoura Substation during planned or unplanned outage of the Pequot Lakes end of the line. In addition, the Pequot Lakes Substation is supplied by a single 115 kV line. Due to expected load growth, within a few years the 69 kV supply to the Pequot Lakes Substation will be unable to support satisfactory voltage to the area electrical customers during planned or unplanned outages of the single 115 kV line that supplies the substation.

The existing Birch Lake 69/34.5 kV Substation normally serves the MP and GRE loads in Hackensack, Ten Mile Lake, Pleasant Lake, Longville and Wabedo and surrounding rural areas. During planned or unplanned loss of the 34.5 and 69 kV circuits in this area, the Badoura Substation and the new MP Akeley 115/34.5 kV Substation provide alternate sources of electric energy to these loads. Presently, several switching events are required to maintain voltage and prevent line overloads when this area needs to be served by its alternate sources. As load continues to grow, the electrical system will no longer be capable of maintaining voltage at acceptable levels when these loads must be served from their alternate source during peak load periods.

2.5.2 Proposed Transmission System Additions to Resolve Problem

MP and GRE studies have determined that new electrical facilities are needed to meet existing and future electric load requirements. Proposed facilities to maintain and improve the electric power service to this region are:

- Rebuild an existing 34.5 kV Badoura (MP)-Birch Lake Tap (MP) line to 115 kV.
- Build a Birch Lake (GRE)-Birch Lake Tap 115 kV line.
- Convert Tripp Lake distribution substation to 115 kV service
- Build a Birch Lake Tap-Pine River (CWP) 115 kV line.
- Build a Pine River (CWP)-Pequot Lake (MP) 115 kV line.
- Convert Pine River (CWP) distribution substation to 115 kV service.

These proposed transmission system improvements will provide a highly needed second 115 kV source to Pequot Lakes and provide a 115/69 kV source at Birch Lake and a 115/34.5 kV source at Pine River to support the voltages to the northern 34.5 kV system and to the eastern 69 kV system.

2.6 Effect of Promotional Practices on Creating Need

The growth in demand in this part of Minnesota is a result of growth in the number of customers and not MP or GRE promotional activities. MP and GRE promote conservation and load shifting programs, not increased usage. While some load shifting programs (e.g., off-peak water and space heating) may result in a slightly higher demand during off-peak times, none of the increase in demand occurs at peak. The need for new transmission is caused by projected increases in peak demand. Nearly all of the projected increase in this area of Minnesota is a result of residential and commercial development in the MP and GRE service territories. As discussed in Section 8.0, conservation programs will not have a significant impact on reducing this developing load. Nothing MP or GRE have done, or could do, would have any significant impact on the factors causing the need for this Project.

3.0 DESCRIPTION OF THE PROJECT

3.1 Corridor Description

3.1.1 General Description of Corridor

The new 115 kV transmission line would be located between the endpoints of Pequot Lakes and Park Rapids and traverse through Cass, Crow Wing and Hubbard counties (Figure 3-1). The Project would connect the Pequot Lakes Substation located northeast of Pequot Lakes, the Pine River Substation located southwest of Pine River, the Badoura Substation, the Long Lake Substation located east of Park Rapids, and the Birch Lake Substation located east of Hackensack. Substation improvements would include new transformer additions at the Long Lake, Pine River and Birch Lake substations and conversion of the distribution service at the Pine River and Tripp Lake substations to 115 kV service.

3.1.2 Land Use Patterns

The Project covers a variety of land use patterns in a general rural environment.

Land use along the Trunk TH 371 corridor consists of a mix of woodlots, commercial, residential and agricultural property. The Minnesota Department of Transportation (Mn/DOT) is presently expanding a section of TH 371 from two to four lanes. In addition, a state Minnesota Department of Natural Resources (DNR) trail (Paul Bunyan Trail) parallels TH 371 on the west side from Pequot Lakes to Pine River. The towns of Pine River, Backus and Hackensack (all with populations of less than 1,000 residents) are located along the TH 371 corridor. A small air strip also lies in a north-south alignment on the west side of TH 371 in Backus.

The east-west portion of the corridor between TH 371 and the Badoura Substation consists of northern forest state lands and a mix of residential, woodlots and irrigated agriculture. The east-west portion of the corridor between the Badoura Substation and the Long Lake Substation consists predominantly of irrigated agriculture with a mix of residential properties, cottages and woodlots. New residences were noted near the end of the corridor on the edge of Park Rapids. The diagonal portion of the corridor along the MP 230 kV line consists of northern forest state lands, cottages and residential properties.

3.1.3 Right-of-Way Requirements/Procedures

The right-of-way width requirement for a 115 kV transmission project would be 100 feet for all three structure design types, understanding that the right-of-way width for the

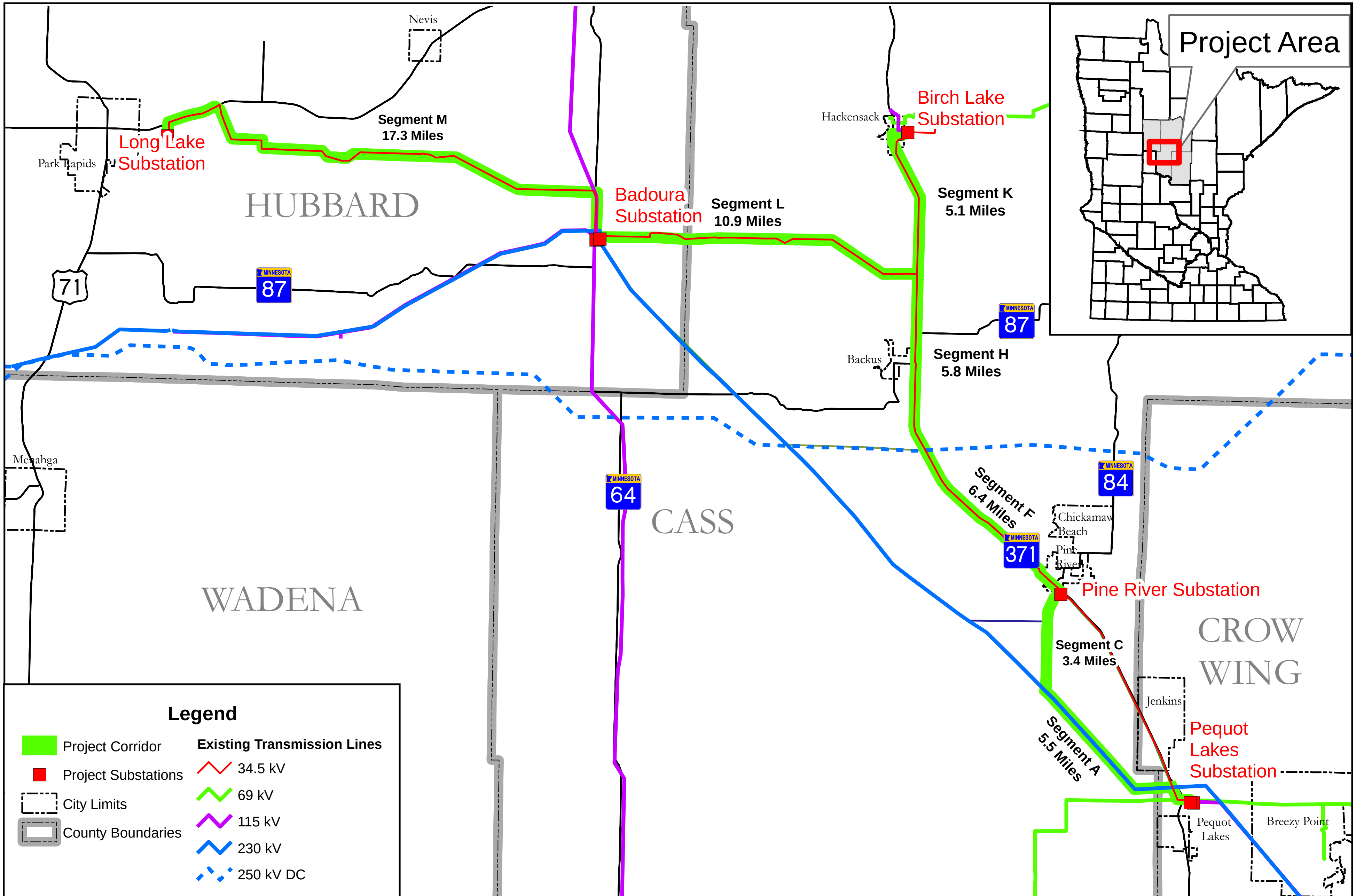

Figure 3-1 - Project Corridor Map
Badoura 115 kV Transmission Project
Cass, Crow Wing, and Hubbard Counties, MN

single pole designs could be reduced in certain higher density, developed areas. The required right-of-way width may also be less in areas where the new transmission line follows an existing linear corridor such as a road or trail. The Applicants would seek a permanent easement, providing the right to construct, operate and maintain the transmission line, for the full width and length of the right-of-way.

Once approvals from various state, federal and local agencies and governmental units are secured, land rights acquisition would commence for new right-of-way or where existing easements are not large enough. Land rights include easement acquisition in the case of a transmission line, or acquisition of a fee interest in the case of a substation. As a general practice, landowners would be contacted to review details and to discuss the initial phase of the Project, including survey and soil investigation. Upon completion of the survey and preliminary design, landowners would be contacted and easement/fee acquisition negotiations would commence.

During the acquisition phase of the Project, landowners would be given a copy of the conveyance documents, generally including easements, deeds, structure design or photos, offer sheets and a plan showing the proposed or rebuilt transmission line or facility relative to the landowner's property. Additional information may also be given to each landowner explaining power line safety, easement acquisition procedures, and damage settlement. 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 would 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 design.

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

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

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

Upon completion of construction activities, landowners would be contacted to determine whether or not construction damages have occurred. Areas that sustain construction damage would be restored to the pre-construction condition to the extent possible.

Landowners would 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 the construction of the transmission line. Once construction cleanup is complete and construction damages have been successfully mitigated, landowners would be sent a final contact letter signaling the close of the Project and requesting notification of any outstanding issues related to the Project.

3.1.4 Corridor Considerations

The Project was reviewed during the electrical planning process by a team of siting, right-of-way, environmental and engineering personnel. The team reviewed the general study area for significant siting issues that may arise. The team analyzed the study area and identified preliminary corridors based on opportunities to:

- share right-of-way with existing transmission lines by double circuiting where practical or paralleling an existing line;
- minimize impacts to reliability (i.e., consider if existing lines can be taken out of service for construction);
- parallel roads to help decrease the amount of right-of-way required (the road that requires the least amount of clearing is normally chosen);
- parallel field lines, property lines or railroads, where access is adequate and the transmission line would cause minimal conflicts; and
- minimize the length of the transmission line to reduce the impact area and costs for the Project.

3.1.5 Future Routing Considerations

Once corridors are selected as part of the certification process, routes will be identified that avoid, to the extent possible, areas where a high-voltage transmission line (HVTL) could create significant impacts. These areas include:

- high density residential areas;
- areas where clearances are limited because of trees or nearby structures; and
- environmentally sensitive sites, such as wetlands, archaeologically significant sites, areas with threatened, endangered and species of special concern, areas of significant biological or cultural significance, and state and federal lands.

Proposed route segments will then be provided to several agencies (DNR, State Historic Preservation Office (SHPO), United States Army Corps of Engineers (USACE), United States Fish and Wildlife Service (USFWS), Mn/DOT, Tribal groups, and others), the public, and other utilities for review. The routes will be reviewed by these groups through a variety of methods: letters written with a general description of the proposal and maps of the proposed route, meetings with the DNR and the Mn/DOT, and public meetings held in the area of the proposal.

3.2 Transmission Line Description

3.2.1 Line Length, Types of Conductors

Line Length

A 115 kV transmission line constructed within the proposed corridor would be approximately 55 miles in length. The Project would be located in Crow Wing, Cass and Hubbard counties.

Conductors

The 115 kV transmission line would use 636 ACSR (aluminum conductor steel reinforced) Rook conductor, which has an ampacity of 914 amps at 100 degrees C. This will limit maximum continuous electric power capacity of the line to 182 megavolt amperes (MVA), provided there is not a more restrictive limit associated with the line's substation terminal equipment or transformation capacity. There would be three single conductors for the 115 kV circuit. The line will be shielded with either 3/8 inch H.S. (7-strand) steel or 64 mm 2/258 (24-fiber) overhead ground wires, dependent upon structure type.

3.2.2 Structure Types, Structure Height and Span Length

Three structure types are being considered for the Project: wood H-frame, wood single pole, and wood single pole with distribution underbuild. Dependent upon land use type, topography, right-of-way constraints and other design-dependent features, each of the three transmission line structure designs would be appropriate in certain areas within the proposed corridor.

Figure 3-2 shows the cross section views of typical 115 kV transmission line structures and distribution underbuild that could be incorporated onto the structures along portions of the line.

Wood H-frame

The two pole structure design is suited for areas with rugged topography and for areas requiring longer spans to avoid or minimize placement of structures in wetlands or waterways. The average span would be 600 to 900 feet, with 1,000-foot spans achievable with certain topography. The structure height would average 60 to 90 feet with taller structures required for the exceptionally long spans and in circumstances requiring additional vertical clearance (i.e., railroad tracks) exceeding the National Electric Safety Code (NESC) requirements.

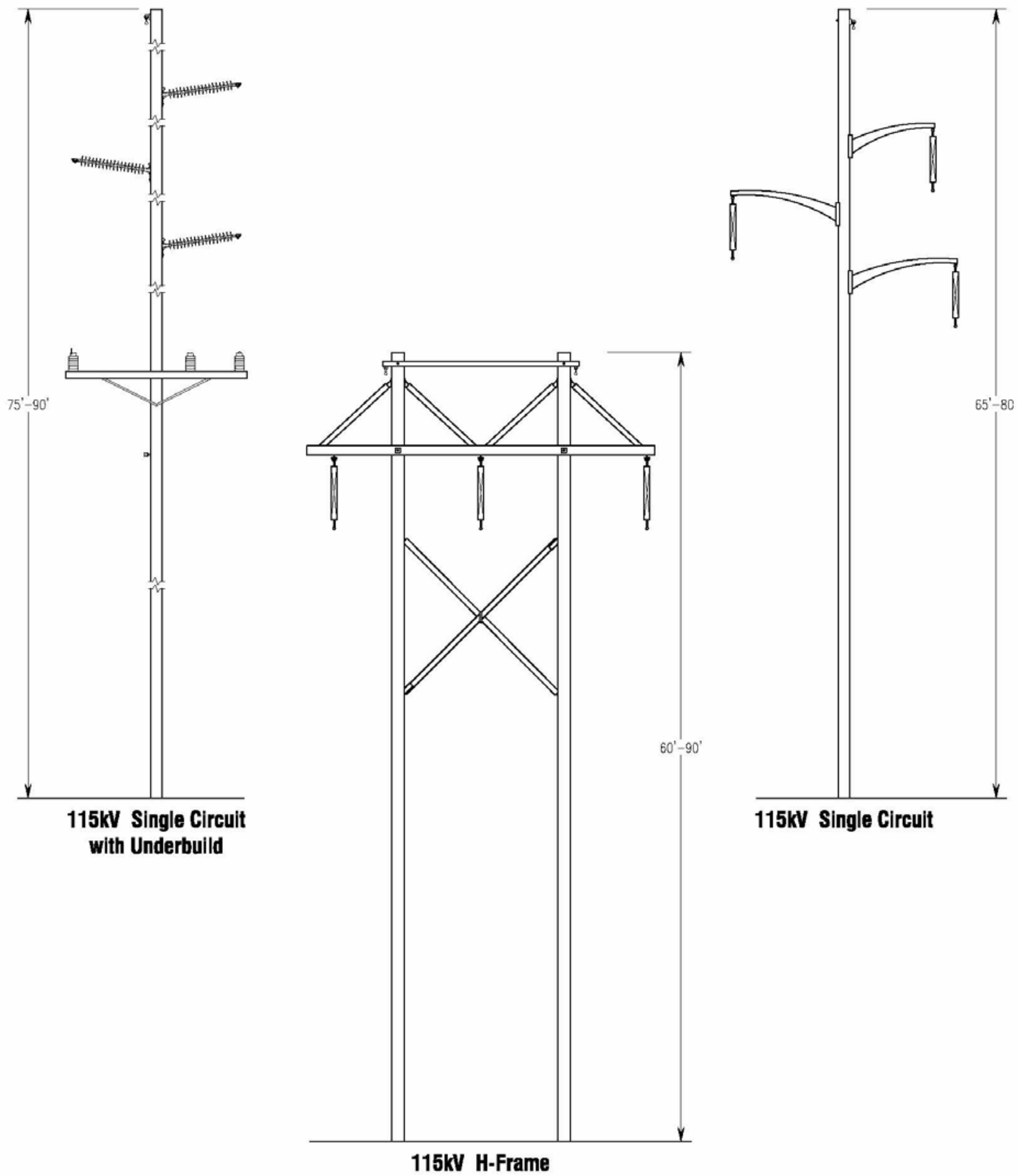

Figure 3-2 Typical 115 kV Transmission Structures

Single Pole (no underbuild)

The single pole design is suited for areas where available right-of-way is limited, such as where corridors are shared along roads in developed areas. Average structure height would be 65 to 80 feet to achieve average span lengths of 400 to 600 feet. Specific structure heights and span lengths may exceed the average due to land use requirements and topography.

Single Pole (with underbuild)

This single pole design is used in areas where existing land use development restricts the placement of two separate power line circuits—a high voltage circuit and a lower voltage (distribution line) circuit. The advantage of this design is less right-of-way requirement; 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, averaging 75 to 90 feet in height. Specific areas may require taller poles due to topography and/or vertical conductor clearance requirements. The conductor used for the lower voltage circuit and other limiting factors result in a shorter average span; averaging 250 to 350 feet. The shorter average spans would require more poles per mile than the other two structure design options.

3.2.3 Maximum Power-Carrying Capacity

The lines will have a maximum continuous power carrying capability of 182 megavolt amperes (MVA). The power flow is not expected to reach these levels under normal system operations.

3.2.4 Projected Load During Peak Load Conditions

Load flow analyses indicate that initially the proposed 115 kV line will carry 16 MVA on the Badoura-Long Lake 115 kV line and 33 MVA on the Badoura-Pequot Lakes 115 kV line during normal operating conditions and at the projected 2009 peak load. Based on forecast load growth rates, flows on the Badoura-Long Lake line will increase to approximately 18 MVA and the flows on the Badoura-Pequot Lakes line will increase to approximately 35 MVA by 2025. Due to other regional transmission line additions and market conditions, these lines may vary greatly in their loading levels as these lines will parallel 230 kV and potential 345 kV Projects such that looped flow is expected on contingent conditions. It should be noted that the lines are being built for local load serving issues and not for enhancing market opportunities.

3.2.5 Projected Line Losses – Peak Load and Average Conditions

It is difficult to place an exact value on losses associated with any transmission project because demand for electric power is not constant and losses are related to the square of current flow through the electric system. This means that losses will change over time, increasing as demand increases and falling as demand decreases.

Because the Badoura-Long Lake and Badoura-Pequot Lakes 115 kV line is a looped line that parallels other high capacity 115 kV and 230 kV lines, it will succumb to regional transmission schedules. Transmission line losses will be difficult to determine with varying schedules. Because of this, the accuracy of determining an average loss may be difficult. With this in mind, analysis using the 2009 peak load model and PSS/E power flow software, the proposed 115 kV Project will result in a 1.0 MW reduction of on-peak transmission losses on the MP and GRE systems.

Because line losses equal the square of the current times the resistance of the transmission system (I^2R) and because current flow varies with respect to time as electric demand changes, there is no precise method to calculate average annual loss reductions. One method to estimate average annual loss savings is based on the following formulas[1];

$$\text{Loss Factor} = (0.3 \times \text{Load Factor}) + (0.7 \times \text{Load Factor}^2)$$
$$\text{Annual Loss savings} = (\text{Loss Factor} \times \text{Peak Loss Savings}) \times 8760 \text{ hours/year}$$

The average load factor for the loads served by the Project from 2001 to 2004 is 50% (based on MP Energy Management System (EMS) and GRE metered data). Using the method described above, and loss savings for the Project area, this Project is estimated to reduce transmission losses by 2,847 MWH annually (1.0 MW x [(0.3 x 0.5) + (0.7 x 0.5^2)] x 8760 hours/year).

3.2.6 Voltages During Operation

The line will be designed to operate at a nominal voltage of 115,000 volts. During normal operations, voltage will deviate somewhat from nominal levels. Typical system intact voltage will be in the range of 95% to 105% of nominal and post contingency voltage will range between 90% and 110% of nominal.

3.2.7 Electrical Characteristics

The line will be a three-phase, 60 hertz (Hz) alternating current (AC) transmission line insulated to operate at a nominal voltage of 115,000 volts. The line will use 636 ACSR Rook conductors that have typical 60 Hz impedance of approximately 0.149 +J0.732 ohms per mile. The reactive component will vary slightly with structure and conductor configuration. The thermal limit of conductors will be 182 MVA at 100 degrees Centigrade. Depending on transmission structure design, the line will carry an additional wire or two for lightning protection and communications.

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[1] Turan Gonan, Electric Power Distribution System Engineering, McGraw Hill, 1986, 55, 58-59

3.3 Construction Practices

3.3.1 New Construction – Transmission Lines

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

MP and GRE 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. MP and GRE typically use outside contractors for construction activities on large transmission line projects. The specifications used are developed by MP's and GRE's Engineering Services Departments.

Typical tangent structures will be wood, laminated wood or steel direct-embedded poles. Each structure will require a 10 to 15 feet deep hole that has a diameter of 3 to 4 feet. 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 be also inserted for pole stability due to poor soil capacity. Large angle structures will typically be self-supporting steel poles that require a drilled pier foundation. The piers will typically have diameters of 4 to 8 feet. The hole may require a typical depth of 15 to 30 feet depending on design requirements. The piers will be filled with concrete delivered to the site via trucks from a local batch plant.

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 a project's route. The conductors are pulled with a rope lead that connects to every structure through a dolly attached at the insulator location. Temporary guard or clearance poles are installed at crossings to provide adequate clearance over other utilities, streets, roads, highways, railroads, or other obstructions after any necessary notifications are made or permit requirements met to mitigate any concerns with traffic flow or operations of other utilities.

In lowland areas, construction activities may occur during the winter season to mitigate any damage to wetland areas or 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. The Applicants right-of-way agents will coordinate with affected landowners regarding replacement of fences and gates. The contractor will work around cultivated areas until harvest has occurred.

3.3.2 Rebuilt Lines

Rebuilding existing transmission lines would typically involve complete replacement of structures and conductors. Procedures would be similar to those discussed above for the Project. Increased voltage or current requirements would result in increased phase spacing or larger cables. The transmission line would typically be rebuilt in the same right-of-way. However, if the voltage is increased, the right-of-way width needs to be evaluated for proper clearances. Compact designs can sometimes mitigate the need for additional right-of-way for voltage upgrades.

3.3.3 Substation Upgrades

Substation capacity upgrades are typically required for obsolete equipment or equipment that has become undersized based on increased power flow through the facility. In most cases, the substation equipment can be replaced with a similar device that has more capacity carrying capability. In a few cases, the capacity needs may require many portions of the substation to be replaced. In this case it may be more cost-effective to establish a new site that will relieve the overloaded facility. Establishing a second facility would increase reliability and eliminate service concerns if the existing facility is out of service for a long time for rebuilding to a higher capacity. In many cases space considerations based on NESC (National Electric Safety Code) and land availability at an existing site have to be considered when any significant substation work needs to be performed.

3.4 Operation and Maintenance

MP and GRE would periodically use the right-of-way of the transmission line to perform inspections, maintenance, and repair of any damage. Regular maintenance and inspections would be performed over the life of the facility to ensure a reliable system. Annual inspections would be done by foot, snowmobile, all-terrain vehicles, pickup truck, or aerial means. These inspections would be limited to the acquired right-of-way and areas where obstructions or terrain require access off the easement. The Applicants would conduct an aerial inspection of each transmission line annually to ensure reliable operation.

The Applicants would conduct vegetation surveys and remove undesired vegetation that would interfere with the operation of the transmission line. Frequency of vegetation maintenance is on an approximate two-to-five year cycle. Right-of-way clearing practices include a combination of mechanical and hand clearing, along with an application of herbicides where allowed.

3.5 Required Permits/Approvals

Several agencies were contacted for their input on the Project including the DNR, SHPO, Mn/DOT, USFWS, USACE and Tribal groups. Responses are provided in Appendix A. Table 3-1 shows the permits potentially required for the Project.

Table 3-1 Permits/Approvals That May Be Required

Permit	Jurisdiction
LOCAL APPROVALS	
Road Crossing Permits	County, Township, City
Lands Permits	County, Township, City
Building Permits	County, Township, City
Over-width Loads Permits	County, Township, City
Driveway/Access Permits	County, Township, City
STATE OF MINNESOTA APPROVALS	
Route Permit Application (Alternative Process)	Commission
Utility Permit (TH crossings)	Mn/DOT
License to Cross Public Waters	DNR Division of Lands and Minerals
License to Cross State Lands	DNR Division of Lands and Minerals
National Pollutant Discharge Elimination System (NPDES) Permit	Minnesota Pollution Control Agency (MPCA)
Section 401 Water Quality Certification	MPCA
FEDERAL APPROVALS	
Section 404 Approval	USACE
Environmental Approval	RUS

3.5.1 Local Approvals

Road Crossing Permits

These permits may be required to cross or occupy county, township and city road right-of-way.

Lands Permits

These permits may be required to occupy county, township and city lands, such as park lands, watershed districts and other properties owned by these entities.

Building Permits

These permits may be required by the local jurisdictions for substation modifications and construction.

Over-width Loads Permits

These permits may be required to move over-width loads on county, township or city roads.

Driveway/Access Permits

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

3.5.2 State of Minnesota Approvals

Route Permit (Alternative Process)

A HVTL cannot be constructed without a Route Permit approved by the Commission. A route permit under the Alternative Process requires the Applicants to be eligible as outlined in Minnesota Rules 4400.2000.

Utility Permit

A permit from the Mn/DOT is required for construction, placement or maintenance of utility lines to be placed adjacent or across the highway right-of-way. These permits would be acquired once the line design is completed.

License to Cross Public Waters/State Lands

The DNR Division of Lands and Minerals regulates utility crossings over, under or across any state land or Public Waters identified on the Public Waters and Wetlands maps. A license to cross Public Waters is required under Minnesota Statute § 84.415 and Minnesota Rules Chapter 6135. The Applicants work closely with the DNR on these permits and would file for them once the line design is complete.

NPDES Permit

An NPDES permit is required for stormwater discharges associated with construction activities disturbing soil and equal to or greater than one acre in an area. A requirement of the permit is to develop and implement a Stormwater Pollution Prevention Plan, which includes Best Management Practices (BMPs) to minimize discharge of pollutants from the site. The Applicants would review the need for an NPDES permit for work at the Pine River Substation and other locations as may be required.

3.5.3 Federal Approvals

Section 404 Approval

The Applicants require Section 404 approval from the USACE when filling of a wetland or water of the United States is required. Section 404 approvals are not expected to be required for this Project.

Section 401 Certification

The Applicants require a Section 401 Water Quality Certification when federal approval for the Project is obtained (i.e. Federal Energy Regulatory Commission (FERC) permits or a USACE Individual Permit).

Environmental Approval

The RUS requires environmental approval of a project before construction can begin.

4.0 COST AND EFFICIENCY ANALYSIS OF THE PROJECT

4.1 Construction Costs/Cost Analysis Assumptions

4.1.1 Transmission Line Costs

The cost for the three proposed transmission line designs is divided into preconstruction and construction costs. Preconstruction costs include permitting and right-of-way acquisition costs. Construction costs include right-of-way clearing, transmission line construction, and right-of-way restoration costs.

<u>Preconstruction Costs</u>

The internal and consultant costs resulting from preparation and approval of Certificate of Need and Route Permit applications, public information meetings and public hearings, and acquiring easements for approximately 55 miles of right-of-way is estimated to be **$3,101,000**.

<u>Transmission Construction Costs</u>

The transmission line costs for the three proposed design types vary due to the number of structures per mile (i.e. span length), the height and diameter of the wood poles, labor, and hardware costs. The H-frame design is the least expensive and would range from $300,000 to $400,000 per mile, inclusive of right-of-way clearing. The approximate 55 miles of transmission line would cost $16.5 to $22.0 million to construct.

The single pole (without underbuild) design is $300,000 to $400,000 per mile, including the right-of-way costs. The approximate 55 miles of transmission line with the single pole design would cost $16.5 to $22.0 million to construct.

The most expensive transmission line design would be the single pole (with underbuild) design, which is a double circuit design. Cost for this design option could be in the range of $400,000 to $500,000 per mile. This is dependent upon removal and salvage value of the underbuilt circuit, which would dictate the average span for the proposed 115 kV circuit. The approximate cost to construct 55 miles of 115 kV transmission line with distribution underbuild is estimated to be $22.0 to $27.5 million.

The estimated cost for the approximate 55 miles of transmission line would be **$24,195,000.**

4.1.2 Substation Upgrade Costs

The Project includes substation additions and upgrades at five existing substations: 115/69/34.5 kV Pequot Lakes Substation; 34.5/12 kV Pine River Substation; 69/12 kV Birch Lake Substation; 115/34.5 kV Badoura Substation; and the 115/34.5 kV Long

Lake Substation. The cost for additional land for expansion of the Pine River Substation is included in the construction cost estimates.
The estimated costs for upgrading/additions to operate substations at 115 kV are:

Pequot Lakes	$1,300,000
Pine River	$2,800,000
Birch Lake	$2,042,000
Badoura	$ 750,000
Long Lake	$1,700,000
TOTAL	**$8,592,000**

The estimated cost for the Project would be **$35,888,000.**

4.2 Annual Operational and Maintenance Costs

The annual cost of right-of-way maintenance is currently approximately $350 per mile.

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

4.3 Service Life and Depreciation

In 2003, MP filed with the Commission an Average Service Life Petition for the Company's Transmission and Distribution Assets. The study was approved by the Commission on June 30, 2003 in Docket No. E015/D-03-500. For this filing, MP completed analytical and judgmental review of all plant accounts that comprise the average service life grouping. MP used a simulated plant balance method for analytical results. These results were reviewed with engineering management from the transmission and distribution lines of business, and their expertise and knowledge was the deciding factor in areas of discussion.

Using the depreciation rates approved in the study by the Commission, the Badoura Project results in annual depreciation expense of approximately $822,000. Table 4-1 lists the alternatives (discussed in Section 9.0) and their estimated impact on annual depreciation expense.

Table 4-1 Badoura Project - Impact on Annual Depreciation Expense

Badoura Project	Reconductor Alternative (Section 9.3)	Alt. Line/Tap Voltages Alternative (Section 9.6)	Generation /Delayed Project Alternative (Section 9.7)	Alt. Corridor Alternative (Section 10.0)
$822,000	$342,000	$1,038,000	$1,188,000	$884,000

4.4 Effects on Rates

MP and GRE have determined that MP would finance the construction of the Project. MP would bill GRE for transmission services through the established Network Integration Transmission Services (NITS) Agreement.

Table 4-2 shows the Annual Revenue Requirements for the Project and the alternatives that are discussed in Section 9.0.

Table 4-2 Annual Revenue Requirements - Badoura Project and Alternatives

BADOURA PROJECT	RECONDUCTOR ALTERNATIVE (SECTION 9.3)	ALT. LINE TAP/VOLTAGES ALTERNATIVE (SECTION 9.6)	GENERATION/DELAYED PROJECT ALTERNATIVE (SECTION 9.7)	ALTERNATE CORRIDOR ALTERNATIVE (SECTION 10.0)
$5,562,646	$2,309,600	$6,541,636	$9,369,371	$6,034,003

4.5 Effect of Project on Service Reliability (Service Areas and Throughout State)

4.5.1 Park Rapids Area

GRE recently constructed the Long Lake Substation near Park Rapids, which serves MP and Itasca-Mantrap loads in Park Rapids and the surrounding rural areas. The peak load served by the new Long Lake Substation is approaching 40 MW. The Long Lake Substation is supplied with electric energy by a single 115 kV line and when this line is out of service, the area is supplied via long 34.5 kV lines from the Badoura, Akeley and Hubbard substations. Multiple switching events are required to restore electric service to the customers fed out of Long Lake to maintain acceptable voltage and insure no circuit is overloaded. As load continues to grow, it is expected that by 2009, some load would need to be shed during unplanned outages of the single 115 kV line supplying the Long Lake Substation at peak load periods to maintain voltage. Although the recently completed Long Lake Substation did not add additional transmission capacity into the Park Rapids area, it was the start of plans to provide a 115 kV looped system to serve the Park Rapids area.

The Badoura-Long Lake 115 kV Project would provide a highly needed second 115 kV source to the Park Rapids area, resulting in continued service to all electrical services if one of the two 115 kV lines or two 115/34.5 kV transformers are out of service.

4.5.2 Pequot Lakes Area

Electrical energy for MP customers and GRE cooperative customers in Backus, Pequot Lakes, Pine River, and the surrounding rural area is provided by a 34.5 kV line between MP's Pequot Lakes and Badoura substations. The Pine River and Pequot Lakes area loads are normally supplied from the Pequot Lakes Substation with the Badoura Substation serving as an alternate source. These loads have steadily increased and are expected to reach a point at which the voltage will fall below acceptable levels during peak load periods while being served from the Badoura Substation during planned or unplanned outage of the Pequot Lakes end of the line. In addition, the Pequot Lakes Substation is supplied by a single 115 kV line. Due to load growth, within a few years the 69 kV supply to the Pequot Lakes Substation will not support voltage during a planned or unplanned outage of the single 115 kV line that supplies the substation.

The existing Birch Lake 69/34.5 kV Substation normally serves the MP and GRE loads in Hackensack, Ten Mile Lake, Pleasant Lake, Longville and Wabedo and surrounding rural areas. During planned or unplanned loss of either the 34.5 or 69 kV circuits in this area, the Badoura Substation and the new MP Akeley 115/34.5 kV Substation provide an alternate source of electric energy to these loads. Presently, several switching events are required to maintain voltage and prevent line overloads when this area needs to be served by its alternate sources. As load continues to grow, it will not be possible to maintain voltage at acceptable levels when these loads must be served from their alternate source during peak load periods.

GRE's 69 kV system serves communities from Deer River to Cross Lake. Continued growth on the southern portion of the 69 kV system has created voltage concerns serving the Emily and Cross Lake City substations if the Cross Lake City-Mission 69 kV line is lost. On this outage the load is picked up by the Deer River source and from the weak Badoura 34.5 kV source. Many capacitors have already been added to the system and capacitor coordination issues have eliminated the possibility of adding more capacitors to this line segment. A strong source at Birch Lake would provide the needed voltage support for many years.

The Badoura-Birch Lake-Pequot Lakes 115 kV Line Project would provide a highly needed second 115 kV source to Pequot Lakes and provide a 115/69 kV source at Birch Lake to support the voltages to the northern 34.5 kV system and to the eastern 69 kV system. Pine River and Tripp Lake substations will also have load shifted to the new 115 kV line. Providing a second high voltage source to these areas would ensure reliable service if certain other sources are out of service.

4.5.3 Regional Impacts of the Project

Although the Badoura-Long Lake and Badoura-Pequot Lakes 115 kV lines would be built for local load-serving needs, there may be potential impact on the rest of the transmission grid in the state, as power would flow more efficiently through the system. Because these lines are looped and parallel existing lines, they would provide more efficiency in the transmission grid. The line would have minimal impact on the reliability of the statewide system; however, it would share in the delivery of power if certain lines are out of service.

5.0 ANALYSIS/MITIGATION OF ECONOMIC, ENVIRONMENTAL, AND SOCIAL CONSEQUENCES OF THE PROJECT

5.1 Summary of Public, Tribal and Governmental Input on the Project

A summary of public input on the Project from the various zonal meetings was provided in Section 2.3.

Several agencies were contacted for their input on the Project, including the DNR, SHPO, USFWS, USACE and Tribal groups. All agency responses are provided in Appendix A. The USACE provided a generic letter outlining potential permitting requirements as listed in Section 3.5. The DNR provided a short letter outlining necessary licenses as listed in Section 3.5. The SHPO sent a short letter recommending development of plan for identification, evaluation and treatment of cultural resources.

The Applicants also held meetings with the DNR to discuss any issues they may have, specifically including plans for a state trail that parallels TH 371, and with Mn/DOT to discuss future development plans for TH 371. The Project was also discussed as part of a Transmission Planning Meeting held in accordance with Minnesota Rule, Chapter 7848, in Baxter, Minnesota on May 10, 2005.

The Applicants conducted open houses, prior to submission of this application, on July 13th, 2005 in Pine River and July 14th, 2005 in Park Rapids. Comment cards were provided at the meetings. Meeting notice ads were placed in local papers and invitations were sent to local agencies and public authorities in and near the corridor. A total of four people registered at the meetings. Follow up also occurred with four contacts requesting information on the Project. The materials provided at the meeting include materials describing the Project, corridor maps, and the certification process.

As required by Minn. Rules 7848.1900, subp. 6, and approved by the Commission (see Docket No. ET-2, E-015/TL-05-867, Order Approving Notice Plans, as Revised dated August 25, 2005), the Applicants implemented the Notice Plan for this Project on September 6, 2005. By this process, notice of the Project was provided to all persons reasonably likely to be affected by the Project, by direct mail and newspaper notice. The Notice Plan was mailed to about 940 addresses.

The second transmission planning meeting as required by Minn. Rules 7848.0900, subp. 1(A) was held at the Backus City Hall on Wednesday, October 5, 2005. Forty people attended the Project information sharing meeting. By October 14, 2005, 27 people had contacted the Applicants for additional information on the Project.

5.2 Description of the Corridor

The corridor between Pequot Lakes and Park Rapids is located in Cass, Crow Wing and Hubbard counties (Figure 5-1). The corridor is comprised of seven segments that total 55 miles: A, C, F, H, K, L and M as described below.

5.2.1 Corridor Segments

Segment A (5.5 miles)

The Project begins at the Pequot Lakes Substation and exits to the north following the Riverton to Badoura 230 kV line, traveling cross-country in a northwesterly direction until it intersects with County Road 1, approximately three miles south of Pine River.

Segment C (3.4 miles)

New right-of-way would start at County Road 1 and then run north to the Pine River Substation.

Segment F (6.4 miles)

This segment follows the 34.5 kV line that exits the east side of the Pine River Substation and travels northwest along the west side of TH 371 next to the DNR Paul Bunyan Trail to a point north of Pine River. Here the 34.5 kV line crosses to the east side of TH 371 where it continues to parallel TH 371 until it intersects with the MP Direct Current transmission line (MP +/- 250 kV DC line) three miles south of Backus.

Segment H (5.8 miles)

This segment follows a 34.5 kV line that starts at the intersection with the MP DC line and continues to parallel TH 371 on the east side until the Birch Lake 34.5 kV Tap approximately two miles north of Backus.

Segment K (5.1 miles)

This segment follows a 34.5 kV line that starts at the Birch Lake 34.5 kV Tap (just north of Backus) and continues to parallel TH 371 on the east side until just south of Hackensack where it turns northeast and runs cross-country to Third Street before terminating at the Birch Lake Substation.

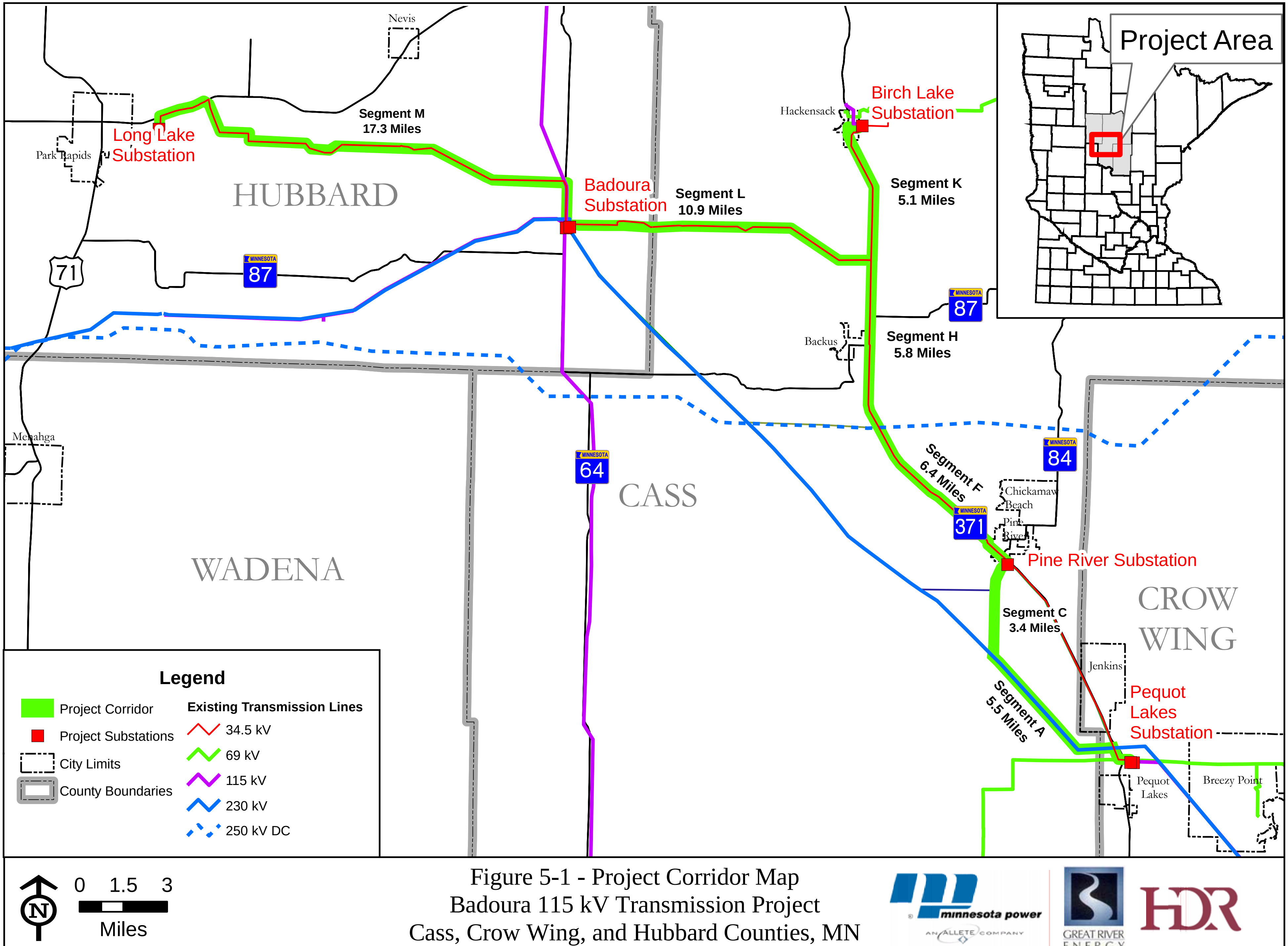


Figure 5-1 - Project Corridor Map
Badoura 115 kV Transmission Project
Cass, Crow Wing, and Hubbard Counties, MN

Segment L (10.9 miles)

This segment follows the Badoura to Birch Lake Tap 34.5 kV line that starts at the Birch Lake 34.5 kV Tap (approximately two miles north of Backus) and runs west cross-country until it meets 16th Street in Cass County, which becomes 140th Street in Hubbard County. At this point it parallels the street to the north until just before County Road (CR) 64, where it crosses the road and enters the Badoura 115 kV Substation on the north side.

Segment M (17.3 miles)

The last segment follows the Badoura to Long Lake 34.5 kV line that exits the Badoura 115 kV Substation paralleling CR 64 northerly for approximately 2.5 miles. It then crosses CR 64 and travels westerly before meeting 174th Street. It parallels 174th Street on the south side until it turns south at Crown Point Road, where the line crosses the road and continues west cross-county. The line then intersects with CR 11 and turns north paralleling CR 11 until it intersects with 178th Street. The line turns west and parallels 178th Street until it intersects with CR 20, then follows CR 20 north until it intersects with TH 34. It then turns west and follows TH 34 around the north end of Long Lake until it intersects with 169th Avenue. The line turns south and follows 169th Avenue until it reaches the Long Lake Substation (just east of Park Rapids).

5.3 Physiographic Setting

5.3.1 Existing Environment

The proposed transmission corridor is located within the Northern Minnesota Drift and Lake Plains section of the Ecological Classification System (DNR 2005). The corridor falls within the Pine Moraines and Outwash Plains subsection. This subsection is characterized by end moraines, outwash plains, till plains and drumlin fields (DNR 2005). Sands and sandy loam soils overlay bedrock and vary in depth between 200 and 600 feet below ground surface.

The corridor, which starts in Crow Wing County, traverses through Cass County and ends in Hubbard County, passes through only the Pine Moraines and Outwash Plains subsection. This area is characterized by morainic soils, excessively drained sands and numerous wetlands (DNR 2005). The corridor is within three major watersheds: the Pine River, Leech Lake River and Crow Wing River. Kettle lakes and lakes greater than 160 acres are common throughout. Elevations generally range between 1,250 and 1,500 feet across the Project area. The lowest elevation is 1,232 feet near Pine River, and the highest elevation is 1,565 feet located between the Badoura Substation and TH 371.

5.3.2 Impacts and Mitigation

Minimal surficial and subsurface disturbances would occur for all proposed corridors. No impacts to the physiographic setting are anticipated; therefore no mitigation is proposed.

5.4 Human Settlement

5.4.1 Existing Environment

Crow Wing County

The corridor is near Pequot Lakes (2000 population 947; 479 occupied homes), which has several technology and manufacturing employers (US Link, Hunt Technology, Pequot Tool), a public school system, and several small businesses including banks, restaurants, retail and grocery stores.

Cass County

The Project corridor crosses the towns of Pine River (2000 population 928; 438 occupied homes) and Hackensack (2000 population 285; 132 occupied homes), and passes near Backus (2000 population 311; 123 occupied homes). There are several small businesses (restaurants and retail) in Hackensack. Employers in Pine River include the public schools, the Whispering Pines Good Samaritan Nursing Home, and several smaller businesses, including car dealers, grocery stores and banks.

Employers in Backus include the Backus Elementary School, several small manufacturing companies, and smaller businesses, such as grocery stores.

Hubbard County

The western end of the Project corridor is approximately two miles east of the City of Park Rapids (2000 population 3,276; 1,476 occupied homes). Employers in Park Rapids include the public schools, health services, county government, frozen food manufacturing, medical equipment manufacturing, and several smaller businesses, including grocery stores, retail stores and banks.

5.4.2 Environmental Consequences and Mitigation

There are no impacts to human settlement anticipated as a result of this Project. The transmission line would be located within or parallel to existing utility right-of-way. Any necessary expansion of right-of-way would not result in any loss of homes.

5.5 Socioeconomic Setting

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

5.5.1 Existing Environment

Crow Wing County

The Project is located in northwest Crow Wing County. According to the 2000 U.S. Census, the county had a total population of 55,099. The 2004 Crow Wing County Comprehensive Plan shows that between 1990 and 2000, the population grew by 25 percent, and is continuing to grow at a similar pace. Within the Project area, the TH 371 corridor is showing the greatest amount of growth.

General demographics for Crow Wing County show a 49.2 percent male and 50.8 percent female distribution of the predominantly (97.6 percent) white population. Approximately 17.1 percent of residents are 65 years old or older. Median household income for the county ($37,589) is approximately 20 percent lower than the statewide average of $47,111. Unemployment in Crow Wing County was 5.5 percent, slightly higher than the statewide average (4.7 percent) for the year 2004 (U.S. Department of Agriculture (USDA) Economic Research Center).

The county's 755 farms (144,743 acres) produced a total market value of agricultural products of over $13.7 million in the year 2002, including $5 million in crops and $8.7 million in livestock, poultry and related products (2002 U.S. Census of Agriculture, USDA, National Agriculture Statistics Service). The 2004 Comprehensive Plan shows that major employers in the county include retail centers, resorts, medical centers, government services and schools. Construction, real estate, finance, insurance, transportation and public utilities experienced the largest amount of growth from 1990 to 2000.

Cass County

The Project crosses Cass County in Wilson, Pine River, Powers and Birch Lake townships. According to the 2000 U.S. Census, the county had a total population of 27,150. The 2002 Cass County Comprehensive Plan shows that between 1990 and 2000, the population grew by 25 percent and is continuing to grow at a similar pace.

General demographics for Cass County show a 50.5 percent male and 49.5 percent female distribution of the predominantly (86.5 percent) white population. Approximately 18 percent of residents are 65 years old or older. Median household income for the County ($34,332) is approximately 27 percent lower than the statewide average of $47,111. Unemployment in Cass County was 8.2 percent, higher than the statewide average (4.7 percent) for the year 2004 (USDA Economic Research Center).

The county's 646 farms (197,153 acres) produced a total market value of agricultural products of over $14.3 million in the year 2002, including $3.9 million in crops and $10.4 million in livestock, poultry and related products (2002 U.S. Census of Agriculture, USDA, National Agriculture Statistics Service). Major employers in the county include government services, leisure and hospitality services and trade, transportation and public utilities (Minnesota Department of Employment and Economic Development).

Hubbard County

The Project is within southeastern Hubbard County. According to the 2000 U.S. Census, the county had a total population of 18,376. The 1990 U.S. Census Data show that between 1990 and 2000, the population grew by 23 percent, and is continuing to grow at a similar pace.

General demographics for Hubbard County show a 50.0 percent male and 50.0 percent female distribution of the predominantly (96.3 percent) white population. Approximately 18 percent of residents are 65 years old or older. Median household income for the county ($35,321) is approximately 25 percent lower than the statewide average of $47,111. Unemployment in Hubbard County was 6.0 percent, slightly higher than the statewide average (4.7 percent) for the year 2004 (USDA Economic Research Center).

The county's 535 farms (140,004 acres) produced a total market value of agricultural products of over $22.9 million in the year 2002, including $17.3 million in crops and $5.6 million in livestock, poultry and related products (2002 U.S. Census of Agriculture, USDA, National Agriculture Statistics Service). Major employers in the county include government services, trade, transportation and public utilities, manufacturing, education and health services and leisure and hospitality services (Minnesota Department of Employment and Economic Development).

5.5.2 Environmental Consequences and Mitigation

Any impacts to social and economic resources would generally be of a short-term nature. Revenue would likely increase for some local businesses, such as hotels, restaurants, gas stations and grocery stores due to workers associated with construction of the Project. Other local businesses, such as ready-mix concrete and gravel suppliers, hardware stores, welding and machine shops, packaging and postal services and heavy equipment repair and maintenance service providers would also likely benefit from construction of the Project. Impacts to social services would be unlikely because of the short-term nature of the construction Project. Construction crews would be approximately 20-30 personnel who would likely reside temporarily in the nearby towns (Park Rapids, Hackensack and Pine River).

There would also be some long-term beneficial impacts from the new transmission lines and substation additions. These benefits include an increase to the counties' tax base resulting from the incremental increase in revenues from utility property taxes based on the value of the Project. The availability of reliable power in the area would have a positive effect on local businesses and the quality of service provided to the general public.

5.6 Noise, Radio and Television

5.6.1 General

Corona discharges from the conductors of an overhead transmission line result in the formation of audible noise and radio frequency noise. Corona occurs when the electric field intensity at the transmission line's conductors exceed the breakdown strength of air resulting in ionizing the air near the conductors. If the discharges are excessive, the audible noise can reach annoyance levels and the radio frequency discharges can cause interference with radio and TV reception.

Corona formation is a function of the conductor radius, surface condition, line geometry, weather condition and most importantly the lines operating voltage. Corona produced audible noise, radio and television interference is typically not a concern for power lines with operating voltages below 161 kV, because the electric field intensity is low.

The Applicants are unaware of any complaints related to audible noise, radio or TV interference resulting form the operation of existing 115 kV transmission lines located near the Project area and do not expect that audible noise and radio TV interference will be an issue in the Project corridor.

5.6.2 Audible Noise

Noise levels are measured on a logarithmic scale in units of decibels (dB). In addition, human hearing is not equally sensitive to all frequencies of sound, therefore 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 A-weighted decibels (dBA). In general terms, a noise level change of 3-dBA is imperceptible to human hearing. A 5-dBA change in noise level is clearly noticeable and a 10-dBA change in noise levels is perceived as a doubling of noise loudness. Table 5-1 provides estimates of the noise levels of some common sources expressed in dBA.

Table 5-1

Common Noise Sources and Levels

Sound Pressure Level (dBA)	Typical Sources
140	Jet engine (at 25 meters)
130	Jet aircraft at 100 meters
120	Rock and roll concert
110	Pneumatic chipper
100	Jointer/planer
90	Chainsaw
80	Heavy truck traffic
70	Business office
60	Conversational speech
50	Library
40	Bedroom
30	Secluded woods
20	Whisper

Source: MPCA, 1999 A Guide to Noise Control in Minnesota

As mentioned, transmission lines can create an audible crackling sound due to corona discharges from the conductors. Transmission line audible noise levels depend significantly on prevailing weather conditions for a given line geometry and operating voltage. Fair weather audible noise is very low and seldom noticed even if standing under a power line. Audible noise is the highest during periods when the conductor is wet, such as during periods of rain or fog. 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 and low background noise, transmission lines will produce audible noise that can be heard when standing under the line within or at times slightly beyond the edge of the line's right-of-way.

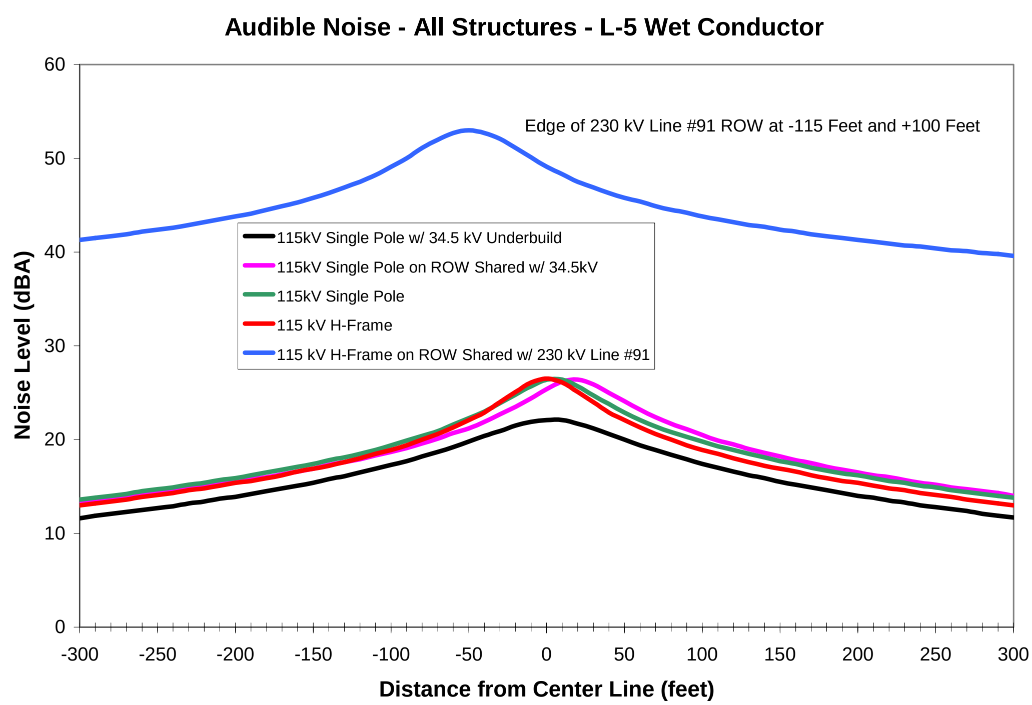
Minnesota Rule 7030.0040 establishes standards to regulate noise levels by land use types. The terms L50 and L10 designate noise levels expressed in dBA that are not to be exceeded more than 50% or 10% of the time, respectfully. The most restrictive MPCA standards require noise levels be less than an L50 level of 50 dBA and L10 level of 55 dBA at night. Table 5-2 identifies the established Minnesota noise standards for daytime and nighttime grouped by noise area classification.

Table 5-2
Noise Standards by Noise Area Classification

Noise Area Classification	Daytime		Nighttime	
	L_{50}	L_{10}	L_{50}	L_{10}
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

The most restrictive MPCA standard (Classification Area 1) requires that noise levels be less than an L50 level of 50 dBA and L10 level of 55 dBA at night. Graphs of the noise levels for the various line geometries considered for this Project are shown in Figure 5-2. It indicates that noise levels will be well below these limits at the edge of the right-of-way even during foul weather periods when the conductors are wet and the transmission line noise will be at it highest level. Note the graphs show the more restrictive L5 noise level rather than the L50 or L10 levels; the L5 level is a level that is not exceeded more that 5% of the time. During fair weather conditions, the transmission line noise will seldom be noticed even if standing directly under the transmission line.

Figure 5-2 Noise Levels Expected for the Project



5.6.3 Radio Noise

“Radio Noise” is a term used to refer to any unwanted interference of an electromagnetic nature with any signal or communication channels throughout the radio frequency band of operation, 3 kilohertz (kHz) to 30,000 kHz. Corona-generated radio noise could cause interference with virtually any type of radio reception. However, in practice it has been found that the bands principally affected are the amplitude-modulated (AM) broadcast band, 535 to 1,605 kHz and in particular those stations broadcasting below approximately 1,000 kHz. Frequency-modulated (FM) stations are seldom impacted by electric transmission facilities. Cellular phones are unlikely to be affected due to the high frequencies used; in fact, utility personnel often use cellular phones within substations and transmission line rights-of-way.

The radio noise generated from transmission lines is a function of conductor size and geometry, conductor height above ground, phase spacing, and ground resistance. Because radio noise is due to corona discharges, it also depends on the line’s operating voltage and weather conditions.

The Federal Communications Commission (FCC) considers transmission lines inadvertent emitters and therefore they are not covered directly by FCC regulations. However, in the past, the FCC and the State of Minnesota have suggested that transmission line radio noise should not result in interference within a licensed broadcast station’s primary coverage area for non-mobile receivers outside the line’s right of way. Based on the Applicants experience with operating other 115 kV transmission lines, the Project should not impact reception of commercial AM radio stations with non-mobile receivers within a station’s primary coverage area.

5.6.4 Television Interference

Corona generated noise could cause interference with TV picture reception similarly as in the case with AM radio interference since 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 that it is typically not affected by transmission line radio frequency noise.

Due to the higher frequencies of the TV broadcast signal (54 megahertz 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, MP and GRE would 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 would 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.

5.7 Electric/Magnetic Fields (EMF)

5.7.1 General

The term EMF refers to electric and magnetic fields that are present around any electrical device and can occur indoors and outdoors. Electric fields are the result of voltage or electrical charges, and the intensity of the electric fields is related to the operating voltage of the line. Magnetic fields are the result of the flow of electricity or current that travels along transmission lines, distribution (feeder) lines, substation transformers, house wiring and electrical appliances. The intensity of a magnetic field is related to the current flow through the conductors (wire).

Considerable research has been conducted throughout the past three decades to determine whether exposure to power-frequency (60 Hertz (Hz)) electric and magnetic fields cause biological responses and health effects. Epidemiological and toxicological studies have shown no statistically significant association or weak associations between EMF exposure and health risks.

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

Minnesota, California and Wisconsin all have recently conducted literature reviews or research to examine this issue. In 2002, Minnesota formed an Interagency Working Group to evaluate the body of research and develop policy recommendations to protect the public health from any potential problems resulting from HVTL EMF effects. The Working Group consisted of staff from various state agencies. The Working Group published its findings in a White Paper on EMF Policy and Mitigation Options (White Paper 1) in September 2002.

The findings of the Working Group are summarized below:

> Research on the health effects of EMF has been carried out since the 1970’s. Epidemiological studies have mixed results – some have shown no statistically significant association between exposure to EMF and health effects, some have shown a weak association. More recently, laboratory studies have failed to show such an association, or to establish a biological mechanism for how magnetic fields may cause cancer. A number of scientific panels convened by national and

international health agencies and the United States Congress have reviewed the research carried out to date. Most researchers concluded that there is insufficient evidence to prove an association between EMF and health effects; however many of them also concluded that there is insufficient evidence to prove that EMF exposure is safe (White Paper 1).

5.7.2 Environmental Consequences and Mitigation

The EQB has addressed the matter of EMF with respect to new transmission lines in a number of separate dockets over the past few years [Docket Nos. 03-64-TR-Xcel (161 kV Lakefield line); 03-73-TR-Xcel (345 kV Buffalo Ridge line); 04-84-TR-Xcel (115 kV Buffalo to White line) and 04-81-TR-Air Lake-Empire (115 kV line in Dakota County)]. The findings of the Minnesota Environmental Quality Board (EQB) and the discussion in the Environmental Assessments prepared on each of those projects are pertinent to this issue with respect to the transmission lines proposed here. Documents from those matters are available on the EQB webpage: www.eqb.state.mn.us.

In June 2005, in Docket No. 03-73-TR-Xcel for the 345 kV Buffalo Ridge line, the EQB made the following findings with regard to EMF:

118. There is at present insufficient evidence to demonstrate a cause and effect relationship between EMF exposure and any adverse health effects. The EQB has not established limits on magnetic field exposure and there are no federal or Minnesota health-based exposure standards for magnetic fields. There is uncertainty, however, concerning long-term health impacts and the Minnesota Department of Health and the EQB all recommend a "prudent avoidance" policy in which exposure is minimized. No significant impacts on human health and safety are anticipated from the Project.

119. In previous routing proceedings, the EQB has imposed a permit condition on high voltage transmission line permits limiting electric field exposure to 8 kilovolts per meter (kV/m) at one meter above ground. This permit condition was designed to prevent serious hazard from shocks when touching large objects such as semi trailers or large farm equipment under extra HVTLs of 500 kV or greater. Predicted electric field densities are less than half of the 8 kV/m permit condition for the Project's 34.5 kV and the 115 kV lines.

The electric field from a transmission line can induce an electric charge on other conducting objects in the vicinity of the line, such as vehicles and fences. If these objects are insulated or semi-insulated from the ground, and a person touched them, a small current would pass through the person's body to the ground. This might be accompanied by a spark discharge and mild shock, similar to what can occur when a person walks across a carpet and touches a grounded object or another person. Due to the relatively low operating voltage of the proposed line (115 kV), these discharges are unlikely to reach an annoyance level. To insure that any discharge does not reach unsafe levels, the NESC requires that any discharge be less than 5 milliamperes (ma). The line would be designed such that the discharge from any large object such as a bus or truck parked under or adjacent to the line would be significantly less than 5 ma. The Applicants would assure that any fence or other large permanent conductive object in close proximity or parallel to the line would be grounded so that excessive discharges would not occur.

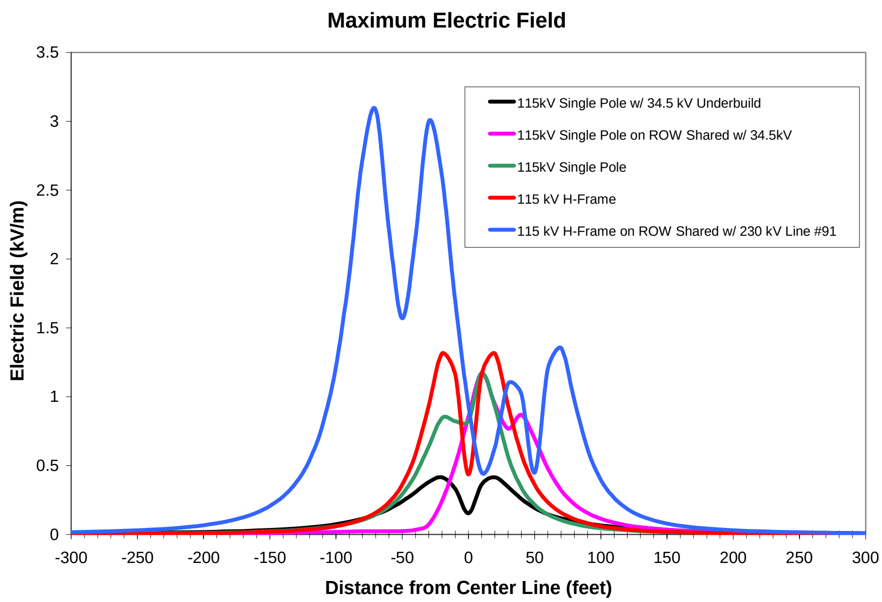
High intensity electric fields can have adverse impacts on the operation of pacemakers and implantable cardioverter/defibrillators (ICD). Interference to implanted cardiac devices can occur if the electric field intensity is high enough to induce sufficient body currents to cause interaction.

Modern bipolar devices are much less susceptible to interactions with electric fields. Medtronic and Guidant, manufacturers of pacemakers and ICDs, have indicated that electric fields below 6 kV/meter are unlikely to cause interactions affecting operation of most of their devices.

Older unipolar designs are more susceptible to interference from electric fields. Research completed by Toivoen et. al. (Toivoen et. al., 1991) has indicated that the earliest evidence of interference was in electric fields ranging from 1.2 to 1.7 kV/meter. Figure 5-3 shows that the e-field for all structure alternatives are well below levels at which modern bipolar devices are susceptible to interactions with electric fields. For older style unipolar designs, the e-field within the right-of-way from the “115 kV H-Frame on a shared right-of-way with the existing 230 kV line” does exceed levels that Toivoen et. al. has indicated may produce interference. However, a recent paper concludes that the risk of interference inhibition of unipolar cardiac pacemakers from high voltage power lines in everyday life is small[2]. In the unlikely event a pacemaker is impacted, the effect is typically a temporary asynchronous pacing (commonly referred to as reversion mode or fixed rate pacing). The pacemaker would return to its normal operation when the person moves away from the source of the interference.

[2] Scholten A, Joosten S, Silny J, Unipolar cardiac pacemakers in electromagnetic fields of high voltage overhead lines, Journal of Medical Engineering and Technology, 2005, 29(4):170-5

Figure 5-3 Maximum Electric Fields for the Project



The magnetic field profiles around the proposed lines for the structure and conductor configurations being considered for the Project are provided in Appendix B**.** Because the magnetic field is dependent on current flow, the expected magnetic field was calculated for two conditions: current flow at the conductor's thermal capacity and current flow at expected system intact peak load levels.

Several conclusions can be drawn from the magnetic field profile data:

- Magnetic field levels decrease rapidly (inverse square of the distance from source) from the centerline.

- Because magnetic fields decrease as current flow decreases, the fields expected during normal operation would be significantly less than those represented in the graphs, because the graphs depict the fields associated with current flow at the conductor thermal limit at expected 2009 peak load conditions.

5.8 Land Use

This section describes existing land use within the Project corridor and potential effects that could result from construction of the Project.

5.8.1 Existing Environment

The Project covers a variety of land use patterns in a general rural environment. Segments A and C consist of northern forest state lands, cottages and residential properties. Segments F, H, and K consist of a mix of woodlots, commercial, residential and agricultural property along TH 371. Mn/DOT is presently expanding the section of TH 371 within the Project corridor from two to four lanes. In addition, the Paul Bunyan Trail parallels TH 371 on the west side from Pequot Lakes to the Pine River. Segment L consists of northern forest state lands for the eastern half and a mix of residential, woodlots and irrigated agriculture in the western half. Segment M consists predominantly of irrigated agriculture with a mix of residential properties, cottages and woodlots.

<u>Crow Wing County</u>

The Project is located in northwest Crow Wing County. The 1996 Crow Wing County Current Land Use Map shows that the corridor crosses areas of forest, grassland, rural residential uses, bare rock and wetlands.

<u>Cass County</u>

The Project crosses central Cass County in Wilson, Pine River, Deerfield, Powers and Birch Lake townships. According to the Cass County Land Use Map, the corridor crosses forest, wetland, grassland and rural residential land uses.

The Project corridor also crosses the towns of Pine River and Hackensack and passes near the town of Backus, paralleling TH 371. According to the 1994 Pine River Zoning Map, the corridor crosses primarily commercial and industrial land uses, although the southern end of the town is zoned for medium density residential uses. The Pine River Municipal Airport is within half a mile of the Project corridor in Section 36 of Pine River Township. The corridor passes through areas within Airspace Obstruction Zoning and Land Use Safety Zoning.

In Hackensack, the corridor crosses areas of commercial (primarily along TH 371) and residential land uses.

The Backus Land Use Map shows that the corridor passes through areas zoned for single family residential, commercial, industrial and institutional (churches, schools and cemeteries) land uses. The Backus Municipal Airport is also within the Project corridor in Section 29 of Powers Township. The corridor is within the Safety Zones of the airport.

<u>Hubbard County</u>

The Project is within southeastern Hubbard County. Hubbard County does not maintain an official land use map. Field visits and aerial mapping show that the portion of the corridor within Hubbard County crosses primarily irrigated agricultural land with a mix of residential properties, cottages and woodlots.

The western end of the Project corridor is approximately two miles east of the City of Park Rapids. A cursory field review showed new residences near this end of the corridor outside of the incorporated City of Park Rapids. The Project corridor is outside of the safety zoning associated with the Park Rapids Municipal Airport, which is approximately two miles southwest of the western Project terminus.

5.8.2 Environmental Consequences and Mitigation

Impacts to land use as a result of the Project are expected to be minimal. Because the corridor follows an existing 34.5 kV line, construction within transmission right-of-way will minimize placement of structures in other land uses. Some placement of structures outside of existing right-of-way may be necessary due to expanded right-of-way needs associated with the upgraded facility. Construction of the facility would not change the possible land uses for any area. The Applicants would work with the Backus and Pine River Municipal airports to ensure that structures comply with airport safety zones and ordinances.

5.9 Cultural Resources

5.9.1 Existing Environment

The Minnesota State Historical Preservation Officer provided database search results of all known or reported archaeological sites and historic architectural structures within one mile of the townships and sections crossed by the corridors. Within these corridors, the database lists 40 archaeological sites and 88 historic architectural structures. Of these known resources, there are three archaeological sites listed on the National Register of Historic Places (NRHP) and four archaeological sites that are considered eligible for listing in the NRHP. There are also two architectural structures listed on the NRHP and five that the SHPO has determined eligible. Most of the historic structures are within the corporate limits of the towns in the area, most notably, Pine River and Park Rapids. Historic structures must be at least 50 years old to be significant.

It is important to note that most of the listed sites have not been evaluated as to their historical significance and that there may be other resources within the alternative corridors that have not yet been identified. However, the sites listed here demonstrate the variety of uses the land has seen over time. The archaeological sites listed range from the Archaic Period (6,000 - 800 years B.C.) to the Historic Period, with most falling within the Woodland Period (1000 B.C – 1700 A.D).

As the SHPO database is organized by county, the database search results of the historic and archaeological sites within a mile of the Project are similarly presented below. The sites were included if they occurred in the same section as the proposed corridor.

Cass County

- six recorded archaeological sites (artifact scatters, cemeteries, earthworks)
- one unconfirmed cemetery
- two unconfirmed artifact scatters
- 16 architectural structures (one considered eligible for NRHP in Pine River)

Crow Wing County

There are no recorded sites or historic architectural structures within the Project sections.

Hubbard County

- three recorded sites (lithic scatters/artifact scatters, earthworks/cemeteries, structural ruins)
- seven architectural structures

According to the SHPO database, sections crossed in whole or partly by Segments A, C, F, H, K, L, and M contain recorded historic structures and/or archaeological sites, as shown on Table 5-3.

5.9.2 Environmental Consequences and Mitigation

Construction of new transmission line structures in the proposed corridors could impact previously identified and currently unknown cultural resources.

Archaeological sites may be disturbed during construction of transmission structures, maintenance structures, staging areas or access roads. Historic buildings or other sites may be impacted as construction of modern transmission structures may compromise the integrity of a historic viewshed from or to above ground cultural resources. The realized potential impacts would be determined once routes are selected within these proposed corridors.

Table 5-3 Recorded Structures and/or Archaeological Sites – Project Corridor

Segment	Historic/Architecture	Archaeology
A	1 property CA-WLS-001	1 site 21CA067
C	4 properties (CA-PRC-001, CA-PRC-006, CA-PRC-052, CA-WLS-001)	1 site (21CA214)
F	11 properties (CA-PRC-001, CA-PRC-003, CA-PRC-004, CA-PRC-005, CA-PRC-006, CA-PRC-007, CA-PRC-008, CA-PRC-009, CA-PRC044, CA-PRC-052, CA-PRT-001)	3 sites (21CA214, 21CAbv, 21CAbx)
H	0 properties	2 sites (21CA170, 21CA178)
K	3 properties (CA-HSC-001, CA-HSC-002, CA-HSC-003)	0 sites
L	0 properties	3 sites (21CAbb, 21HB0002, 21HB0058)
M	7 properties (HB-WOT-001, HB-WOT-002, HB-WOT-003, HB-NVT-001, HB-HEN-005, HB-HEN-006, HB-HEN-007)	3 sites (21HB002, 21HB0020, 21HB0058)

Prior to construction, areas that are deemed high potential for cultural resources will be surveyed. The surveys would be coordinated with the appropriate landowners or land management agency. A product of the survey would be a cultural resources report recording findings and suggesting mitigation measures. The findings would be reviewed with the SHPO and specific mitigation measures necessary for each site or resource would be determined.

Mitigation may include careful relocation of access routes, structure sites and other disturbed areas to avoid cultural sites.

5.10 Hydrologic Features

5.10.1 Existing Environment

The corridor lies within the Pine River and Crow Wing River watersheds of the Upper Mississippi River Basin. Within the portion of the corridor in Hubbard County, surface water flows generally towards the Crow Wing River; within Cass and Crow Wing counties the water generally flows towards the Pine River.

Hydrologic features, such as wetlands, lakes, rivers and floodplains perform several important functions within a landscape, including flood attenuation, ground water recharge, water quality protection and wildlife habitat production. Hydrologic resources are regulated by several different agencies in Minnesota, including the USACE, the Minnesota Board of Water and Soil Resources (BWSR), the DNR and the MPCA. The regulatory environment is described in the following section.

Regulatory Environment

In addition, all Wetlands are defined by the USACE as “Waters of the United States” and are subject to jurisdiction under Section 404 of the Clean Water Act (1972). Waters of the United States include both wetlands and non-wetlands that meet USACE criteria. In Minnesota, all wetlands are regulated under the Wetland Conservation Act of 1991 (see Minnesota Statute §103G.222-.2373 requiring coordination with BWSR) and Section 404 of the Clean Water Act by the USACE.

Public Waters are water basins and watercourses of significant recreational or natural resource value in Minnesota as defined in Minnesota Statute §103G.005. The DNR has regulatory jurisdiction over these waters.

The Clean Water Act requires states to publish, every two years, a list of streams and lakes that are not meeting their designated uses because of excess pollutants (impaired waters). The list, known as the 303(d) list, is based on violations of water quality standards. In Minnesota, the MPCA determines which water bodies are considered impaired.

National Wetlands Inventory Wetlands

Wetland resources for the Project area were identified by reviewing USFWS National Wetland Inventory (NWI) mapping. NWI wetlands are shown in Figure 5-4. There are 499 NWI wetlands totaling 1,862 acres within the Project corridor. Palustrine scrub/shrub and palustrine emergent make up the majority of the area. Table 5-4 shows the wetland resources for each segment in the corridor.

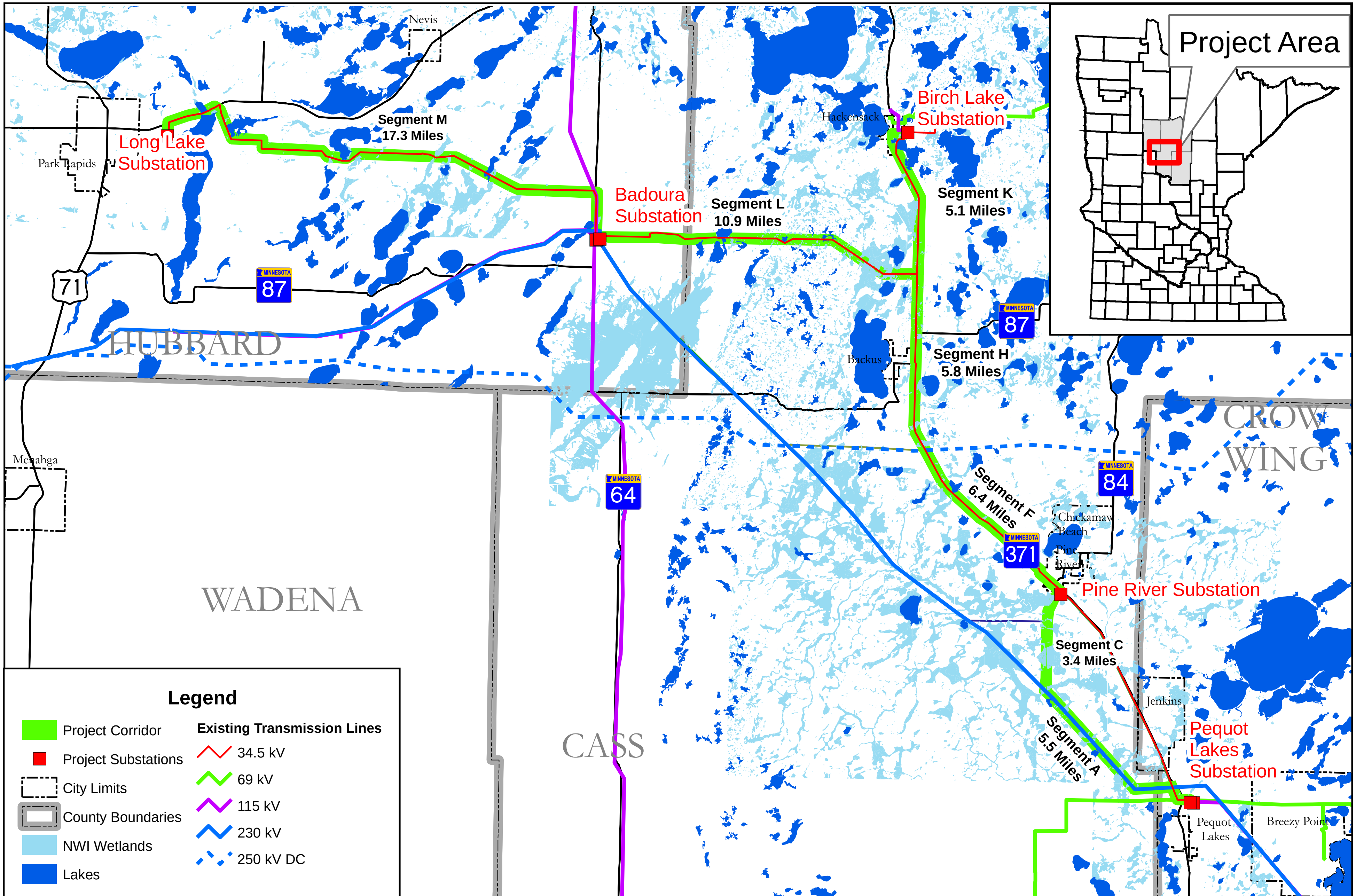


Figure 5-4 - National Wetlands Inventory Map - Project Corridor
Badoura 115 kV Transmission Project
Cass, Crow Wing, and Hubbard Counties, MN

Table 5-4 NWI Wetlands

Segment	Wetland Type	No. of Basins	Area (Acres)	% of Wetlands in Segment
A	Lacustrine	0	0	0
	Palustrine	-	-	-
	Emergent	46	114	46.7
	Forested	2	2	0.7
	Scrub/shrub	17	117	47.8
	Unconsolidated bottom	6	12	4.8
	Riverine	0	0	0
	Total	**71**	**245**	
Segment	Wetland Type	No. of Basins	Area (Acres)	% of Wetlands in Segment
C	Lacustrine	0	0	0
	Palustrine	-	-	-
	Emergent	8	128	54
	Forested	1	1	.4
	Scrub/shrub	22	101	42.7
	Unconsolidated bottom	3	2	0.7
	Riverine	1	5	2.3
	Total	**35**	**237**	
Segment	Wetland Type	No. of Basins	Area (Acres)	% of Wetlands in Segment
F	Lacustrine	1	24	33.4
	Palustrine	-	-	-
	Emergent	19	18	25.6
	Forested	0	0	0
	Scrub/shrub	6	26	37
	Unconsolidated bottom	1	0.2	0.2
	Riverine	1	3	4.1
	Total	28	71	
Segment	Wetland Type	No. of Basins	Area (Acres)	% of Wetlands in Segment
H	Lacustrine	0	0	0
	Palustrine	-	-	-
	Emergent	39	113	16.7
	Forested	15	127	18.7
	Scrub/shrub	57	419	61.7
	Unconsolidated bottom	19	20	2.9
	Riverine	0	0	0
	Total	**467**	**1,458**	

Segment	Wetland Type	No. of Basins	Area (Acres)	% of Wetlands in Segment
K	Lacustrine	1	3	1.7
	Palustrine	-	-	-
	Emergent	8	38	22.9
	Forested	2	31	18.4
	Scrub/shrub	21	95	56.7
	Unconsolidated bottom	0	0	0
	Riverine	1	0.6	0.4
	Total	**33**	**167**	
Segment	Wetland Type	No. of Basins	Area (Acres)	% of Wetlands in Segment
L	Lacustrine	7	82	17.8
	Palustrine	-	-	-
	Emergent	61	80	17.4
	Forested	10	174	38.0
	Scrub/shrub	59	78	17.1
	Unconsolidated bottom	37	45	9.7
	Riverine	0	0	0
	Total	**174**	**459**	
Segment	Wetland Type	No. of Basins	Area (Acres)	% of Wetlands in Segment
M	Lacustrine	7	15	2.7
	Palustrine	-	-	-
	Emergent	32	238	43.6
	Forested	9	51	9.4
	Scrub/shrub	23	38	7.0
	Unconsolidated bottom	10	203	37.3
	Riverine	0	0	0
	Total	**81**	**545**	

Public Waters Inventory

The Project corridor crosses 14 DNR Public Waters Inventory (PWI) lakes (11 in Cass County and three in Hubbard County), four PWI wetlands (one in Cass County and three in Hubbard County) and six PWI creeks and rivers (four in Cass County and two in Hubbard County) (Figure 5-5). Table 5-5 shows the PWI resources for the corridor.

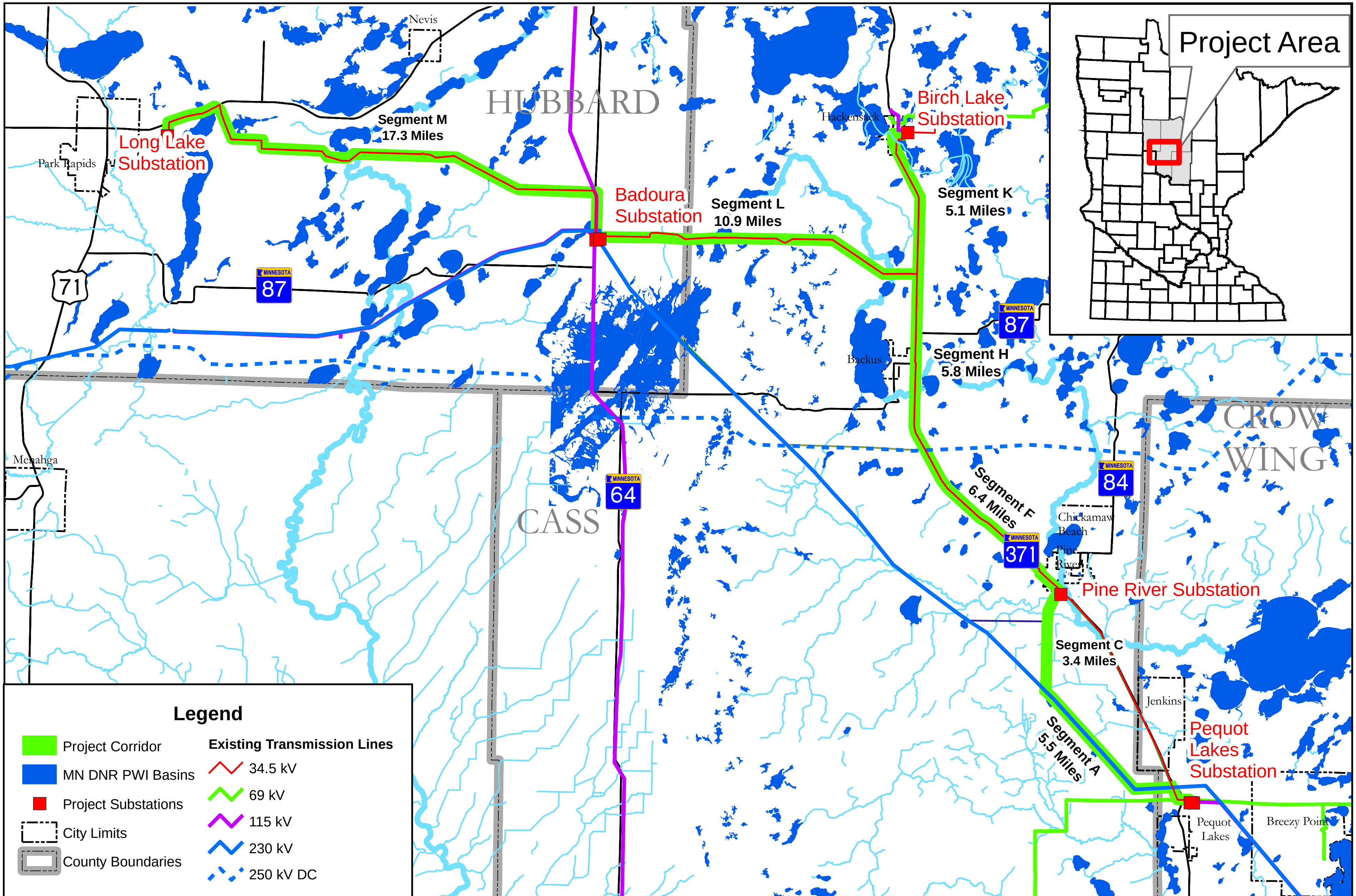


Figure 5-5 - Water Resources Map - Project Corridor
Badoura 115 kV Transmission Project
Cass, Crow Wing, and Hubbard Counties, MN

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Table 5-5 PWI Waters

County	Name	Type	Location
CASS	Boot (343 P)	Lake	T138N, R30W, Sections 16, 21 and 22
	Paquet (381 P)	Lake	T140N, R30W, Sections 20 and 29
	North Haynes (449 P)	Lake	T139N, R31W, Sections 5 and 6
	Unnamed (448 P)	Lake	T139N, R31W, Sections 3 and 10
	South Haynes (450 P)	Lake	T139N, R31W, Sections 7 and 8
	Unnamed (833 P)	Lake	T139N, R31W, Section 7
	Unnamed (834 P)	Lake	T139N, R31W, Section 8
	First Trestle (837 P)	Lake	T139N, R31W, Section 2
	Unnamed (838 P)	Lake	T139N, R31W, Sections 2 and 11
	Unnamed (839 P)	Lake	T139N, R31W, Sections 2 and 3
	Pine River (3 crossings)	River/stream	Between Beuber and Island lakes
			Between Pine Mountain and Bowen lakes
			South of the City of Pine River
	Unnamed Tributary to Island Lake	River/stream	North of Island Lake
HUBBARD	Fifth Crow Wing (92 P)	Lake	T140N, R33W, Sections 29 and 30
	Long (161 P)	Lake	T140N, R34W; Section 20
	Peysenske (169 P)	Lake	T140N, R34W; Sections 21, 22, 27 and 28
	Kettle (1 W)	Wetland	T139N, R32W, Section 4
	Tamarack (94 W)	Wetland	T140 N, R33W; Section 25
	Mud (168 W)	Wetland	T140N, R34W; Sections 20 and 21
	Crow Wing River	River/stream	South of Fifth Crow Wing Lake
	Wallingford Creek	River/stream	South of Tamarack Lake

303 (d) Impaired Waters

The MPCA lists four impaired waters within the Project corridor on its 2004 Impaired Waters List: Boot Lake in Cass County and Long Lake, Tamarack Lake and the Crow Wing River in Hubbard County. All of these water bodies are impaired for mercury and fecal coliform.

Floodplains

The portions of Hubbard, Cass and Crow Wing counties within the Project corridor have not been mapped by the Federal Emergency Management Agency (FEMA) for floodplains. It is possible that the corridor crosses the 100-year floodplains associated with the Crow Wing River, Pine River, and/or Hay Creek, as well any floodplains associated with the lakes in the vicinity.

5.10.2 Environmental Consequences and Mitigation

Impacts to hydrologic resources could occur by directly filling wetlands or Public Waters due to construction of the Project, or by otherwise negatively altering their functions and values. The Applicants would perform a wetland delineation of the selected route, concentrating on areas of disturbance near proposed transmission structures. Depending upon the results of the delineation, Project components may be moved to avoid affecting wetlands along the route.

The Applicants anticipate that the Project would be able to avoid most wetland areas and surface water features, such as rivers and streams, by spanning the transmission line over the water bodies. There are several PWI and NWI basins that are wider than 1,000 feet within the corridor and may not be able to be spanned completely. However, rebuilding in-place or paralleling the 34.5 kV transmission lines that currently skirt the majority of the hydrologic features would minimize any new impacts to wetlands and water bodies.

To further protect hydrologic features, best management practices for sediment and erosion control would be implemented. To minimize contamination of water due to accidental spilling of fuels or other hazardous substances, all construction equipment would be equipped with spill cleanup kits. Construction of the Project would not affect the loading of mercury or fecal coliform into the impaired waters within the Project area.

In the unlikely event that impacts to hydrologic features are unavoidable, the Applicants would work with the jurisdictional agencies (USACE, DNR and/or BWSR) to determine the best ways to minimize the impacts and create appropriate mitigation measures.

5.11 Flora and Fauna

5.11.1 Existing Environment

Vegetation

The proposed corridor is located within the Northern Lakes and Forests Ecoregion, which is dominated by mature conifer and northern hardwood forests and interspersed with lake and wetland plant communities. Minnesota Landsat land cover data shows that approximately 44 percent of the corridor is woodland (including mature coniferous and deciduous forests), and 21 percent of the corridor is grassland. A summary of the land cover types within the corridor is shown in Table 5-6.

Table 5-6 Landsat Land Cover Types

Land Cover Type	Area (acres)	Percent of Corridor
Coniferous Forest	2,410	18.1%
Deciduous Forest	3,490	26.2%
Grassland/Shrubby Grassland	2,755	20.7%
Wetlands	700	5.3%
Open Water	225	1.7%
Cultivated Land/Rural Farmstead	3,474	26.1%
Urban/Industrial (cities & towns)	255	1.9%

The corridor crosses the Badoura State Forest in Hubbard County and is within half a mile of the Foothills State Forest near Hackensack. The Badoura State Forest contains a state nursery, where Norway pine, Jack pine, White pine, White spruce, Black spruce, Black walnut, Green ash, Red oak, Silver maple and Wild plum are cultivated. This portion of the state has not been mapped by the DNR for rare or unique terrestrial communities.

Wildlife

Wildlife in the vicinity of the Project corridor consists of birds, mammals, fish, reptiles, amphibians and insects, both resident and migratory, which use the area habitat for forage, shelter, breeding habitat and/or stopover during migration. Species likely to be found are those associated with forested and/or grassland habitats, including small mammals, such as voles, shrews, mice and rabbits, larger mammals, such as beaver, bobcat, coyote, gray wolf, river otter, fox, white tailed deer, black bear, waterfowl and songbirds (both forest and grassland species). Fish, reptiles and amphibians, such as snakes, turtles, toads and frogs would likely be found near the wetlands and open water within the corridor.

The Badoura and Foothills State Forests are managed for wildlife and likely provide habitat for many woodland species. There are no DNR-managed Scientific and Natural Areas (SNA) or Wildlife Management Areas (WMA) within the Project corridor. Crow Wing Chain WMA in Hubbard County, Twin Heron WMA in Cass County and Lowell WMA in Crow Wing County are all within five miles of the corridor. These WMAs are managed for waterfowl, grouse and furbearers and also provide habitat for non-game species of wildlife. It is possible that wildlife found within these WMAs could be found within the Project corridor.

Special Status Species

A review of the Minnesota Natural Heritage Database identified no special status species within the 2,000-foot wide corridor and one species, bald eagles, within a one-mile radius of the corridor. The bald eagle is a federally threatened species and state special status species. Bald eagles are found in mature forests near open water and potentially are present in the Project corridor.

5.11.2 Environmental Consequences and Mitigation

Vegetation

Impacts to vegetation may occur due to the placement of structures. The area around the structure may also be temporarily disturbed due to construction activities. Because much of the corridor follows an existing 34.5 kV line, construction in previously undisturbed communities will be minimized. Some vegetation clearing would be necessary due to expanded right-of-way needs associated with the upgraded facility.

Wildlife

There is minimal potential for the displacement of wildlife and loss of habitat from construction of the Project. Wildlife that inhabits natural areas, such as those near water bodies and state forests, could be impacted in the short-term within the immediate area of construction. The distance that animals will be displaced will depend on the species. Impacts to wildlife are anticipated to be short-term because the route primarily will be constructed along an existing transmission right-of-way.

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

Additionally, electrocution of large birds, such as raptors, is a concern related to distribution lines. Electrocution occurs when birds with large wingspans come in contact with either two conductors or a conductor and a grounding device. The Applicants will use design standards that provide adequate spacing to eliminate the risk of raptor electrocution. As such, electrocution is not a concern related to the Project. The Applicants will work with regulatory agencies to identify potential risks to wildlife species and will develop appropriate mitigative measures.

Special Status Species

No impacts to special status species are expected as a result of this Project. The minimal loss of bald eagle habitat (the one special status species documented within one mile of the corridor) that could occur would not have population level effects. As stated above, the Applicants will use design standards that provide adequate spacing to eliminate the risk of raptor electrocution.

6.0 SYSTEM CAPACITY

6.1 Introduction

Continuing economic growth in the Park Rapids area and TH 371 corridor from Pequot Lakes to Pine River to Walker has caused a considerable increase in electrical use in the region. The addition of new electrical services and the increase in demand from existing services are causing electrical delivery concerns in this area. The existing electrical system, consisting of transmission lines and substations, is approaching its capacity limit. Loss of a facility may result in potential long-term outages. This situation has become a concern for summer and winter peak periods. With added growth, the number of critical hours during the year will continue to increase.

6.2 Transmission Planning Programs – Standards and Criteria

6.2.1 North American Electric Reliability Council

Reliability standards for electric transmission planning are currently established by the NERC. Since its formation in 1968, NERC has operated primarily as a voluntary organization based on reciprocity and mutual self-interest. Its main purpose is to maintain electric system reliability in North America. As currently constituted, NERC is a not-for-profit corporation made up of ten Regional Councils throughout the country. Regional Council members come from all segments of the industry and account for virtually all the electricity supplied in the United States and Canada. The recently formed Midwest Reliability Organization[3] (MRO) serves as one of the NERC's Regional Councils. Minnesota Power and GRE are both members of MRO.

On April 1, 2005 NERC adopted a new version (Version 0) of the reliability standards that were rewritten to be measurable and enforceable. The industry is currently operating under this version of the standards.

The Electricity Modernization Act of 2005 (the Act) was recently passed by Congress and enacted into law by President Bush on August 8, 2005. A provision of this law provides for a system of mandatory, enforceable reliability standards to be developed by a new organization referred to as the Electric Reliability Organization (ERO). Reliability standards are to be developed by the ERO subject to review by FERC; once approved, standards may be enforced by the ERO subject to FERC review. The Act directs FERC to issue a final rule to implement the ERO on or before February 5, 2006. The Applicants are anticipating that the Version 0 standards will be initially adopted by the ERO.

[3] Formation of the Midwest Reliability Organization (MRO) was approved by the Mid-Continent Area Power Pool (MAPP) Executive Committee in November 2002. In 2005, this organization became operational and replaced the MAPP Regional Reliability Council of the NERC.

Version 0 of the NERC planning standards applies primarily to the "bulk" electric system, the electric generation resources, transmission lines, and interconnections generally operated above 100 kV. These systems must be capable of performing under a wide variety of expected system conditions, and must be planned to withstand probable forced maintenance outages and other service interruptions known as "contingencies." The standards are designed to keep the interconnected system planned, designed, and operating to withstand a number of contingencies caused by the loss of a generation unit, a transmission line, or other system failures. The standards require companies to continually keep the system in a secure state (able to withstand the next contingency, even after one or more contingencies have already occurred). NERC's reliability standards are found on its website, http://www.nerc.com/standards.

6.2.2 National Electric Safety Code

The NESC provides a second set of planning criteria. The NESC governs the design, construction and operation of electric utility transmission facilities to ensure public and employee safety.

The NESC was initially defined in the 1920s and is currently revised every five years following extensive research and review. A complete discussion of NESC standards can be found at http://standards.ieee.org/nesc/newssites.html.

The NESC specifies the physical clearances and the mechanical strength of structures and equipment required to ensure safe operation of high-voltage electrical facilities such as transmission lines and substations. Consideration of NESC line-ground and line-line clearances, coupled with NESC mechanical strength requirements, determines whether existing transmission lines can be reconductored or converted to higher voltages. NESC provisions also establish the minimum clearances required from adjacent structures, such as buildings.

6.3 Regional Planning Under MISO

MISO’s Transmission Owner's Agreement, Appendix B describes the process to be used by MISO and its members in planning a transmission system. MISO is responsible for operating and planning all transmission facilities above 100 kV. The process for carrying out the planning of the MISO shall be collaborative with Owners, Users, and other interested parties. The Owners shall continue to have planning responsibilities for meeting their respective transmission needs in collaboration with MISO subject to the requirements of applicable state law or regulatory authority.

Nothing in MISO Transmission Owner's Agreement is intended to restrict or expand existing state laws or regulatory authorities.

The Transmission Owners shall identify and develop expansion plans to provide a reliable power supply to their connected load customers. MISO shall integrate into its overall Plan the Owners' plans, transmission needs identified from transmission service and generator interconnection requests, facility studies, and expansions to support trading opportunities. Any plans that call for modifications to the transmission system that would significantly affect available transmission capacity (ATC) must be approved by MISO before being implemented. MISO shall seek out opportunities to coordinate or consolidate, where possible, individually defined transmission projects into a more comprehensive cost-effective plan that will meet reliability needs, better integrate the grid, and support competition while giving consideration to the inputs from all stakeholders.

The proposed 115 kV Project is to serve local area loads and provide voltage support to these loads. Because it does not result in a significant increase in ATC, it does not require MISO approval. However, the Project plan has been forwarded to MISO. For this Project, MISO's role will be a facilitator, coordinator, and provider of support to move the Project forward.

6.4 MP and GRE's Independent Applications of Programs, Criteria and Modeling

6.4.1 Programs

Power System Simulator Rev 29 (PSS/E) computer software was used to simulate the response of the electric system under the various outage conditions. Equipment current carrying capability and system voltages were all analyzed in these simulations. The output from the computer programs was compared against the appropriate criteria (NERC, Mid-Continent Area Power Pool (MAPP), MP and GRE) to identify system inadequacies. Alternatives were developed that attempt to address the inadequacies identified. The alternatives were then placed into the models and the computer analysis rerun to determine the effectiveness of each of the alternatives. Review of these simulations and consideration of other factors (electric performance, cost, environmental impact, etc.) were used to identify the recommended transmission alternative.

In addition to the PSS/E software, PowerWorld Simulator software, an interactive power systems simulation package, was used. This software provides a means to explain power system basics to non-technical people. It was used at the various public meetings to illustrate the inadequacy of the electric system serving the Project area, the need to address this inadequacy, and how the Project provides a solution to the inadequacy.

6.4.2 Modeling

Currently, the primary responsibility for building and maintaining the models used to analyze the reliability of the electrical system in Minnesota and throughout the region falls with MRO's[4] Modeling Building Subcommittee (MBS). The MBS maintains what is essentially a power flow, base case transmission model library. The library includes a series of power system models that simulate the behavior of the bulk electric system. The models are designed to accurately represent all major generation, load, and transmission facilities in region. In general, these models include the 69 kV and higher voltage system.

MP and GRE used the 2004 Series Summer and Winter Peak Models to analyze the electric system serving the Long Lake-Badoura and Badoura-Pequot Lakes areas. Because loading of the existing 34.5 kV lines is a concern in summer and voltage support a concern in the winter, both seasons were studied. Winter typically has the higher peak, with summer loading being 94% of winter peak. Detailed modeling of the MP and GRE 34.5 systems were added to the model. This allowed simulation of the lower voltage electric system that supplies energy to the distribution substations located in the Project area. This was necessary because the inadequacy being addressed is low voltage and line capacity issues on the existing 34.5 kV loop that supplies the distribution substations serving the Project area's electric loads.

In the base model, the Project area loads were modeled using historic data from the MP EMS (Energy Management System) system and GRE metered delivery point data. The process used involved determination of the ten days where the coincident load served by the existing 34.5 kV lines in the Project area peaked for both the summer and winter seasons. The days and associated loads were derived from MP EMS data for January 2001 through May 2005. These peak loads were then averaged and the flows for the winter season and summer season historic hour that most closely matched the average were used in the base models that represented existing system winter 2005 and summer 2005 peak load conditions. These loads were then scaled by the growth rates supplied by the load forecast to determine the critical year, ability of the system to meet present demand, and to determine the increase in capacity of the Project and its alternatives.

6.4.3 Criteria

As noted above, MISO member transmission owners continue to have planning responsibilities for meeting their respective transmission needs in collaboration with MISO. As explained above, MISO does not need to approve the transmission additions described in the Project. However, MP and GRE have submitted the Project for MISO review and inclusion in the MISO Regional Expansion Plan.

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[4] Formation of the Midwest Reliability Organization (MRO) was approved by the Mid-Continent Area Power Pool (MAPP) Executive Committee in November 2002 and it became operational in 2005. The MRO took over many functions formally performed by the MAPP Regional Reliability Council including model building

MP and GRE's internal analysis of the existing system serving the Long Lake and Pequot Lakes areas and alternatives to eliminate the expected inadequacy was conducted using the Power Technology Inc. PSS/E load flow program, applying the standards of NERC, and MP and GRE criteria if more restrictive than NERC. The main issues identified were near term low voltage and longer term line overload concerns. The deficiencies identified, and when they would occur, are based on simulations with modeled load increased at forecast levels of growth. Alternative transmission and generation remedies were identified and their electric performance evaluated. Further review, including integrating MP and GRE system needs, cost, reliability, environmental and other issues, resulted in MP and GRE's conclusion that the proposed 115 kV line is the best solution to insure continued and long term reliable electric service to the Long Lake and Pequot Lakes areas.

The MP and GRE Transmission Planning Criteria used for the study of this area apply sound engineering judgment insuring that reliable electric service will be provided to the area in the future. The criteria, as shown below in Tables 6-1 to 6-3, include acceptable thermal loadings and voltage limits permitted. These planning criteria are consistent with NERC, MISO and MAPP and are approved by MAPP.

Table 6-1 Steady-State Loadings for Maximum Thermal Loading

Facility	< 100 kV	> 100 kV	
		System Intact	Single Contingency
Transmission Line	100%	100%	100% GRE, 110% MP
Transformer	100%	100%[5]	125%[6]

Table 6-2 Steady-State Load Serving Substation Voltage Limits

Criteria	Allowable Voltage Tolerance (% of nominal)	
	System Intact	Single Contingency
Maximum Voltage	105%	105%
Minimum Voltage	95%	92% GRE, 90% MP

[5] MP will load transformers based on IEEE C57 standard with thermal loading not to exceed 110 degrees Centigrade where appropriate

[6] MP will load transformers based on IEEE C57 standard allowing post contingency thermal loading up to 135 degrees Centigrade

Table 6-3 Maximum Voltage Change for Switched Capacitor Banks

Allowable Voltage Change for Switched Shunts (%)[7]	
System Intact	**Single Contingency**
3%	5%

6.5 Ability of Present Systems to Meet Demand

6.5.1 Park Rapids Area

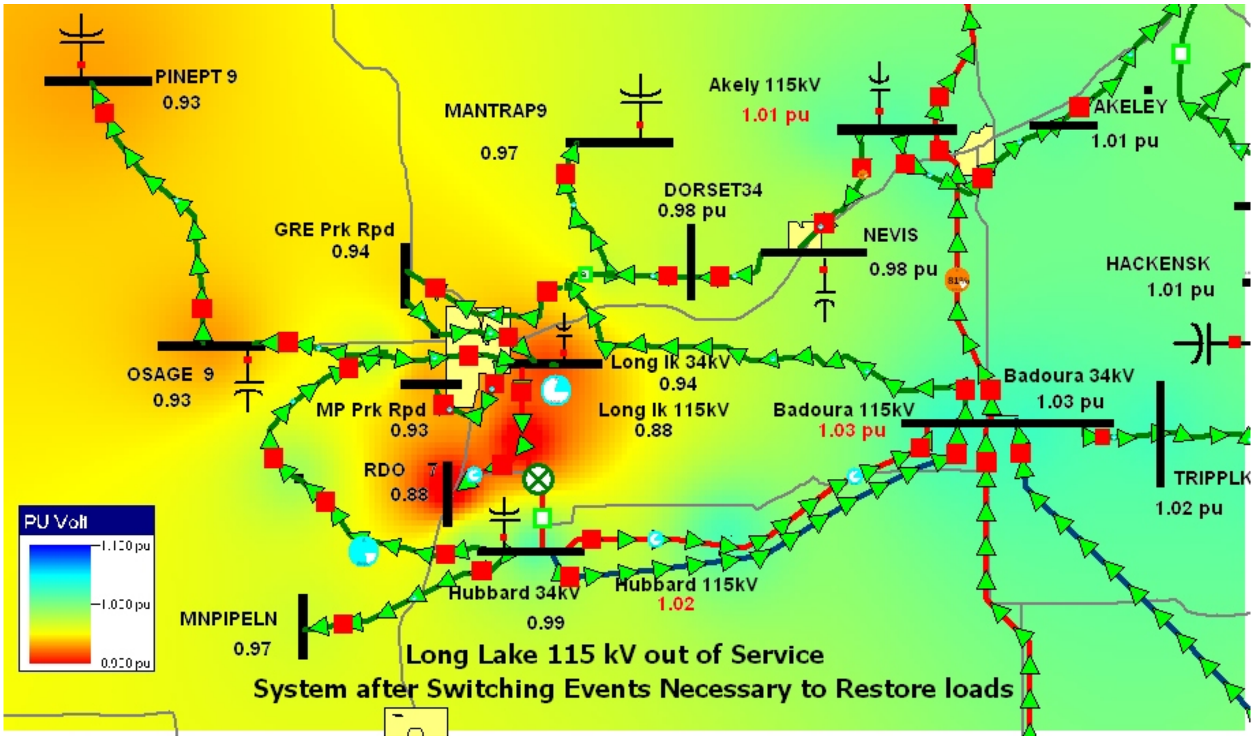
GRE recently constructed the Long Lake Substation near Park Rapids. It serves MP and Itasca-Mantrap loads in Park Rapids and the surrounding rural areas. The peak load served by the Long Lake Substation is approaching 40 MW.

The Long Lake Substation is supplied with electric energy by a single 115 kV line from the Hubbard Substation. When this line is out of service, the area is supplied by long 34.5 kV lines out of the Badoura, Akeley and Hubbard substations. The majority of the load has to be served from the Hubbard Substation because other sources are so distant that the voltage drop limits the amount of load that can be transferred. This requires multiple switching events to restore electric service to the customers fed out of the Long Lake Substation to maintain acceptable voltage and ensure no circuit is overloaded. As load continues to grow, it is expected that by 2009, some load would need to be shed during unplanned outages of the single 115 kV line supplying the Long Lake Substation at peak load periods to maintain voltage. The recently completed Long Lake Substation did not add extra firm transmission capacity into the Park Rapids area, it only replaced an existing line. However, it was the start of what eventually will be a reliable, 115 kV looped system to serve the Park Rapids area.

Figure 6-1 shows a voltage profile of the Park Rapids and surrounding electric system at its critical load during a simulated loss of the 115 kV supply to the Long Lake Substation after all switching events to restore electric service have been made. As shown, the voltage in the area around the RDO (industrial customer) load-serving substation and Long Lake Substation is less than the acceptable lower limit of 90% to 92%.

[7] MP will allow higher voltage change than shown in chart based on flicker charts if determined to be appropriate.

Figure 6-1 PowerWorld Simulation of Post Contingency Park Rapids Area Voltage Profile with Park Rapids Area Load at Critical Limit

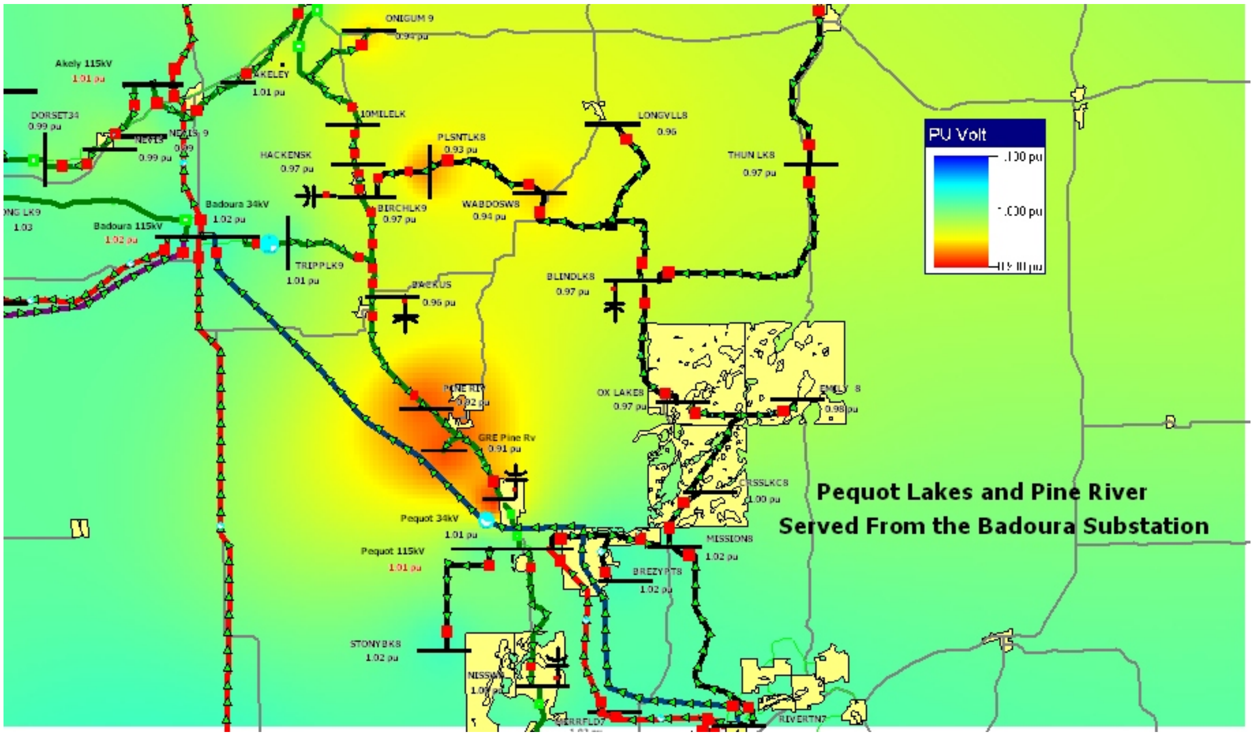


Historic MP EMS load data indicate that the Park Rapids area peak load is approaching the critical load level. Once the Park Rapids area peak load exceeds the critical level, the industrial load (RDO) will have to be shed during loss of the Hubbard 115 kV source supplying the Long Lake Substation. With continued growth on this system, more load shedding would need to occur that may impact residential services.

6.5.2 Pequot Lakes Area

Electrical energy for MP customers and GRE cooperative customers in Backus, Pequot Lakes, Pine River, and the surrounding rural areas is provided by a 34.5 kV line between MP's Pequot Lakes and Badoura substations. The Pine River and Pequot area loads are normally supplied from the Pequot Lakes Substation with the Badoura Substation serving as an alternate source. These loads have steadily increased and there is concern that voltage will fall below acceptable levels at peak load periods while being served from the Badoura Substation during planned or unplanned outage of the Pequot Lakes end of the line. The PowerWorld Voltage profile below (Figure 6-2) illustrates the voltage concern when the Pine River and Pequot Lakes area loads are served from Badoura. As can be seen, the voltage in the Pine River area is just above acceptable levels. Due to continued load growth, it will not be possible to maintain voltage during these conditions if a Project to address this inadequacy is not implemented by the 2008 - 2009 timeframe.

Figure 6-2 PowerWorld Simulation of Post Contingency Voltage Profile of Pequot Lakes-Pine River Area

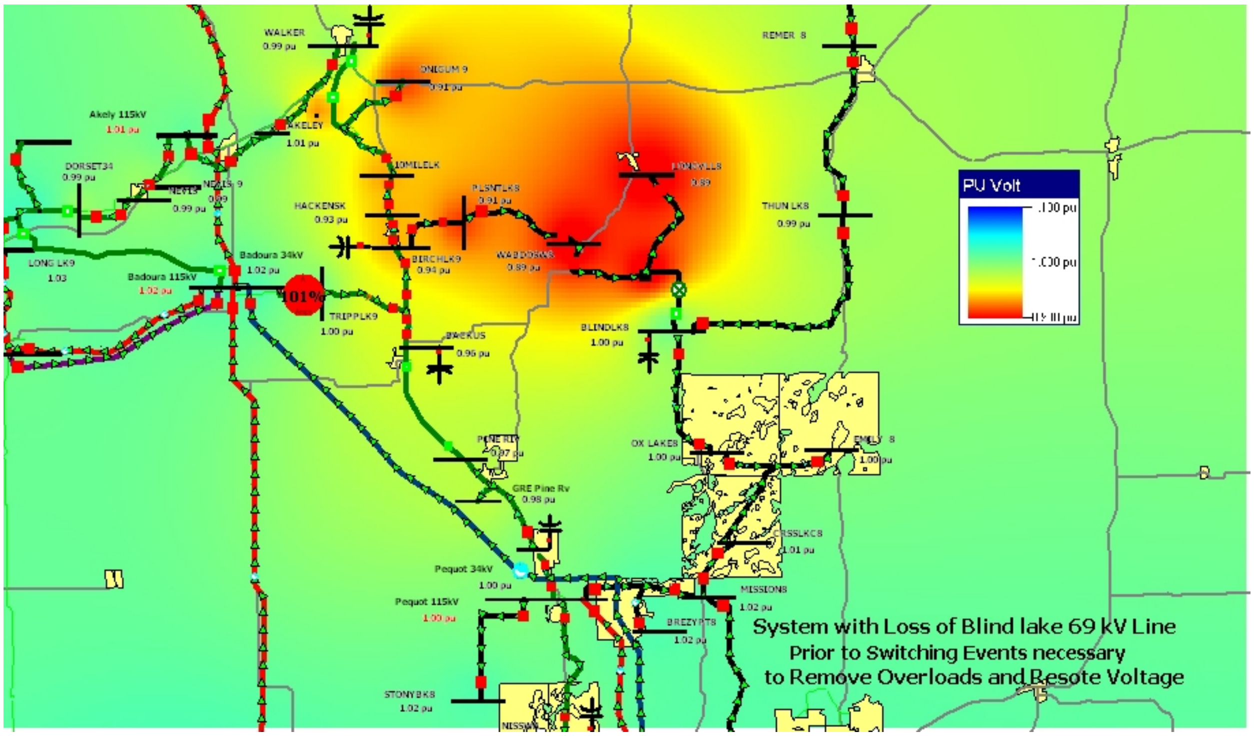


Historic MP EMS load data indicate that the Pequot Lakes area load has exceeded the critical load level of 13 MW at least once last winter (based on top of the hour readings). If the most limiting contingency were to occur when the Pequot Lakes area load is above the critical load level, load will need to be shed in order to maintain voltage within acceptable levels and prevent damage to sensitive equipment.

Lastly, the Pequot Lakes Substation is supplied by a single 115 kV line. Due to load growth, within a few years the lower voltage lines in the Pequot Lakes Substation will be unable to support voltage during planned or unplanned outage of the single 115 kV line that supplies the substation.

The existing Birch Lake 69/34.5 kV Substation normally serves MP and GRE loads in Hackensack, Ten Mile Lake, Pleasant Lake, Longville, Wabedo and surrounding rural areas. During planned or unplanned loss of either the 34.5 or 69 kV circuits in this area, the Badoura Substation and the new MP Akeley 115/34.5 kV Substation provide an alternate source of electric energy to these loads. Figure 6-3 illustrates the line overload and voltage concerns during area contingencies. In this example, the 69 kV line at Blind Lake is out of service. Prior to any switching events, all area load is supplied by the 34.5 kV line out of the Badoura Substation. As can be seen, this results in overload of this line and area voltage is at the lower end of acceptable levels.

Figure 6-3 PowerWorld Simulation of Post Contingency Voltage Profile of Birch Lake- Blind Lake Area



Presently, several switching events are required to restore voltage and remove line overloads when this area needs to be served by its alternate sources. Similarly, the outages on the eastern GRE 69 kV system require a strong 69 kV source in the Birch Lake area to maintain appropriate voltages. The Birch Lake Substation is presently rather weak in providing this needed voltage support. As load continues to grow, it will no longer be possible to maintain voltage at acceptable levels when these loads must be served from their alternate source during peak load periods.

6.6 Analysis of Relationship Between the Project and Overall State Energy Needs

The need for this Project was included in the *2003 Biennial Report* and was discussed in the 2003, 2004 and 2005 Northeast Zone State Transmission Planning Public Meetings (see Sections 2.2 and 2.3). In addition, the Applicants held voluntary public meetings in the Project area (see Section 5.1) and met with local officials to discuss the need for the Project, proposed plans and alternative solutions. This provided an opportunity for the public and local governments and state agencies to become involved in the transmission planning process consistent with the Minnesota Energy Security and Reliability Act.

The Project is a local, load-serving Project that will insure a secure and reliable electric energy supply to consumers in the Park Rapids and Pequot Lakes areas. This is consistent with the goals of the Minnesota Energy Security and Reliability Act that will address a wide range of energy issues, including building the infrastructure necessary to deliver electric energy in a timely, efficient, secure, and reliable manner while minimizing cost and impact on the environment.

If the Project or one of its alternatives is not constructed, studies indicate that as load continues to grow, the Project area's electric security will decrease and lead to reduced reliability. An insecure, unreliable electric supply is not in the best interest of the area's residents or the State's; therefore, doing nothing would not be consistent with the energy policies of the State.

6.7 System Capacity with the 115 kV Transmission Project

With the addition of the proposed 115 kV source, the region would greatly increase its capacity, as high voltage transmission sources to the Project areas would consist of two 115 kV sources instead of one. This would represent a minimum of doubling the existing firm transmission capacity, and would meet projected long-term capacity needs to approximately the 2020 timeframe for the 34.5 kV system (if the loads maintain present growth patterns). The GRE 69 kV system would also benefit in long-term service; however, with the rapid growth seen in this area, another 115 kV source may be needed sooner than 2020.

<u>PUBLIC DOCUMENT- TRADE SECRET DATA HAVE BEEN EXCISED</u>

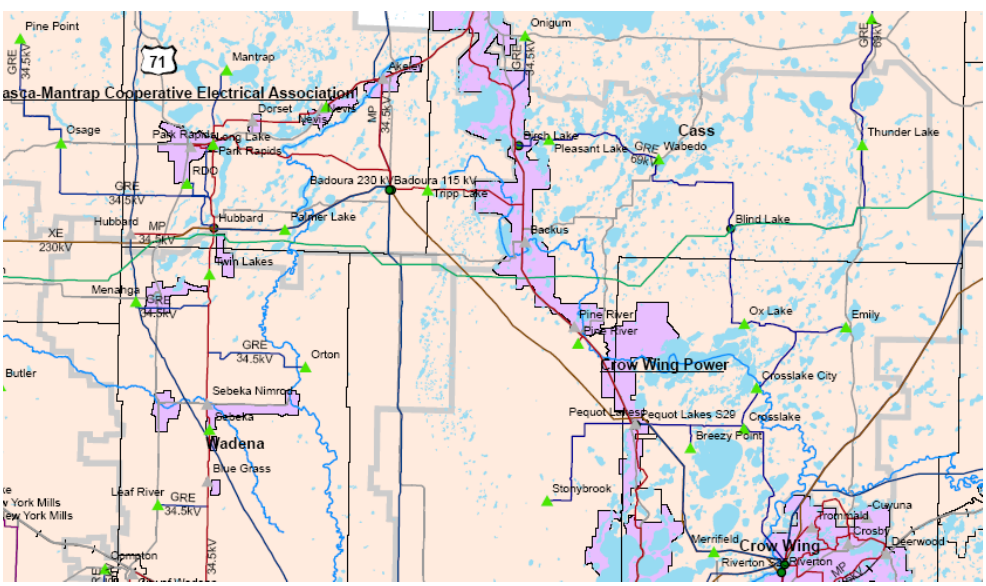
7.0 PEAK DEMAND/ANNUAL ENERGY CONSUMPTION FORECASTS

The load forecast for this joint filing is unique in that it requires a forecast for both MP and GRE service territories. Load growth within each of these two areas is driving the need for the project, and the Applicants were faced with the question as to how to create an usable and accurate area load forecast. MP and GRE discussed various approaches to create the load forecasts, and decided that each should create its own area load forecast.

There are unique factors driving load growth, and these are discussed in each load forecast. Coincident seasonal historic loads at each substation were used to develop the existing system model. Growth rates from the MP and GRE area forecasts were used to project the future loading at the substation level with consideration of higher growth substations within each area forecast.

The area load from MP and GRE's three cooperatives comprise the total load driving the need for the Project. The area including the MP and GRE area loads is shown in Figure 7-1. The lavender regions are served by MP, and the other areas are served by GRE distribution cooperatives.

Figure 7-1 Badoura Area Loads



7.1 Minnesota Power

7.1.1 Introduction

Load forecasting is a key factor in electric utility planning. Commitments to capacity and fuel resources are based on forecasts of customer counts, energy sales, and seasonal peak loads. Cost and revenue projections as well as forward looking plans and budgets also depend on load forecasts. Reliable forecasting and planning requires accurate data and proper model usage. MP has a history of accurate load forecasting, despite dealing with a primarily industrial sales market containing a high degree of future uncertainty and ongoing change volatility. This forecast accuracy stems from MP's detailed knowledge of its customers and their industries and the constant monitoring of the latest forecasting methods, data, and technique developments.

7.1.2 Forecast Methodology

MP's Badoura area basic load forecast methodology uses an econometric forecast modeling approach by customer class. This method begins with forecasts of customer count numbers by eleven major customer classes (residential, residential space heating, residential dual fuel, small commercial, large commercial, commercial and industrial dual fuel, industrial, street lighting, other public authorities, sales for resale, and Company use) and energy sales by the same eleven customer classes.

Historical economic and demographic data includes the incorporation of detailed NAICS (North American Industry Classification System) data from the Minnesota Department of Employment and Economic Development (DEED), the U.S. Department of Labor Bureau of Labor Statistics (BLS), National Planning Associates (NPA), Regional Economic Models, Inc. (REMI), and the IMPLAN Group (IMPLAN). NAICS employment data from Implan, REMI, and DEED were incorporated in the recent history and early forecast periods. MP continues to use the Large Power and other customer class knowledge internally as key inputs to the econometric forecast process. More accurate historical peak demand data and the exclusion of the DSM/CIP data adjustment of past load forecast versions was eliminated due to its contribution to forecast model instability, overstatement of MP growth rates, and heteroskedasticity statistical problems. MP assumes that the impact of conservation and DSM/CIP programs is incorporated into the price and income coefficients of the econometric model specifications more accurately than the previous arithmetic adjustment.

The Badoura project area comprised of Cass, Crow Wing, and Hubbard counties is growing rapidly and is forecast to continue to grow more rapidly than the overall MP system in the next few years. Badoura area economic and demographic growth rates slow in the further out years of the forecast and become much more similar to overall MP system growth after 2012. Historically, economic and demographic growth in the Project area has been very solid and rapid. Employment data shown in Table 7-1 and in Figures 7-2 and 7-3 demonstrate the increase and growth over the last six years and more.

Table 7-1 Employment Data, 2000-2005

MONTH YEAR	EMPLOYMENT LEVEL	JOB INCREASE/DECREASE	PERCENTAGE GROWTH
August 2005	58,293	+678	+1.2
August 2004	57,615	+1,612	+62
August 2003	56,003	-4	-0.007
August 2002	56,007	+2,891	+5.4
August 2001	53,116	+62	+0.1
August 2000	53,054		

Figure 7-2 Badoura Area Employment, 1990-2005

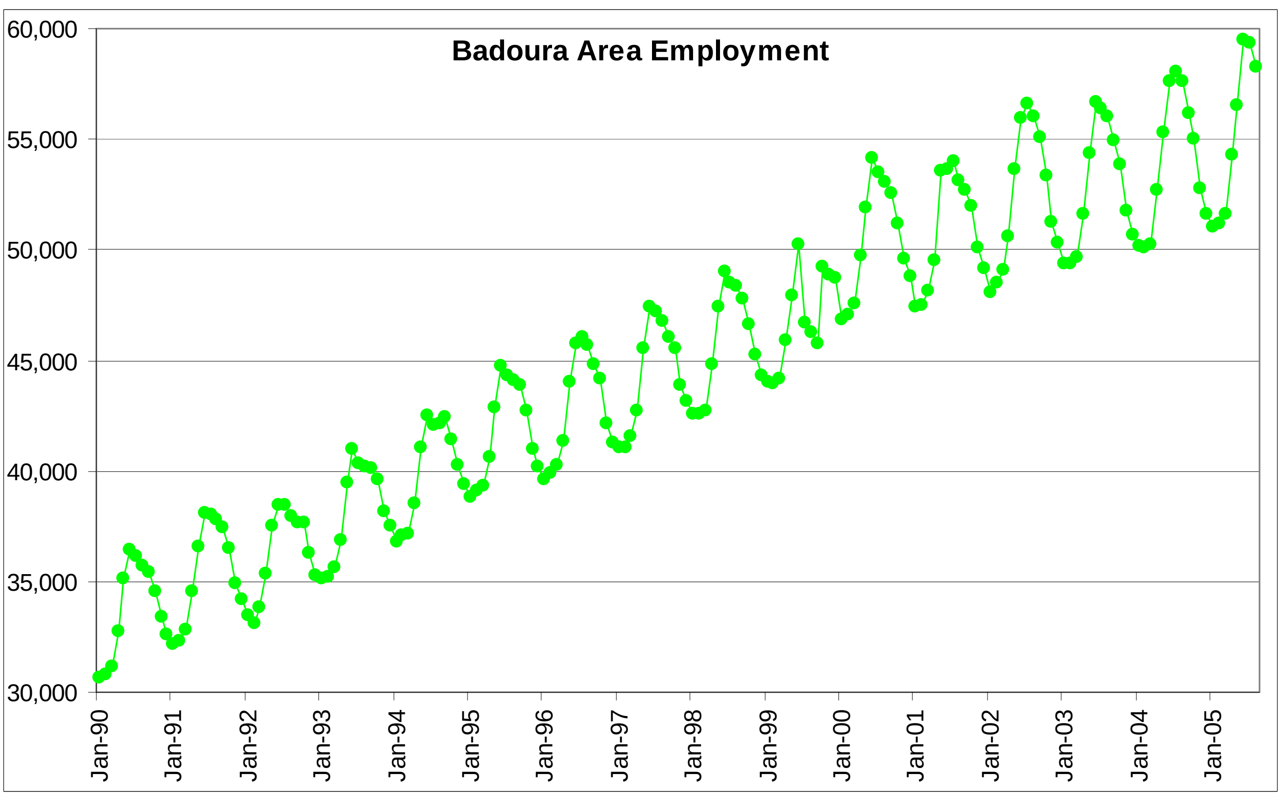
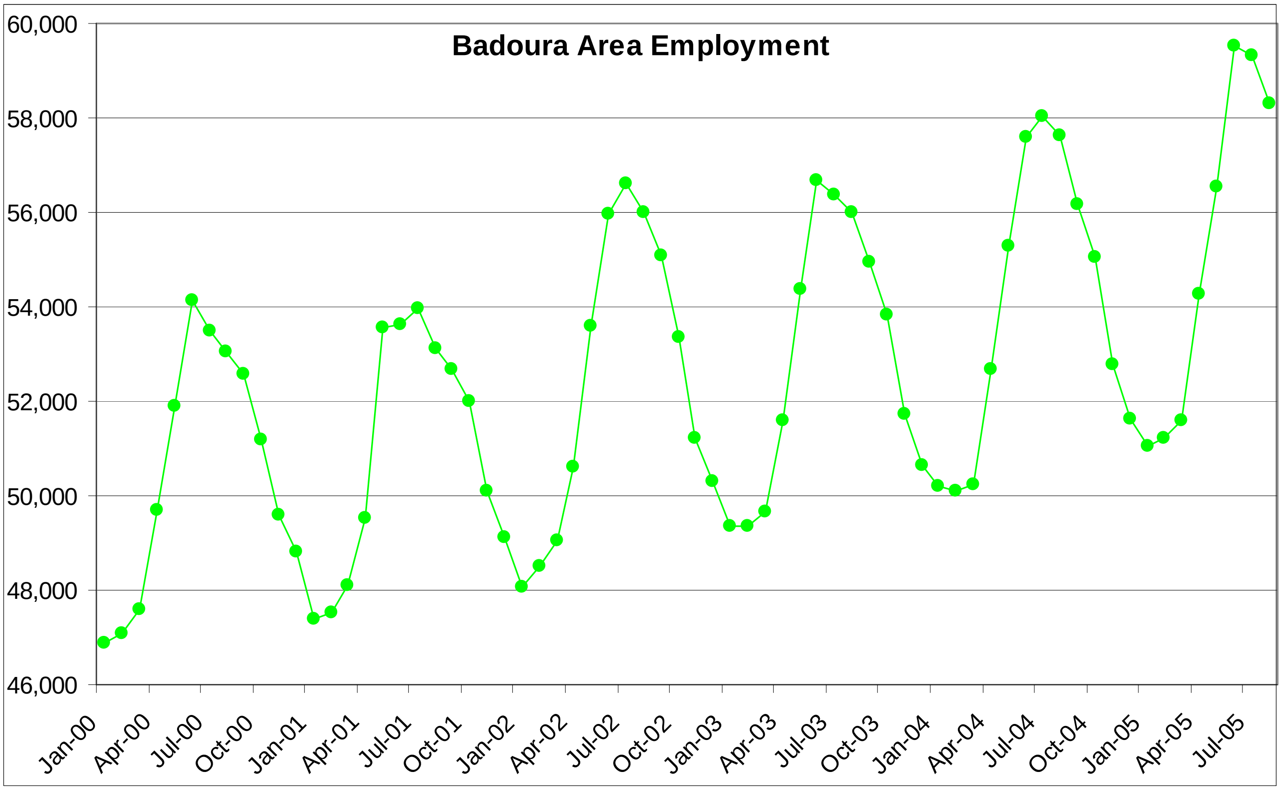


Figure 7-3 Badoura Area Employment, 2000-2005



Project area unemployment (Figures 7-4 and 7-5) appears to be easing from the most recent regional recession in 2003. The declining unemployment appears to be continuing with the January to August 2005 monthly data from MN DEED LAUS (Local Area Unemployment Statistics series).

Figure 7-4 Badoura Area Unemployment, 1990-2004

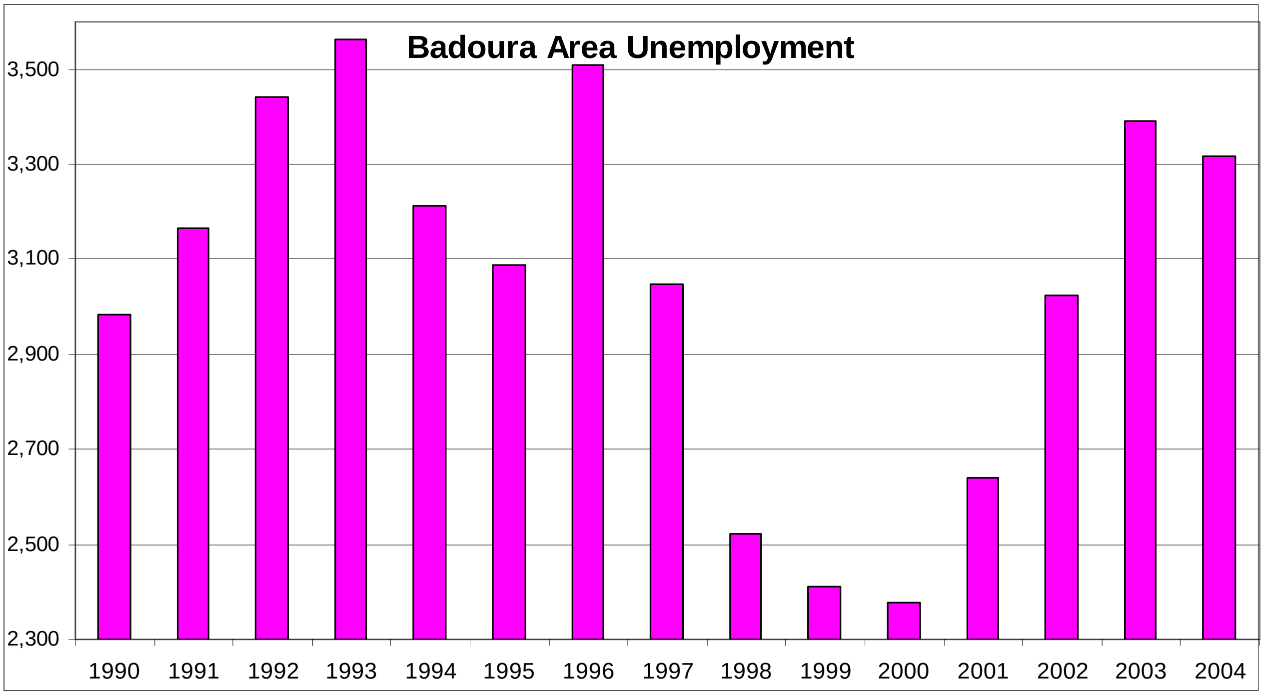
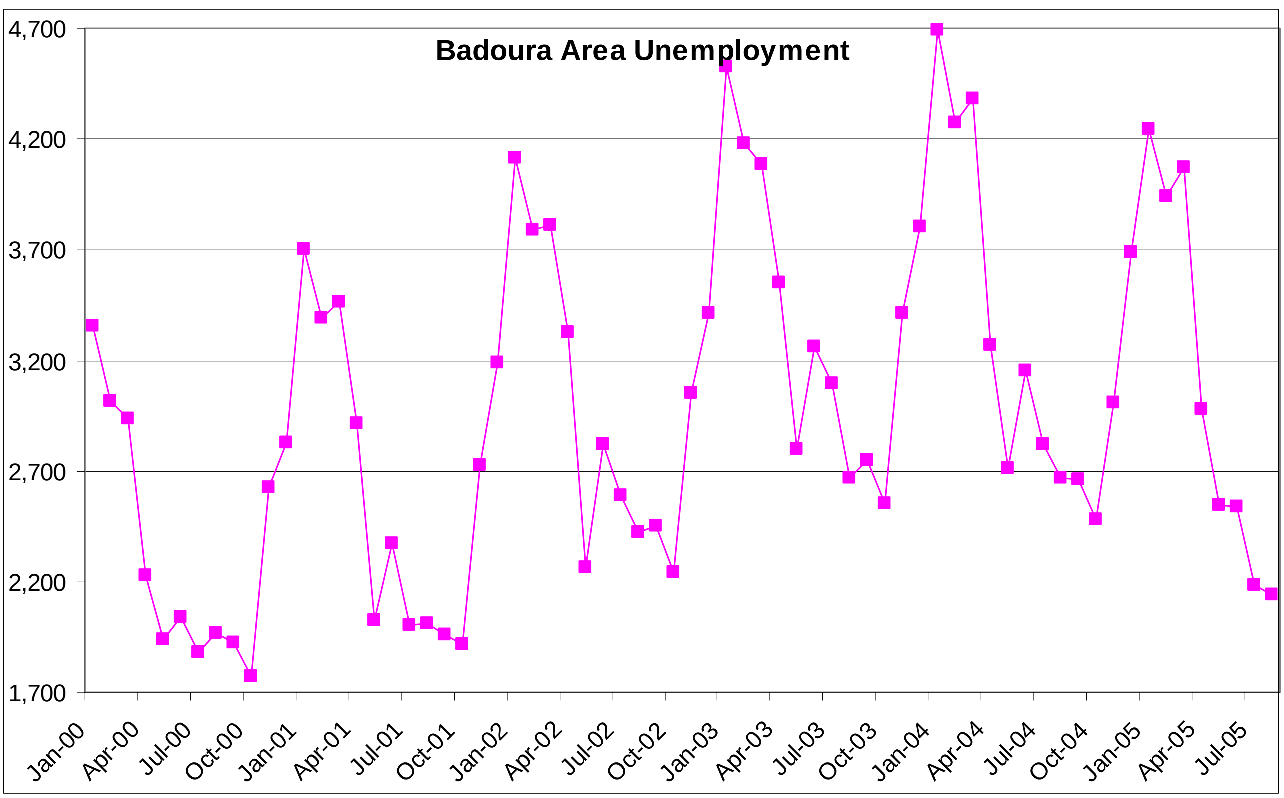


Figure 7-5 Badoura Area Unemployment, 2000-2005



The load forecast approach is much stronger on an economic theory basis, allowing the inclusion of important independent variables and an improvement of forecast model statistical quality measures. MP's chosen forecasting method is econometric. The MP econometric forecast method uses linear regression with ARMA (auto-regressive moving average) error correction terms. The MP Project area econometric models with cross-model linkages provide an excellent forecast output performance for the long-term. The number of econometric forecast models estimated are twenty-one models. The database allows customer count model specifications to utilize twelve observations (1994 to 2005) and the energy sales models by class are estimated from 1995 to 2004, or ten observations. The number of independent variables used in the Badoura area load forecast development are 162 terms.

In the Badoura area load forecast models, there are 62 direct variables and 100 indirect or contributory (calculating) variables in the models providing considerable economic, demographic, price, and weather information detail and forecast model specification alternatives. Economic and demographic forecast drivers were adjusted to reflect the best future estimate at this time. The forward economic and demographic view includes input from the Marketing and other MP groups, as well as external experts such as REMI, Blue Chip Economic Indicators, NPA, IMPLAN, DEED, and BLS. Energy price forecasts are used by class (residential, commercial, and industrial) and total by energy source from the Annual Energy Outlook (AEO) from the U.S. Department of Energy/Energy Information Administration (DOE/EIA) for Minnesota or the West North Central region.

Section 7.1.3 details the development of the customer count and energy sales by class models including which variables were tested and either accepted or rejected. The expected forecast scenario in Section 7.1.8 is the base or most likely forecast future. Low and high forecast scenarios have been developed to indicate a range of reasonable peak demand and energy requirement possibilities in Section 7.1.9 and 7.1.10.

Tools used in the forecast process (Section 7.1.5 Model Documentation) included re-estimation of the MP area REMI model version 6.0 to account for the most current employment data, recent business slowdowns, anticipated load impact in 2008 of a major industrial customer expansion, overall economic growth, and to adjust employment growth using NPA growth rates in the forecast time period. Statistical econometric forecast models are estimated using the Itron metrixND software platform. Forecasts are inherently based on assumptions and judgments grounded in external sources such as REMI, DOE/EIA, NPA, DEED, IMPLAN, Blue Chip Economic Indicators, large customer input, and the National Oceanic and Atmospheric Administration (NOAA) weather averages or normal.

Key modeling data sources include:

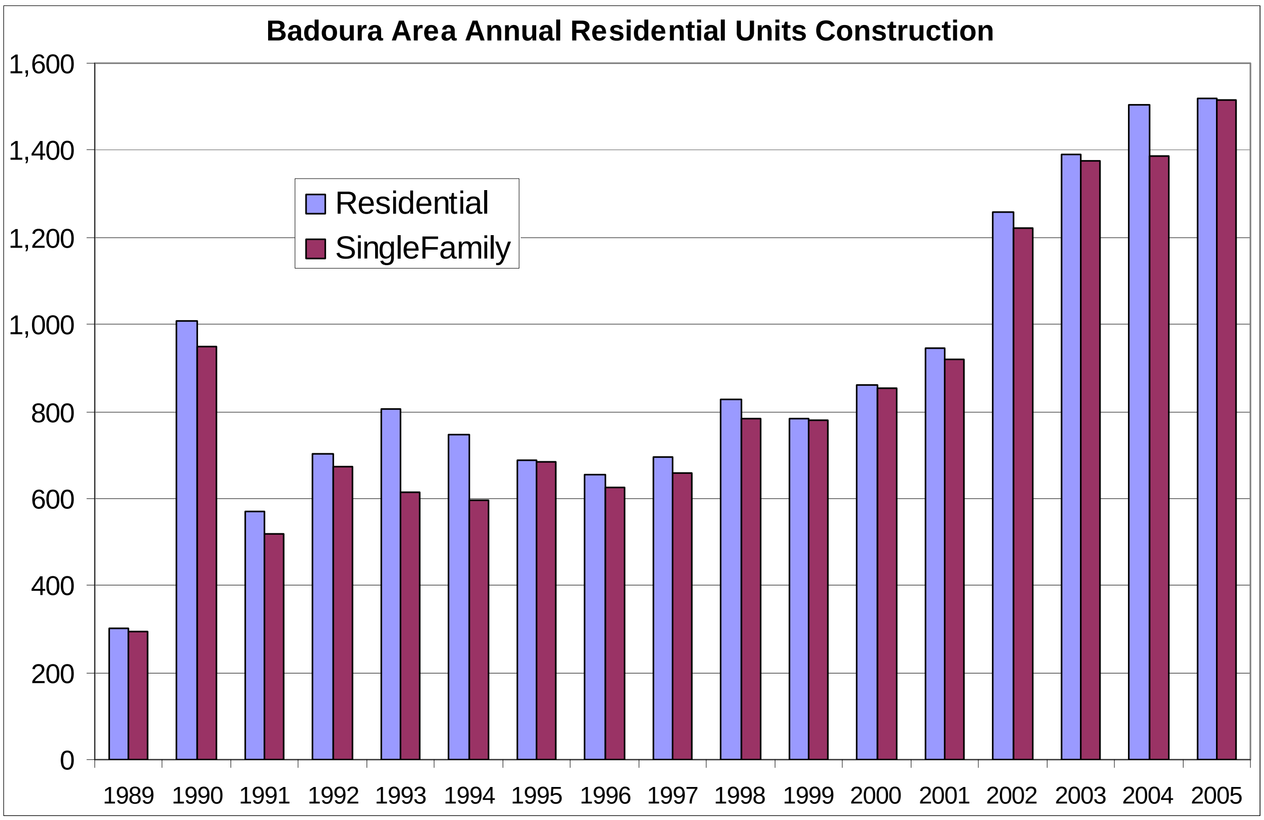
1. The REMI input/output simulation program is exceptionally well suited for identifying the direct, indirect, and induced impacts of recent economic events in the MP area and incorporating those impacts into the economic outlook for the area economy. REMI is especially adept at measuring the total economic impact of a major expansion project or loss situation.
2. NPA provides county-level economic and demographic history and forecasts for the Badoura area.
3. Blue Chip Economic Indicators are input into the REMI model and provide key national economic growth measurements for gross domestic product, inflation, and disposable personal income.
4. DOE/EIA AEO has regional and state level energy prices by class and fuel type for history and forecast periods.
5. NOAA Local Climatological Data (LCD) for Pine River, Minnesota (MN) weather data is a key modeling input for seasonal energy sales for residential, residential space heating, residential dual fuel, small commercial, large commercial, sales for resale, and company use.
6. National economic and demographic data is obtained from the U.S. Department of Commerce Bureau of Economic Analysis (BEA), BLS, and Bureau of the Census (Census).
7. Regional economic and demographic data is obtained from DEED, BLS, Census, BEA, MN State Demographer, and IMPLAN.

MP works closely with its Large Power customers to understand their plans and to better meet both the short- and long-term needs of those customers. The industrial class of the Badoura area includes some large customers who can have a significant impact on MP's demand and energy requirements in this area. And incorporating more of these real-world events by using more data and better quality data in a statistical modeling forecast framework provides a more accurate and reliable forecast product.

The MP forecast group seeks input from the Marketing, Customer Service, and Economic Development areas in developing a tracking list of businesses that have closed or reduced employees or economic output since January 2002 for use in this year's forecast process. Due to the economic influence of large industry leaders in the Badoura area, the local area economy exhibits a high degree of volatile business cycle characteristics. This cyclical volatility necessitates closely monitoring Badoura area economic conditions.

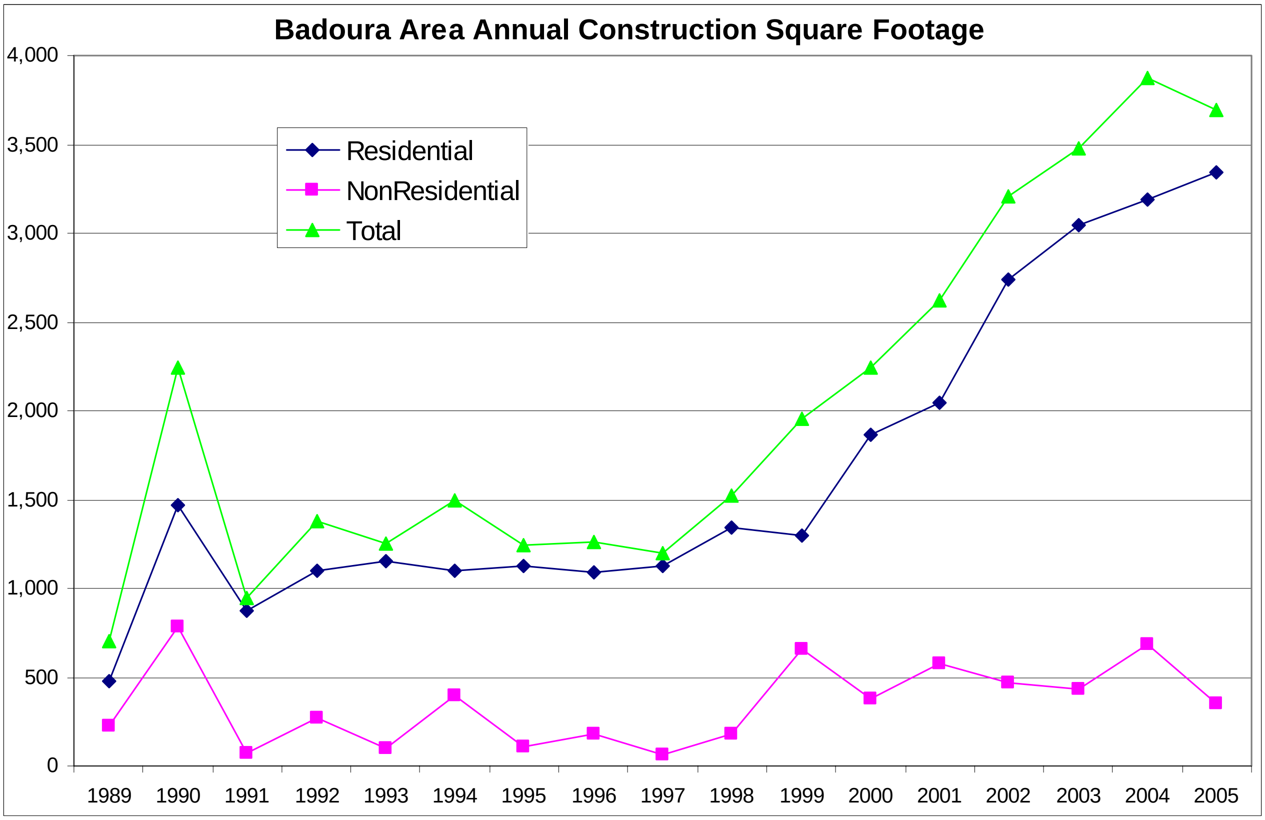
The Badoura area economic view shows a slowing and flattening of the area economy in 2003, with a return of economic growth and recovery beginning in late 2003 and strengthening in the 2004 experience and the first part of the 2005 employment level. McGraw-Hill Dodge Local Construction Bulletins also demonstrate the historical levels and types of growth activity in the Badoura area. Dodge construction data is new activity for each year or annually. Adding the new construction to a base housing or business building stock would demonstrate the continuing nature of this area's strong growth. Residential units constructed have increased in recent years and that most of the new residential construction is for single-family housing units. The Badoura area averaged an annual addition of 686 residential units from 1989 to 1997 (Figure 7-6). The residential additions have more than doubled to 1,418 residential units from 2002 to 2005 and 2005 data is only a part year from January to August of 2005.

Figure 7-6 Badoura Area Annual Residential Units Construction



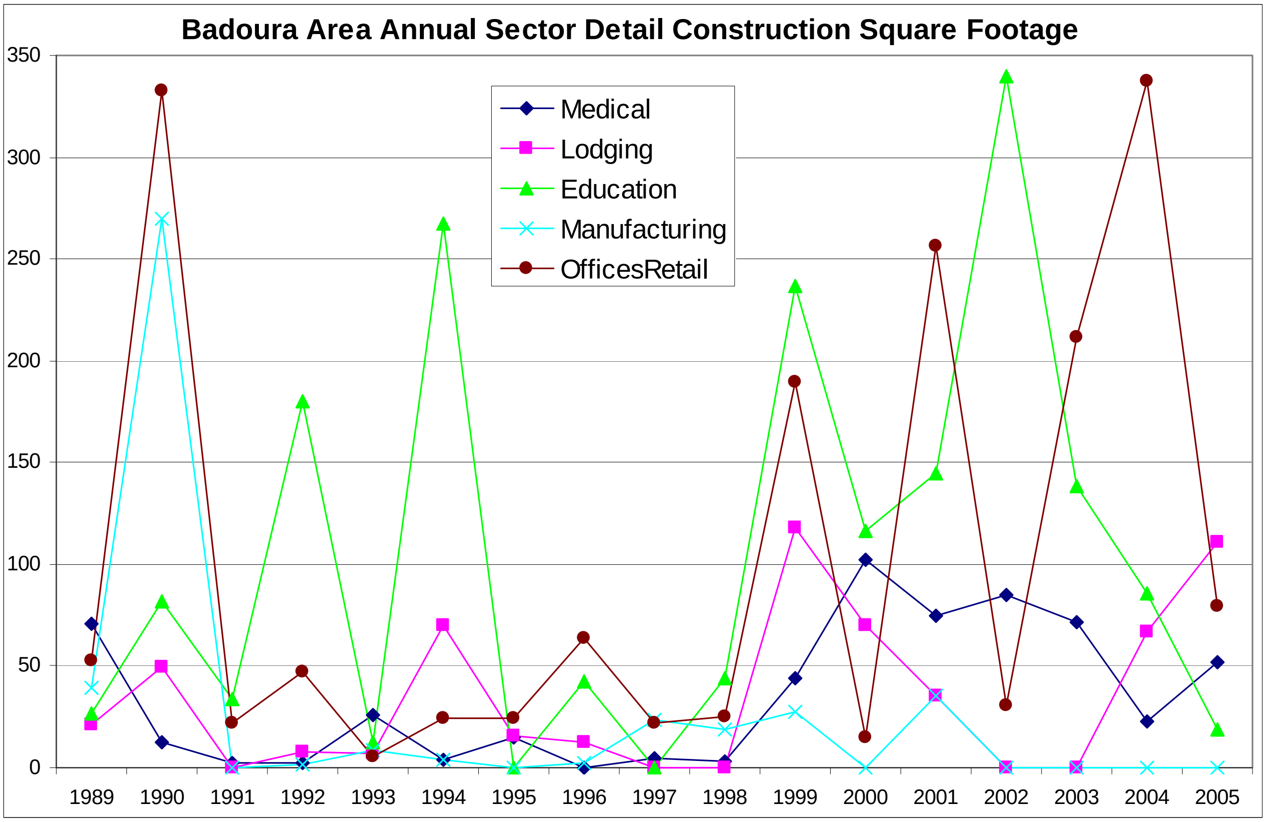
The addition of square footage (Figure 7-7) shows the rapid increase in new construction housing size as the driver of most of the square footage growth since 1998. The non-residential square footage also appears to have increased significantly from 1999 to 2005 in comparison to 1991 to 1998, but the graph scale is heavily influenced by the larger residential sector.

Figure 7-7 Badoura Area Annual Construction Square Footage



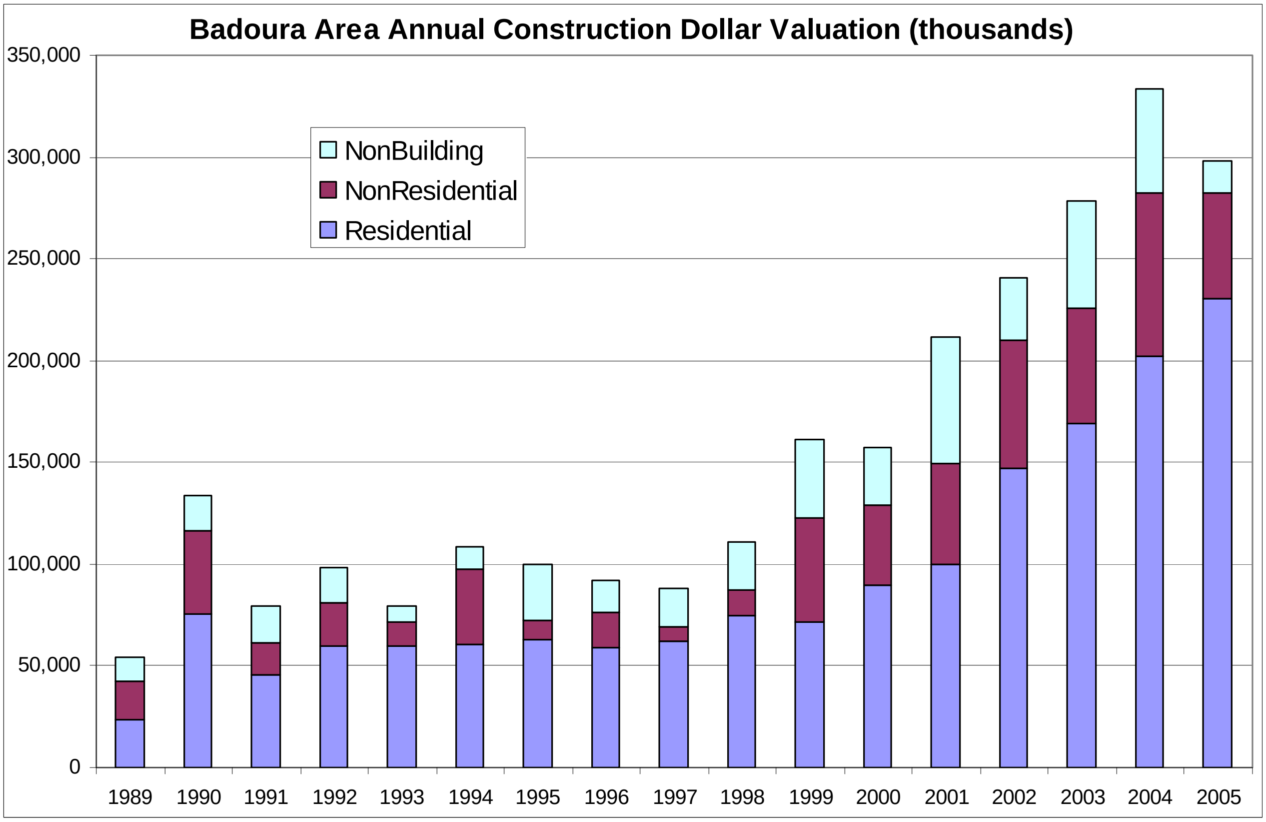
Badoura area square footage (in thousands square feet) by major construction sectors (Figure 7-8) indicates that the growth has been broad based across the area economy. For various years, most of the sectors have seen construction increases in the hundreds of thousands square footage increase. Offices and retail building has been very strong in 1999, 2001, and 2004. Education building was high in 1994, 1999, and 2002. Medical construction grew rapidly from 2000 to 2003 inclusive.

Figure 7-8 Badoura Area Annual Sector Detail Construction Square Footage



The Badoura area has changed from a slightly below 100 million dollars valuation construction growth area prior to 1998 to almost 325 million in 2004 (Figure 7-9).

Figure 7-9 Badoura Area Annual Construction Dollar Valuation



7.1.3 Model Development

MetrixND, an advanced statistics program for analysis and forecasting of time series data that is stored in Microsoft Excel or Microsoft Access databases, was used to develop MP's load forecasting models for the Badoura area. This software, developed by Itron (formerly Regional Economic Research, Inc. or RER) has estimation algorithms for:

- Exponential smoothing
- Linear regression models
- Artificial neural networks (ANNs)
- ARIMA and seasonal ARIMA models
- Linear regression with ARMA and seasonal ARMA errors
- ANNs with seasonal ARMA errors (ANNARMA)

Key statistical measures examined and used in the determination of the best forecast model design included the theoretical correct sign of the variables, statistical significance of the variable measured by the t statistic, Durbin-Watson test, adjusted R-squared, MAPE (mean absolute percentage error), residual error plot, independent variable elasticity values, F statistic, and other common statistical measures.

Customer class forecasting models, as summarized below, were developed using linear regression estimation with appropriate ARMA error algorithms.

[TRADE SECRET DATA EXCISED]

Theoretically, the forecast models should be structurally similar to the MP system models, and generally, such was the case here. The forecast models include a price of electricity variable, the ratio of the electric and natural gas price variable by customer class, or the customer class price of electricity and customer class price of natural gas, a demographic variable like area population, households, or aggregate or sector employment, an economic variable such as gross regional product, sector earnings, per capita income, or total economic output as forecast by NPA or REMI. Also, the energy sales forecast models include a weather affected variable of cumulative heating degree days and cumulative cooling degree days for the Pine River Dam weather station.

7.1.4 Database Listing

The following variables are included in the load forecast database (mnemonic, descriptor, sources):

- SUMMWPK - Minnesota Power (MP) Summer Peak Demand
- WINMWPK - MP Winter Peak Demand
- RESCUST - Badoura Area Residential Customer Count
- RESSHCUS - Badoura Area Residential Space Heating Customer Count
- RESDFCUS - Badoura Area Residential Dual Fuel Customer Count
- SCOMCUST - Badoura Area Small Commercial Customer Count
- LCOMCUST - Badoura Area Large Commercial Customer Count
- CIDFCUST - Badoura Area Commercial and Industrial Dual Fuel Customer Count
- INDCUST - Badoura Area Industrial Customer Count
- SLCUST - Badoura Area Street Lighting Customer Count
- PUBLCUST - Badoura Area Other Public Authorities Customer Count
- RSALCUST - Badoura Area Sales for Resale Customer Count
- COMPCUST - Badoura Area Company Use Customer Count
- RESENER - Badoura Area Residential Energy Sales
- RESSHEN - Badoura Area Residential Space Heating Energy Sales
- RESDFEN - Badoura Area Residential Dual Fuel Energy Sales
- SCOMEN - Badoura Area Small Commercial Energy Sales
- LCOMEN - Badoura Area Large Commercial Energy Sales
- CIDFENER - Badoura Area Commercial and Industrial Dual Fuel Energy Sales
- INDENER - Badoura Area Industrial Energy Sales

- SLENER - Badoura Area Street Lighting Energy Sales
- PUBLENER - Badoura Area Other Public Authorities Energy Sales
- RSALENER - Badoura Area Sales for Resale Energy Sales
- COMPENER - Badoura Area Company Use Energy Sales
- BASESUM - MP Summer Peak Demand Base
- BASEWIN - MP Winter Peak Demand Base
- UNADJSUM - MP Summer Peak Demand Unadjusted for DSM/CIP
- UNADJWIN - MP Winter Peak Demand Unadjusted for DSM/CIP
- GDP - U.S. Gross Domestic Product in Chained 2000 Dollars - Bureau of Economic Analysis (BEA) / Blue Chip Economic Indicators
- GRP - MP Area Gross Regional Product in Chained 1996 Dollars - REMI
- OUTPUT - MP Area Total Industry 1996 Dollars Economic Output - REMI
- TAC - MP Area Taconite Industry 1996 Dollars Economic Output - REMI
- PAPERWOOD - MP Area Paper and Wood Industry 1996 Dollars Economic Output - REMI
- CONSTR - MP Area Construction Industry 1996 Dollars Economic Output - REMI
- TWIU - MP Area Transportation, Warehousing, Communication, Information, and Utilities Industries 1996 Dollars Economic Output - REMI
- TRADW - MP Area Wholesale Trade Industry 1996 Dollars Economic Output – REMI
- TRADR - MP Area Retail Trade Industry 1996 Dollars Economic Output - REMI
- FIRE - MP Area Finance, Insurance, and Real Estate Industries 1996 Dollars Economic Output - REMI
- SERV - MP Area Services Industry 1996 Dollars Economic Output - REMI
- OTHMFG - MP Area Other Manufacturing Industries 1996 Dollars Economic Output - REMI
- RDI - U.S. Disposable Personal Income in Chained 2000 Dollars - BEA / Blue Chip Economic Indicators
- DSM - Demand Side Management Coincident to MP Peak Demand Date and Time
- DSMRES - MP Residential Sector Demand Side Management
- DSMCOM - MP Commercial Sector Demand Side Management
- DSMIND - MP Industrial Sector Demand Side Management
- ACSAT - MP Area Air Conditioning Saturation Level - Bureau of Census (BC) / surveys / model
- EHSAT - MP Area Electric Heating Saturation Level - BC / surveys / model
- SDDI - Summer Peak Degree Day Index (Duluth) - National Oceanic and Atmospheric Administration (NOAA) / average normal
- WDDI - Winter Peak Degree Day Index (Duluth) - NOAA / average normal
- SPD - Summer Peak Degree Day Term (Duluth) - NOAA / average normal
- SDDepart - Summer Peak Degree Day Index Departure (Duluth) from NOAA normal
- WPD - Winter Peak Degree Day Term (Duluth) - NOAA / average normal
- HDD - Heating Degree Days Index (Pine River) - NOAA / average normal

- CDD - Cooling Degree Days Index (Pine River) - NOAA / average normal
- HH - Badoura Area Households - National Planning Associates (NPA)
- POP - Badoura Area Population - NPA
- EMPL - Badoura Area Total Employment - NPA
- FARMEM - Badoura Area Farm Sector Employment - NPA
- PNFEM - Badoura Area Nonfarm Private Employment - NPA
- MINEM - Badoura Area Mining Sector Employment - NPA
- CONEM - Badoura Area Construction Sector Employment - NPA
- MFGEM - Badoura Area Manufacturing Sector Employment - NPA
- TWIUEM - Badoura Area Transportation, Warehousing, Communication, InformationTIUERNG - Badoura Area Transportation, Warehousing, Communication, Information, and Utilities Sectors 2000 Dollars Earnings – NPA
- WTRDERNG - Badoura Area Wholesale Trade Sector 2000 Dollars Earnings - NPA
- RTRDERNG - Badoura Area Retail Trade Sector 2000 Dollars Earnings - NPA
- FIREERNG - Badoura Area Finance, Insurance, and Real Estate Sectors 2000 Dollars Earnings - NPA
- SRVERNG - Badoura Area Services Sector 2000 Dollars Earnings - NPA
- GOVTERNG - Badoura Area Government Sector 2000 Dollars Earnings - NPA
- TPINC - Badoura Area 2000 Dollars Total Personal Income - NPA
- RPGAS - Average Price per million Btu of Natural Gas in Chained 2000 Dollars - Department of Energy (DOE)
- RPOIL - Average Price per million Btu of Distillate Oil #2 in Chained 2000 Dollars - DOE
- RPELEC - Badoura Area Average Price per KWh of Electricity in Chained 2000 Dollars - DOE
- RRESPGAS - Residential Sector Average Price per million Btu of Natural Gas in Chained 2000 Dollars - DOE
- RCOMPGAS - Commercial Sector Average Price per million Btu of Natural Gas in Chained 2000 Dollars - DOE
- RINDPGAS - Industrial Sector Average Price per million Btu of Natural Gas in Chained 2000 Dollars - DOE
- RRESPOIL - Residential Sector Average Price per million Btu of Distillate Oil #2 in Chained 2000 Dollars - DOE
- RCOMPOIL - Commercial Sector Average Price per million Btu of Distillate Oil #2 in Chained 2000 Dollars - DOE
- RINDPOIL - Industrial Sector Average Price per million Btu of Distillate Oil #2 in Chained 2000 Dollars - DOE
- RRESPELEC - Badoura Area Residential Sector Average Price per kWh of Electricity in Chained 2000 Dollars - DOE
- RRESSHPEL - Badoura Area Residential Space Heating Sector Average Price per kWh of Electricity in Chained 2000 Dollars - DOE
- RRESDFPEL - Badoura Area Residential Dual Fuel Sector Average Price per kWh of Electricity in Chained 2000 Dollars - DOE

- RSMCOMPEL - Badoura Area Small Commercial Sector Average Price per kWh of Electricity in Chained 2000 Dollars - DOE
- RLGCOMPEL - Badoura Area Large Commercial Sector Average Price per kWh of Electricity in Chained 2000 Dollars - DOE
- RCIDFPELEL - Badoura Area Commercial and Industrial Dual Fuel Sector Average Price per kWh of Electricity in Chained 2000 Dollars - DOE
- RINDPELEC - Badoura Area Industrial Sector Average Price per kWh of Electricity in Chained 2000 Dollars - DOE
- RSLPELEC - Badoura Area Street Lighting Sector Average Price per kWh of Electricity in Chained 2000 Dollars - DOE
- RPAPELEC - Badoura Area Other Public Authorities Sector Average Price per kWh of Electricity in Chained 2000 Dollars - DOE
- RMUNPELEC - Badoura Area Sales for Resale Sector Average Price per kWh of Electricity in Chained 2000 Dollars – DOE
- RESPRRATIO - RRESPELEC / RRESPGAS
- RESSHPRRATIO - RRESSHPEL / RRESPGAS
- RESDFPRRATIO - RRESDFPEL / RRESPGAS
- COMEMPL - TRADWEM + TRADREM + FIREEM + SERVEM
- COMOUT - TRADW + TRADR + FIRE + SERV
- SMCOMPRRATIO - RSMCOMPEL / RCOMPGAS
- LGCOMPRRATIO - RLGCOMPEL / RCOMPGAS
- CIDFPRRATIO - RCIDFPELEL / RCOMPGAS
- INDEMPL - MINEM + MFGEM
- INDOUT - TAC + OTHMFG + PAPERWOOD
- INDPRRATIO - RINDPELEC / RINDPGAS
- ADD - CDD + HDD
- PAUEM - TWIUEM + GOVEM
- PAUPRRATIO - RPAPELEC / RCOMPGAS
- RSALPRRATIO - RMUNPELEC / RPGAS
- DEMPRATIO - RPELEC / RPGAS
- TLCUST - RESCUST+COMCUST+INDCUST+SLCUST+PUBLCUST+RSALCUST
- PCI - TPINC / POP

7.1.5 Model Documentation

Data were collected from a wide variety of sources in different delivery formats. The load forecast databases aggregate these data into an informational framework that is suitable for the development of an econometric forecast and analysis models for planning use within MP for the Badoura area.

Weather data for Pine River, Minnesota was updated and collected for earlier historical periods from the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC). The historical average (1965-2005) is assumed as the weather normal for the forecast period within the modeling process. Energy models by class incorporate cooling and heating degree days on a 65 degree base difference for mean daily temperature aggregated for each month and utilized when statistically acceptable.

National, Minnesota, and county-level area economic and demographic data was downloaded from the internet from the Department of Commerce Bureau of Economic Analysis (BEA), Bureau of the Census, Minnesota Department of Employment and Economic Development (DEED), and Department of Labor Bureau of Labor Statistics (BLS). National Planning Associates (NPA) provide a disk with history and forecast data series at the county level for employment and earnings by sector, population by age cohorts, households, and detailed components of personal income. IMPLAN Group supplied estimates of employment for NAICS level detail for 2001, 2002, and 2003. The Badoura area is additively defined as 3 counties in Minnesota (Cass, Crow Wing, and Hubbard). NPA's forecasts are econometrically derived and consistent with national growth levels disaggregated to the regional, state, MSA, and county level. NPA's sector employment and sector earnings growth rates are used for the forecast of the specific economic sectors. Blue Chip Economic Indicators issues a long-term national economic forecast twice per year. MP uses the March 10th issue (long-term) for the forecasts of inflation (Gross Domestic Product (GDP) chain type price deflator index in 2000 dollars), economic growth (real GDP), and real disposable personal income. Blue Chip Economic Indicators also provide sensitivity high and low cases represented by the top 10 and the bottom 10 survey respondents which are used as primary sensitivity scenario drivers.

Badoura area towns, cities, and villages and their zip codes are as follows: Backus 56435, Pine River 56474, Nevis 56467, Hackensack 56452, Walker 56484, Akeley 56433, Park Rapids 56470, Jenkins 56456, Pequot Lakes 56472, Pillager 56473, Nisswa 56468, Brainerd 56401, Menahga 56464, Sebeka 56477, Ah Gwah Ching 56430, Baxter 56425, Lake Hubert 56459, Merrifield 56465, Crosslake 56442, Emily 56447, Fifty Lakes 56448, Longville 56655, Nimrod 56478, Osage 56570, and Outing 56662.

Energy prices, history and forecast, are from the Department of Energy (DOE) and Energy Information Agency (EIA). The four main fuel types are electricity, natural gas, oil, and propane. End-use class energy price data is categorized by DOE/EIA into residential, commercial, and industrial. DOE's Annual Energy Outlook (AEO) is used for the forecast period. DOE provides historical energy price data for Minnesota, forecast energy price data for the West North Central (WNC) region, and the national total. The Badoura area historical average electric price data is from the Company's CIS information and FERC Form 1, and represents annual class revenue divided by annual class energy. Badoura area classes available as reported are residential, residential space heating, residential dual fuel, small commercial, large commercial, commercial and industrial dual fuel, industrial, street lighting, other public authorities, sales for resale, and Company use. All energy prices are deflated by the 2000 base GDP implicit price deflator (IPD).

The REMI model is particularly well-suited for modeling the economic impact of these types of regional occurrences. The MP area has been severely impacted by the recent national economic recession and slowdown of overall economic growth. This year and last year, there was considerably more positive economic growth news for the next few years. There is evidence of an economic growth turnaround or expansion for the MP area in recent months. And the level of growth in the MP area appears consistent with long-run historical growth levels. The REMI model, as an input-output regional economic forecast model, works especially well in capturing the indirect economic positive and negative effects from expansions, layoffs, and closures. Flexibility of use allowed the forecast staff to test alternative modeling approaches within REMI. REMI model history and forecast results are used for employment by sector, demographics, economic output by sector, and gross regional product. Adjustments to REMI were accomplished through the Employment Update feature and the Firm Sales Policy Update feature. Simulation scenarios were also examined within REMI. Post-2013 employment growth rates within some manufacturing sectors were adjusted to better reflect consistency with historical and early forecast MP area experience within REMI. Demographic forecasts were consistent with the employment outlook. The REMI economic and demographic forecast variables reflected the time-delay from the initial shock event to the measurable action of economic growth, migration, and economic response.

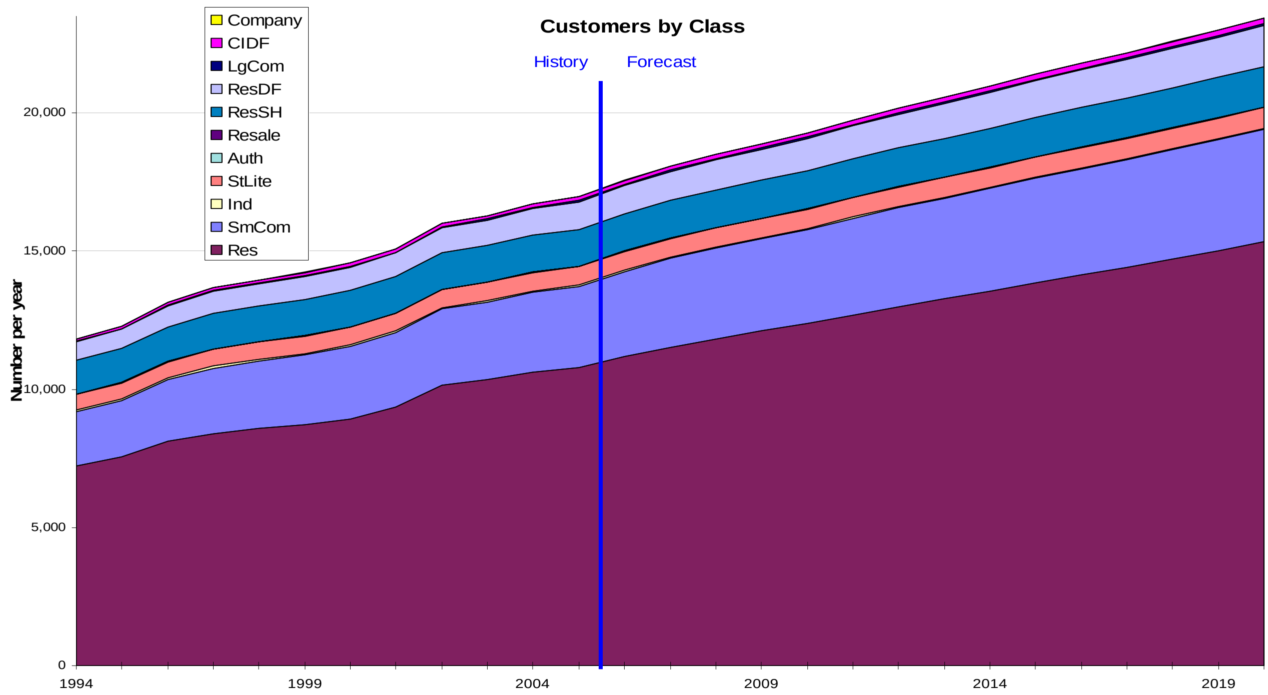
MP load research analysis data was used in this forecast. Load research statistical samples collect hourly profile data for general residential by geographic areas, residential space heating, residential farm, commercial and industrial non-demand, and commercial and industrial demand categories.

Economic growth and recovery begins by late 2003, 2004, and early 2005. Area economic growth is expected to follow long-run historical rates for many years into the future. In the later forecast years, economic growth accelerates to rates at the high end of historical experience reflecting large gains in labor and capital productivity and benefits of technology penetration. With the shift of the Baby Boom demographic into retirement and a decline in the average workforce age, productivity change is the most likely medium for preserving and growing the economic quality of life.

The following model summary and graphs (Figures 7-10 to 7-37) are an overview of the Badoura area forecast framework.

Customer Models

Figure 7-10 Customers by Class



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Energy Models

Figure 7-22 Energy by Class

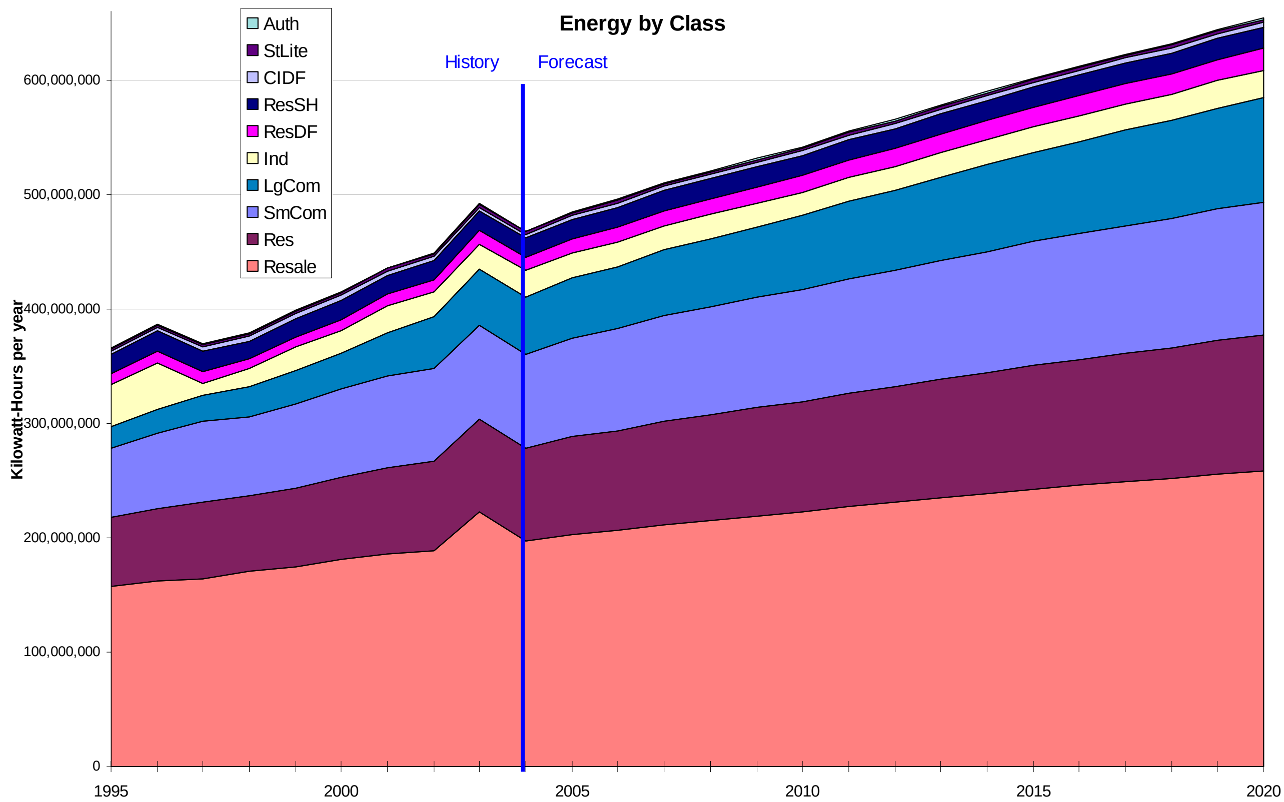

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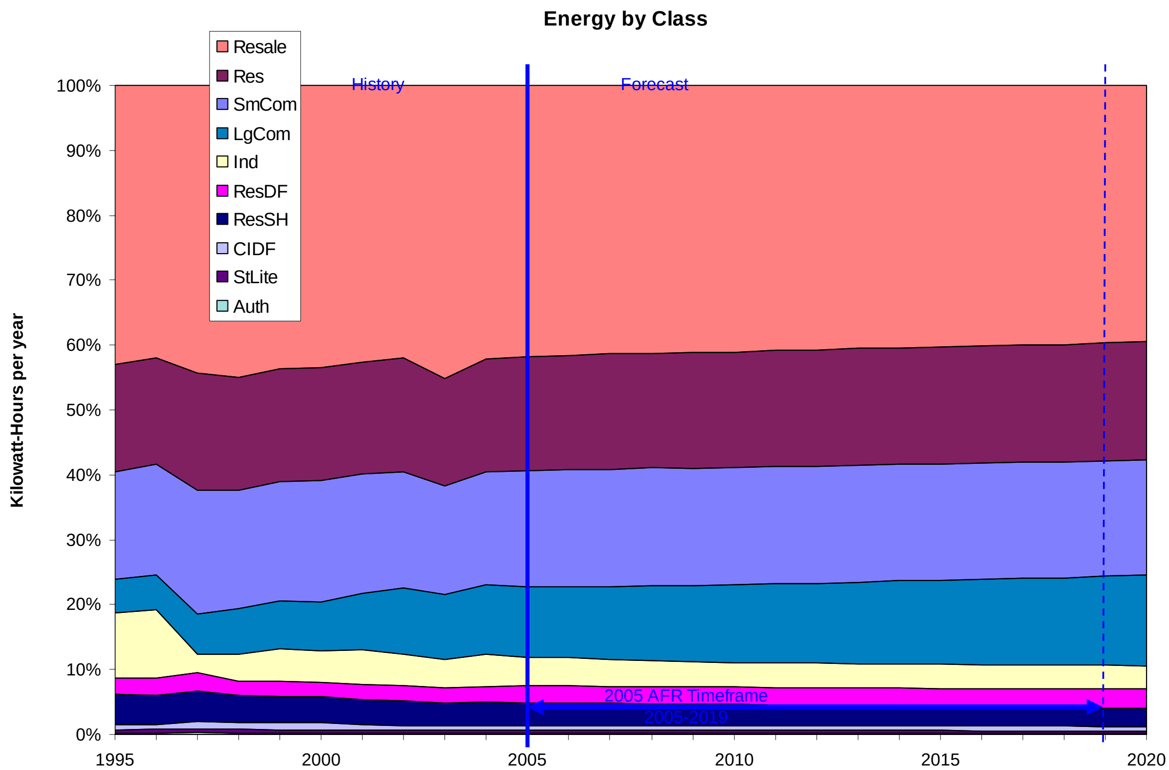
Figure 7-35 Energy by Class



Peak Demand Models

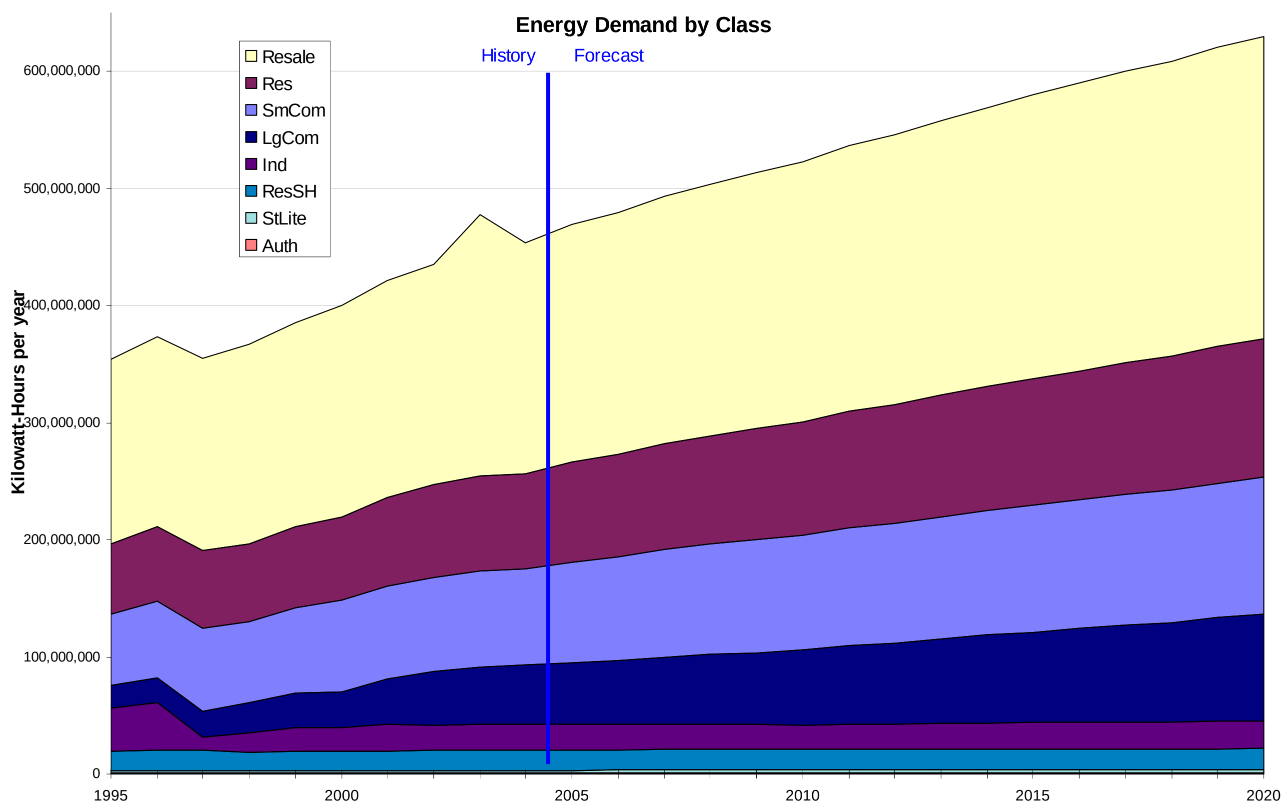
Peak demand is calculated using the annual percentage growth rate of energy sales without the residential, commercial, and industrial dual fuel classes. A constant annual load factor is assumed for the forecast period.

Project area annual percentage growth rates (peak demand growth escalator) are:

1996	5.5%
1997	-4.9
1998	3.2
1999	5.2
2000	3.9
2001	5.3
2002	3.2
2003	9.7
2004	-5.0
2005	3.5
2006	2.1

2007	3.0
2008	2.0
2009	2.0
2010	1.8
2011	2.6
2012	1.7
2013	2.2
2014	2.0
2015	1.9
2016	1.7
2017	1.7
2018	1.4
2019	2.0
2020	1.5

Figure 7-36 Energy Demand by Class



7.1.6 Forecast Scenarios

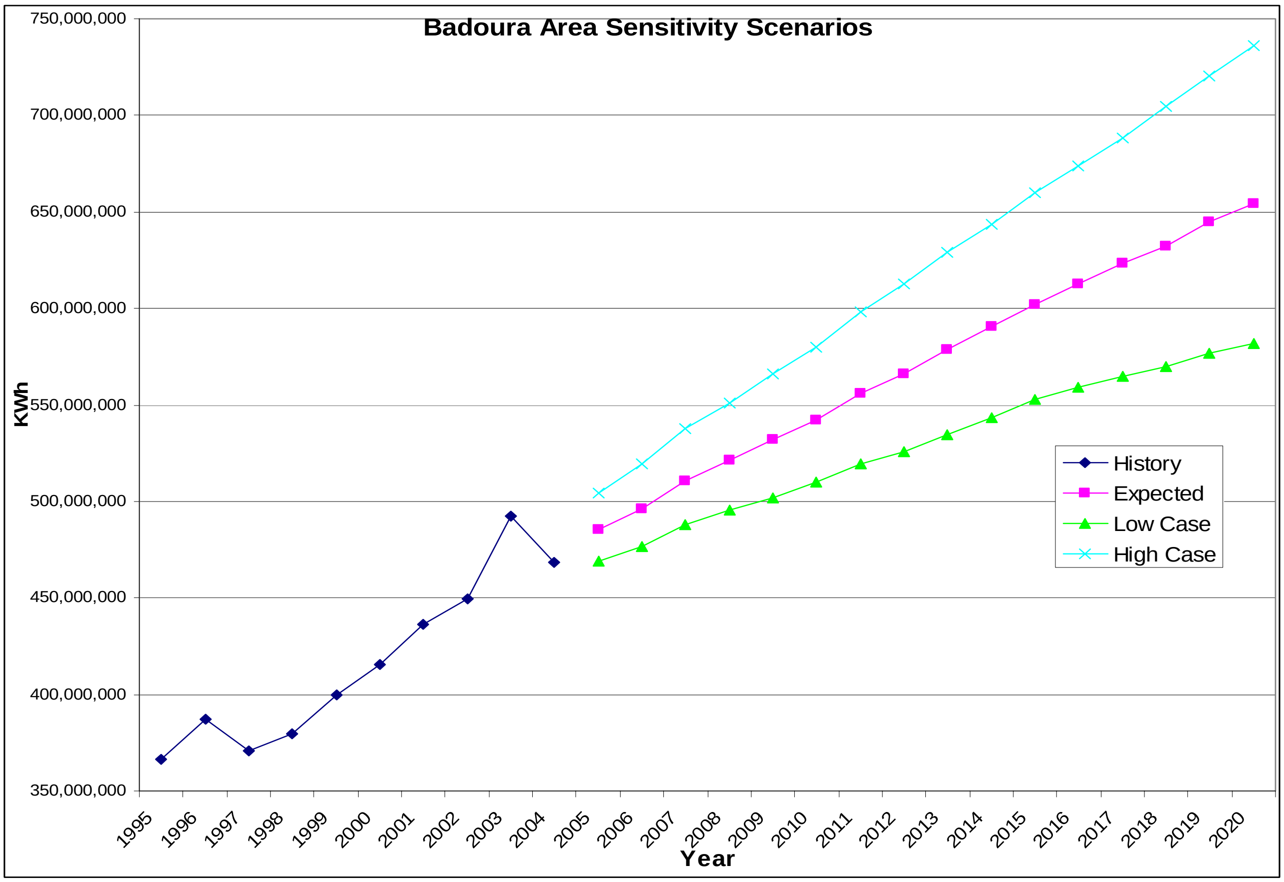
Badoura area customer count and energy by class forecasts were prepared for three scenarios; expected, low, and high cases. The expected forecast is based on levels of economic activity that should occur according to a consensus opinion of national economists as shown in Aspen Publisher's (Robert Eggert) Blue Chip Economic Indicators dated March 10, 2005. Industrial economic activity specifically related to taconite mining and pulp and paper production was obtained from industry experts and from MP's REMI economic model. Predicted demographic and economic information was provided by National Planning Association (NPA) data for Cass, Crow Wing, and Hubbard counties and from MP's REMI model. The expected scenario indicates a slow growth pattern between 2004 and 2008. Due to the recent recession and economic downturn, growth declined in 2001 and 2003 in many economic measures. Economic recovery begins in 2004 and continues positive growth in virtually all sectors, partially offset by a continued slow decline in the mining industry. Rapid economic growth occurs after 2013 to the end of the current forecast, 2020.

The load forecast formula could be placed in a spreadsheet and then calculated for a given set of independent variable values. It then produces a single value dependent variable class customer count or class energy sales forecast. However, the independent variable values that actually will occur are not known with precise certainty. In the high-low scenario analysis, economic, demographic, energy price, and weather assumptions are increased and/or decreased to create an optimistic or high forecast with rapid economic and demographic growth, low electric energy prices, high natural gas and oil prices, and colder than normal winter weather and hotter than normal summer weather. The opposite growth elements apply to the pessimistic or low scenario forecast. The low scenario forecast would be characterized by slow, flat, or declining economic and demographic growth, high electric energy prices, low natural gas and oil prices, and warmer than normal winter weather and cooler than normal summer weather. The uncertainty ranges are initially based on historical data and then increased over time to allow for the increasing uncertainty going into the future.

A resulting low to high range is statistically provided for each year as an indication of uncertainty or "risk" in the forecast and to give planners a reasonable span for which to plan. In the year 2006, for example, there is a statistical probability that the actual annual energy sales will probabilistically turn out to be between 477 GWh (-3.8 percent less than expected) and 519 GWh (+4.6 percent greater than expected), with a point estimate for the expected case of 496 GWh. By 2015, the low to high range is from 553 GWh (-8.1 percent less than expected) and 660 GWh (+9.6 percent greater than expected), with a point estimate for the expected case of 602 GWh for annual Badoura energy sales. Statistical probability ranges were also calculated. Uncertainty bandwidths were derived to assess the lower and upper limits of a 95 percent confidence level range. The Marketing Department high and low cases were also analyzed.

The LTV (large industrial customer) closing is an example of the significant impact the taconite industry and relative competitiveness of Iron Range facilities can have on MP, even though LTV used its own generation to produce the majority of its electric requirements. Indirect regional economic impacts from the LTV shutdown may have substantial future impacts on MP's electric sales, but these as well as others were quantified within the historical updates and survey inputs to the REMI model. Projected annual energy sales for the three forecast scenarios are shown in the chart below, along with historical annual energy sales.

Figure 7-37 Badoura Area Sensitivity Scenarios



7.1.7 Expected Scenario Assumptions, Variables Used in Forecast

BADOURA AREA HOUSEHOLDS USING NPA, (% annual growth)								
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
EXPECTED	1.65	1.83	1.82	1.72	1.73	1.6	1.59	1.57
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
	1.54	1.5	1.52	1.53	1.51	1.49	1.46	1.48

BADOURA AREA TOTAL EMPLOYMENT USING NPA , (% annual growth)								
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
EXPECTED	2.94	3.21	2.85	2.79	2.53	2.18	2.16	2
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
	1.77	1.83	1.8	1.77	1.7	1.37	1.35	1.44

BADOURA AREA PRIVATE NON-FARM EMPLOYMENT USING NPA, (% annual growth)								
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
EXPECTED	2.17	3.58	3.17	3.11	2.76	2.45	2.33	2.26
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
	1.97	1.98	2.02	1.91	1.86	1.49	1.51	1.56

BADOURA AREA COMMERCIAL SECTOR EMPLOYMENT USING NPA, (% annual growth)								
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
EXPECTED	3.51	3.67	3.23	3.2	2.84	2.63	2.44	2.38
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
	2.11	2.12	2.13	2.04	1.97	1.65	1.63	1.69

BADOURA AREA RETAIL TRADE SECTOR EMPLOYMENT USING NPA, (% annual growth)								
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
EXPECTED	3.4	3.36	3.01	2.93	2.8	2.29	2.29	2.11
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
	1.88	1.75	2.09	1.8	1.68	1.48	1.37	1.46

BADOURA AREA TRANSPORTATION, WAREHOUSING, INFORMATION, and UTILITIES SECTOR EMPLOYMENT USING NPA, (% annual growth)								
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
EXPECTED	1.71	3.81	2.86	2.03	3.13	1.62	2.25	1.82
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
	2.16	1.75	2.15	2.07	2.06	1.01	2.03	1.67

BADOURA AREA GOVERNMENT SECTOR EMPLOYMENT USING NPA, (% annual growth)								
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
EXPECTED	4.08	2.1	1.64	1.71	1.84	1.23	1.51	1.05
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
	1.03	1.38	0.95	1.3	1.11	1.02	0.7	1.03

MP AREA GROSS REGIONAL PRODUCT USING REMI, (% annual growth)								
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
EXPECTED	3.76	3.34	3.19	3.12	6.44	3.28	3.46	3.34
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
	3.38	3.21	3.22	3.26	3.29	3.18	3.13	3.04

MP AREA COMMERCIAL SECTOR ECONOMIC OUTPUT USING REMI, (% annual growth)								
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
EXPECTED	3.87	3.1	2.93	3.14	4.38	3.21	3.4	3.19
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
	3.25	3.06	3.07	3.09	3.01	2.84	2.73	2.78

BADOURA AREA PER CAPITA INCOME USING NPA, (% annual growth)								
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
EXPECTED	4.21	3.39	3.15	3.16	2.74	2.49	2.47	2.15
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
	1.99	2.03	2.03	1.95	1.81	1.65	1.5	1.63

PRICE OF ELECTRICITY USING BADOURA DOE, (% annual growth)								
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
EXPECTED	4.29	-0.36	-2.03	-2.65	-0.04	0.79	0.43	-1.64
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
	-0.6	0.65	0.74	0.26	0.82	0.94	0.23	0.5

PRICE OF NATURAL GAS USING DOE, (% annual growth)								
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
EXPECTED	9.43	3.08	-7.35	-5.95	-6.13	-3.53	-2.94	-0.66
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
	0.98	1.97	2.61	1.94	-0.21	-0.47	1.58	2.83

Weather

HEATING DEGREE DAYS USING NOAA PINE RIVER							
EXPECTED	**2005-2019**		**MAX**			**MIN**	
	8958.35		10457	1996		7403	1987

COOLING DEGREE DAYS USING NOAA PINE RIVER							
EXPECTED	**2005-2019**		**MAX**			**MIN**	
	410.175		792	1983		153	1992

In this world of uncertainty, forecasting future energy prices is a particularly difficult task. The underlying assumption is that no significant oil and gas supply interruptions will occur during the fifteen-year forecast period. The electric price changes shown above are based on averages for many different customers, many different end-uses, and changing consumption patterns. They are intended to be used for statistical forecast purposes only and are certainly not indicative of any intention or anticipation of changes in MP's rate pricing structure. The general expectation is that the real price of electricity will remain relatively stable or decline slowly over the early forecast period and increase slightly in the latter forecast years. Future energy prices are based on data from the U.S. Department of Energy (DOE), Energy Information Administration (EIA), National Energy Information Center (NEIC), Annual Energy Outlook (AEO). Economic growth is assumed to resume at healthy growth rates with low inflationary pressures. Other standard demographic and economic assumptions are used in the demand forecast development from NPA, Blue Chip, BLS, IMPLAN, MN DEED, and REMI. The econometric customer count class models are estimated from 1994 to 2005 and energy sales class models are estimated over the 1995 to 2004 time period.

7.1.8 Expected Forecast Scenario

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7.1.11 Confidence in Forecast

MetrixND, like most statistical programs, bases its forecast model estimations on the past history of the data. Forecasts are calculated from the historically-derived model by applying projections and assumptions for the future of the independent variables. These quantitative forecasts are used as a starting point with insight and knowledge of future events used to improve the forecasts. The Expected Case Badoura area forecast projects energy sales and customer counts by class on a long-term, weather-normalized basis and does not predict general business cycles after 2005, nor any abnormal conditions such as strikes, oil supply interruptions, natural catastrophes, or extreme weather.

The wide ranges of energy requirements, customer counts, and peak demand growth rates reflected in Table 7-2 are due largely to weather and economic conditions in the

Badoura area. Because the north central Minnesota economy is, to a large extent, driven by conditions in the specific industries in the Badoura area, a large area of uncertainty makes for a wide span of possible futures.

Table 7- 2 Total System Requirements

TOTAL SYSTEM REQUIREMENTS									
LP CONTRACT EXPIRATION, LOW, ACTUAL & EXPECTED, AND HIGH SCENARIOS									
	ENERGIES – GWh			PEAK DEMAND – %			CUSTOMER COUNT		
	LOW	**EXPECT**	**HIGH**	**LOW**	**EXPECT**	**HIGH**	**LOW**	**EXPECT**	**HIGH**
1998		379			3.2			13,961	
1999		400			5.22			14,232	
2000		415			3.85			14,575	
2001		436			5.27			15,085	
2002		449			3.17			15,998	
2003		492			9.68			16,293	
2004		469			-4.99			16,709	
2005	469	486	504	0.34	3.5	7.23		16,971	
2006	477	496	519	1.59	2.14	2.91	17,358	17,561	17,716
2007	488	511	538	2.37	2.95	3.56	17,715	18,082	18,377
2008	495	521	551	1.51	2.03	2.36	18,004	18,507	18,940
2009	502	532	566	1.35	2.01	2.74	18,232	18,888	19,474
2010	510	542	580	1.51	1.81	2.32	18,481	19,286	20,010
2011	519	556	598	1.85	2.58	3.23	18,792	19,746	20,616
2012	526	566	613	1.24	1.74	2.4	19,055	20,175	21,185
2013	535	579	629	1.69	2.25	2.56	19,322	20,571	21,733
2014	544	591	643	1.71	2.01	2.28	19,600	20,976	22,293
2015	553	602	660	1.65	1.93	2.57	19,898	21,398	22,861
2016	559	613	674	1.16	1.74	2.05	20,142	21,799	23,411

The user of this forecast is cautioned to bear in mind this degree of uncertainty and to consider preparing alternate forecast contingency plans based on the uncertainty ranges presented.

7.1.12 Coordination of Forecasts with Other Systems

MP is a member of MAPP, MISO, Minnesota/Wisconsin Power Suppliers Group (M/W PSG), Upper Midwest Utility Forecasters (UMUF), and other trade associations. While each member of these groups independently determine its power requirements, periodic meetings are held to share information and discuss forecasting techniques and methodologies. MP forecast staff also regularly participates in other forecast meetings offered from the following entities: Itron, REMI, IBF, EEI, IPE, SME, AEIC, UBC, and EPRI.

7.2 Great River Energy

7.2.1 Introduction

This section provides a summary of load forecast, the forecast methodology, and the databases used to construct the base scenario forecast. GRE works with its member cooperatives to prepare the peak demand and annual consumption forecast and has summarized the Crow Wing Power 2004 Long-Range Load Forecast dated September 2005, Itasca- Mantrap Cooperative 2004 Long-Range Load Forecast dated August 2005, and Lake Country Power 2004 Long-Range Load Forecast dated September 2005, which is the primary data source for the forecast.

The 2004 LRLF included five demand scenarios, including the base scenario (most probable economic assumptions, with normal weather). Details of the base scenario are presented in this section, but the forecast primarily used to justify the Project in the transmission analysis due to summer loading levels was Demand Scenario 2. This scenario assumed the most probable economic assumptions and extreme weather conditions.

The 2004 LRLF for each cooperative, along with the historic peak load data, was used to build the transmission models showing the need for the Project. Area loads were also evaluated using a model showing temperature dependence and other load variations.

7.2.2 Definition of Service Area and System

GRE has three member cooperatives serving load in the Badoura area; Crow Wing Power, Lake Country Power, and Itasca-Mantrap. They are member-owned electric cooperatives providing electric service to consumers in Aitkin, Becker, Carlton, Cass, Clearwater, Crow Wing, Itasca, Morrison, St Louis, Hubbard, and Wadena counties. Each cooperative has a unique subset of substations primarily serving customers in the Badoura Area. These substations represent a share of the total cooperative load in the area. Counties served in the Badoura Area include Becker, Cass, Crow Wing, and Wadena. Table 7-3 shows the historic percentage of December 2004 member cooperative peak load that is serving the GRE share of the Badoura Area load.

Table 7-3 Historic Percentage of GRE Member Cooperative Peak Load – December 2004

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7.2.3 Forecast Methodology

Overall Methodological Framework

The three member cooperative forecasts are prepared as a separate work product and are part of the total GRE forecast. GRE staff assists in the preparation of the member system forecasts. These forecasts are the fundamental information from which the area forecasts are derived.

Energy forecasts were prepared for each cooperative by projecting the number of consumers and the average energy usage per consumer for each RUS classification of consumers. Separate forecasts of the number of consumers and the energy usage per consumer were prepared for the following classes:

- residential
- seasonal
- small commercial
- large commercial
- irrigation
- street and highway lighting
- public authorities
- own use categories by member system

The cooperative residential class for each cooperative is shown for 2003 in Table 7-4 as a percentage of each cooperative.

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These classes are a significant share of the totals and were analyzed extensively. Previous end-use long-range load forecasts were studied and previous results were compared to the present forecast.

Non-residential categories were forecast using trend-judgment using a variety of methodologies. Line-loss percentages were estimated and demand was forecast using a load-factor methodology.

To use the cooperative forecast to derive an area forecast, the relationship of area usage to the total cooperative usage must be established. Changes over time must also be evaluated in this exercise. Historic comparisons of the seasonal energy and demand values were used to evaluate this relationship. Once the historic relationship was evaluated, and the trend over time was included, distribution cooperative staff was consulted on the viability of historic values applying in the future.

Linear relationships appeared to be adequate in modeling the area to cooperative totals and were charted with correlation statistics for evaluation. Figure 7-38 shows the energy relationship for Crow Wing Power as an example of the area to total cooperative usage correlation.

Figure 7-38 Crow Wing Power Area Historic Energy Correlation

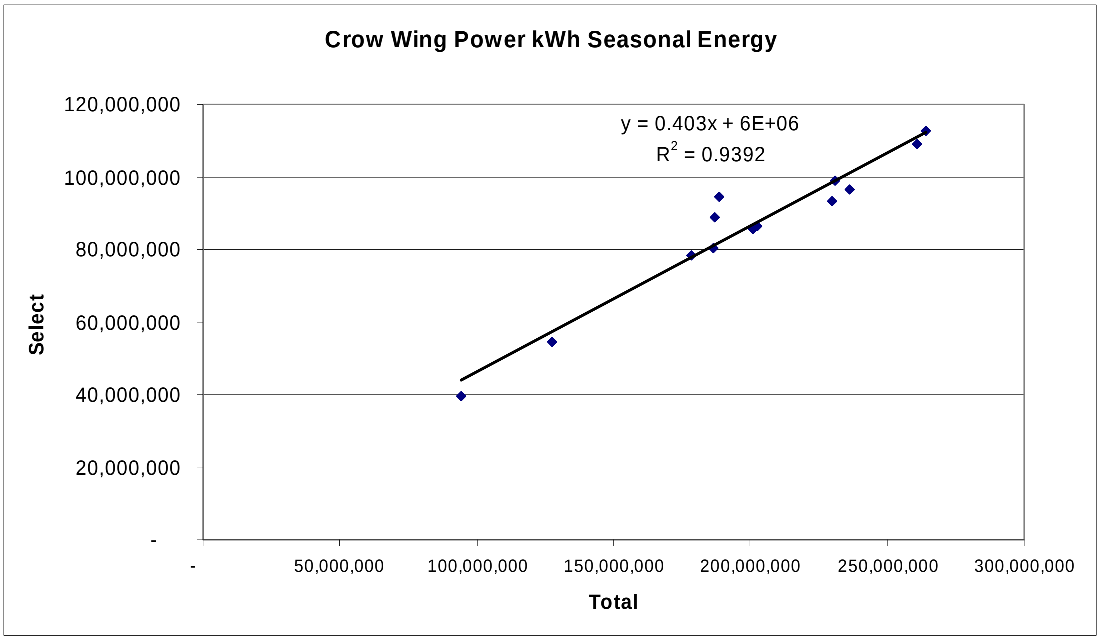
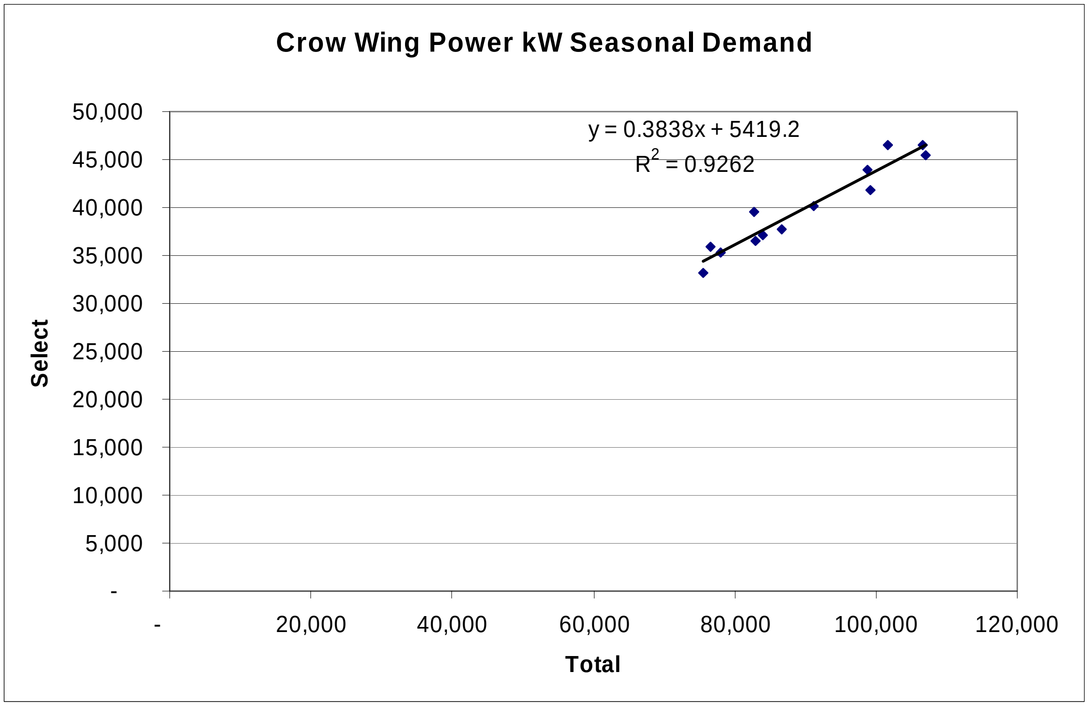


Figure 7-39 shows the correlation of the seasonal demand values over the 1999-2004 period.

Figure 7-39 Crow Wing Power Area 1999-2004 Demand Correlation



Six years of cooperative level seasonal demand and energy values were evaluated for the study area and the total cooperative. Values for 1999 through 2004 were evaluated to determine the relationship of the area usage to the total cooperative. Area growth rates were also compared to the cooperative growth rates to determine if the contribution was increasing. Concerns had been raised that the area load growth was higher than the cooperative growth, but the correlation does not show divergence at higher load levels. The correlations developed a linear relationship of the area load to the cooperative load.

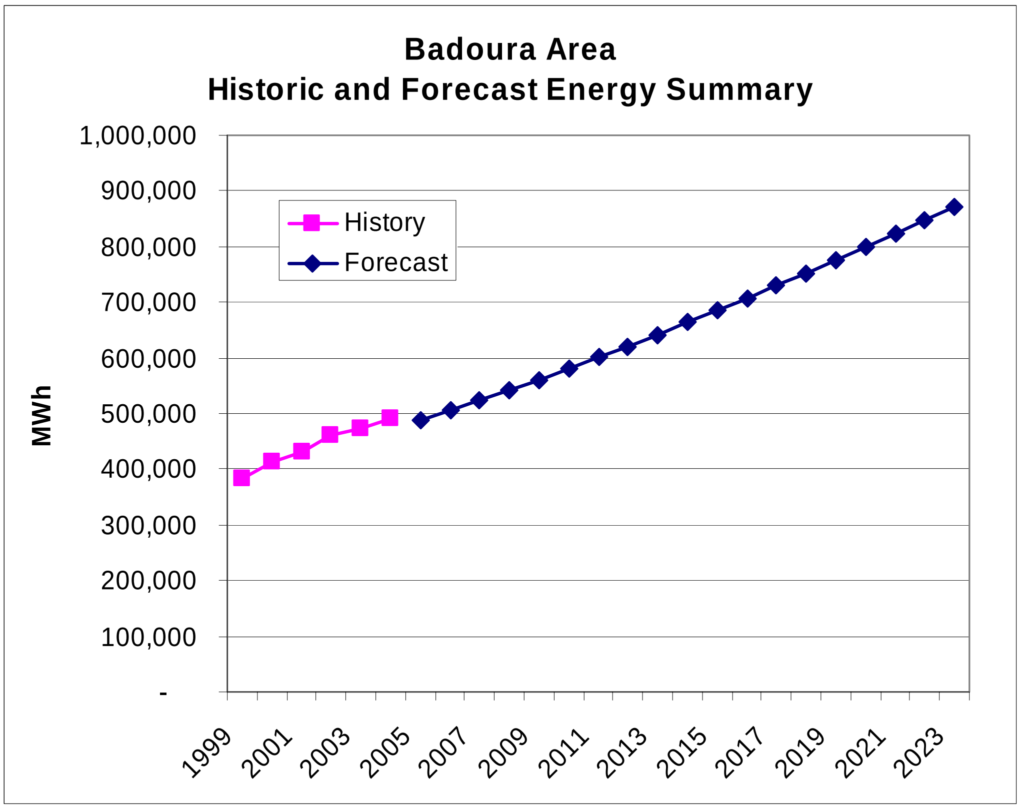
Both demand and energy correlations were developed for each cooperative. Results of the energy correlations are shown in Table 7-5.

Table 7- 5 Energy Correlations for GRE Cooperatives

Member Cooperative	Scaling Factor (slope)	Adder (Intercept- MWh)	Curve Fit (R-Squared)
Crow Wing Power	0.403	6,000	93.92%
Itasca- Mantrap	0812	47	99.43%
Lake Country Power	0.0942	566	87.77%

Table 7-5 indicates that as one example, Crow Wing Power area energy usage is 40.3% of the total cooperative plus 6,000 MWh for the 1999 to 2004 period. Figures 7-38 and 7-39 do not show divergence in the correlation with higher energy usage (indication of later years). From this information, the correlation and input from cooperative staff, the correlation was applied to the total cooperative forecast to derive the area forecast. Figure 7-40 shows the historic and forecasted energy usage for the load in the Badoura Area.

Figure 7-40 Badoura Area Energy Usage



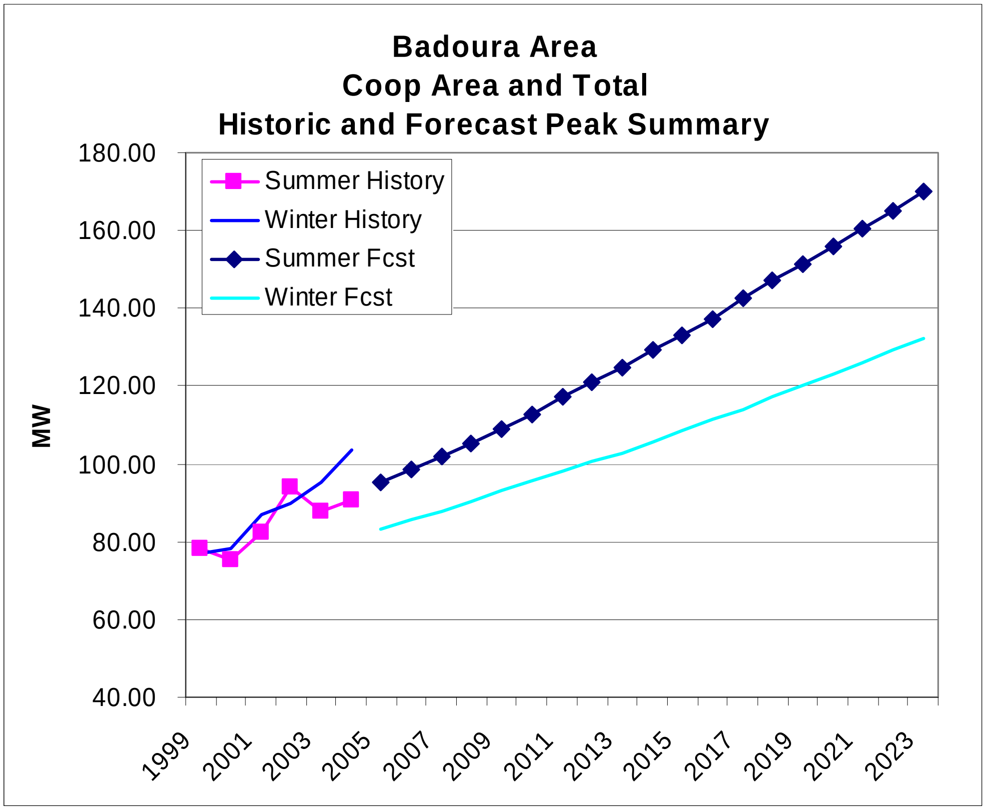
Results of the area to cooperative demand correlations are shown in Table 7-6.

Table 7-6 Demand Correlations for GRE Cooperatives

Member Cooperative	Scaling Factor (slope)	Adder (Intercept – MW)	Curve Fit (R-Squared)
Crow Wing Power	0.3838	5.419	92.62%
Itasca-Mantrap	0.9949	0.659	87.18%
Lake Country Power	0.0587	4.6	54.62%

Table 7-6 indicates that as one example, Crow Wing Power area energy usage is 38.38% of the total cooperative plus 5.4 MW for the 1999 to 2004 period. Figure 7-41 shows the historic and forecasted energy usage for the load in the Badoura Area.

Figure 7-41 Badoura Area Demand Summary



Cooperative load forecast data was not available by class for the Badoura Area, but was only available for the entire cooperative. The area load forecast energy and demand correlations are assumed to cover a number of factors including the class breakdown of load, and peak diversity. Therefore, the area forecast has class contribution that aligns with the total cooperative forecast.

GRE and MP established a historic delivery system peak demand taking into account conditions of the system such as weather conditions and switching configuration. The most recent peaks were given highest consideration because they reflect impact of growth and weather. These historic values were escalated in transmission models by the growth rates from the area forecast. For example, the substations in the Crow Wing Power cooperative service area were escalated at the Crow Wing Power area growth rate.

Specific Analytical Techniques – Cooperative Forecasts

GRE prepared the energy and demand forecasts with input from the cooperatives. Woods & Poole econometric databases (Woods & Poole Economics, Inc., 2004) and other key data were used.

Energy Forecast

The energy forecast is performed first since it is the basis for our demand forecast. As discussed in more detail in the appropriate sections, GRE staff prepares numerous models for both the number of members and usage per member for each member class. We then work with GRE to identify the model that most accurately represents future growth given historical information and known and measurable future load additions or subtractions.

Demand Forecast

Seasonal demand forecasts were developed using the total of the energy forecast of each class and a projected seasonal load factor. The seasonal load factor was developed as follows: seasonal historic load factor trends were analyzed by reviewing a seven and 11-year trend and judgment to create the 20-year projection. More specifically, tables and graphs of the load factor forecasts were examined to determine if it was reasonable to extend the trend twenty years into the future. Judgment is necessary because demand side programs and varying weather conditions affect the historic seasonal load factor.

The forecast was also evaluated for findings and lessons learned from previous end-use forecasts. Special attention was paid to the influence of changing air conditioning saturation and changes in the saturation of electric space heat. Initial load factors were then selected and tables and graphs of the demand forecast were studied. Changes in the trend of demand were studied to see if they were reasonable and if they could be explained. GRE staff then examined these forecasts of demand and load factors. Comparisons were made with the forecasts in other member systems. Differences were noted and the forecasts were re-examined to determine the reason for these differences. Staff members evaluated the demand forecasts to make sure they were reasonable. The resulting forecasts of load factors are reported in this section with the demand forecasts.

Application of Specific Analytical Techniques

Residential Energy Forecast

This classification includes farm and non-farm residential consumers as well as small public buildings. Farm and hobby farm energy consumption includes use for both farms and residences. Residential consumers include single-rural residences, small rural housing developments, and large suburban single-family dwellings and multi-family units.

Residential consumers make up the largest classification in the cooperatives system. City utility and street improvement projects have enabled the continued residential growth in the service area. The remainder of residential growth in the service area has primarily been the result of rural residential developments, scattered throughout the Cooperative's service territory.

Number of Consumers

Because of the size of the residential class and its potential for large changes, special attention was given to the consumer forecast of the residential class of consumers. Both seven and 11-year linear trend forecasts were prepared. Tables and graphs of this data were then studied to detect changes in trend growth.

GRE staff prepared up to five forecasts with supplemental tables and graphs of the number of residential members. The basis for the five forecasts provided by GRE was 1) the Minnesota State Demographer, 2) Woods & Poole, and 3) the Metropolitan Council. GRE staff explained the strengths and weaknesses of each of the demographic forecasts and the resultant five models. Based on the information we constructed a forecast of the number of residential members. Senior staff reviewed the resulting forecast. GRE staff then reviewed the forecast.

These demographic forecasts are documented in the 2004 GRE Forecast Database. This methodology has been used for the last 20 years by the GRE member systems and has been extensively reviewed.

Energy Usage Per Consumer

Staff from the State Demographers Office and the Metropolitan Council met with staff of GRE and the member systems to review the forecasts on June 22, 2004. The Minnesota Department of Commerce was also represented. At this meeting the forecast demographic methodologies were reviewed and compared. This information is contained in the 2004 GRE Forecast Database and was used in developing the 2004 forecast.

An aggregate GRE econometric model was prepared quantifying the relationship between inflation-adjusted wholesale rates and residential energy usage per consumer. This model demonstrated the elasticity of demand and how the higher inflation-adjusted rates of the 1980s reduced energy usage per consumer. Since peaking in the early 1980s, the inflation-adjusted rates have steadily declined, thus resulting, all else being equal, to increased usage. Rates are currently in the range associated with increasing energy usage. Future projections of inflation-adjusted wholesale rates indicate they will remain in the range associated with increasing residential energy usage. This model is documented in the 2004 GRE Forecast Database.

After all factors were reviewed and discussed, comparisons were made among the member systems. A significant difference in growth rates existed between the urban and rural member systems. Urban member systems were experiencing rapid growth in energy usage per consumer. This is likely due to a number of factors, including larger new homes being added to the system, increased number of customers using electric water heating due to new building codes, and increased usage of electronic devices such as computers.

Energy usage per consumer forecasts were selected and reviewed by GRE and member system staff. GRE senior management reviewed the forecasts. Final forecasts were approved after review with GRE staff.

Creation of Forecast

Energy per consumer and residential customer number forecasts were combined to create the residential energy forecast.

As planned in the LRLF Work Plan, GRE hosted a series of meetings with its members to review the residential forecast models and factors affecting growth. A group discussion ensued with comparisons of the member system growth rates.

Draft forecasts were selected and reviewed by member system staff. GRE staff also reviewed the forecast. This process was followed to ensure that all relevant information was reflected in the forecast.

Non-Residential Forecasts

The non-residential categories were forecast using a variety of methods.

Small Commercial

Small Commercial includes businesses and establishments whose service requires a transformer of 1,000 kilovolt-amperes (kVA) or less.

The methodology used to forecast the small commercial category is primarily a trending analysis supplemented by econometric modeling.

After studying prepared tables and graphs of the historical number of small commercial consumers, trend forecasts were prepared and studied. These forecasts are documented in the GRE 2004 Forecast Database.

The forecast growth rate of the residential class was examined when preparing the small commercial forecast because small commercial establishments will be developed as needed to serve a growing, residential population. An econometric model relating small commercial consumer growth to residential consumer growth was prepared. This model reflected the close relationship between residential and small commercial consumer growth.

After reviewing these models, the initial forecast of small commercial consumers was selected by member system staff. Member system senior staff and GRE staff then reviewed this initial forecast.

Table 7-7 shows the percentage of small commercial and industrial consumers and energy in 2003.

Table 7-7 Percentage of Small Commercial and Industrial Consumers and Energy, 2003

[TRADE SECRET DATA EXCISED]

Tables and graphs of the historical usage per small commercial consumer were prepared and studied for trends. Comparisons with the residential class of consumers were completed. The econometric model showed the relationship among real income, real electricity price and total employment, heating degrees, and average usage per small commercial consumer. Forecasts were then selected and reviewed by senior staff and GRE staff.

Large Commercial

Crow Wing Power does not have any large commercial customers. Itasca-Mantrap has one customer, and Lake Country Power has two. Large commercial consumers are defined by a combined single-site transformer capacity over 1,000 kVA. The individual load forecasts for the cooperatives are showing no additional customers through the forecast period.

The Itasca-Mantrap large commercial customer received over 28 percent of the total 2003, and the Lake Country Power large commercial customers received nearly 12 percent of the 2003 energy.

Seasonal

Seasonal residential consumers and energy for 2003 is shown in Table 7-8. Seasonal consumers have summer homes or seasonal cabins located around area lakes. They generally occupy these residences for less than six months of the year, permanently residing elsewhere. These accounts are billed on an annual basis. Some other accounts fall under this classification, such as a member request for annual billing.

Table 7-8 Seasonal Residential Consumers and Energy, 2003

[TRADE SECRET DATA EXCISED]

The seasonal residential accounts have continued to decline over the past eight years. A large percentage of accounts in this category are located on recreational lakes. Vacant lakeshore in the service territory has grown increasingly scarce, which limits seasonal growth. This and the continued residential growth throughout the service area have led to the conversion of seasonal accounts to year-round residential accounts and have contributed to this steady decline.

The seasonal class growth is most influenced by the availability of lakeshore for development. As some member systems are serving fully developed areas, seasonal consumers were transferred to the residential class. Other member systems serve areas with significant lakeshore that could be developed. These member systems are forecasting continued growth in seasonal consumers.

Energy Usage per Consumer

Due to a relatively stable base of consumers classified as seasonal, along with the shifting from higher usage seasonal accounts to year-around residential classification, the energy use per seasonal consumer should remain steady through the forecast period.

Irrigation

The methodology used to forecast this category is trend-judgment. Irrigation consumers and percentage of 2003 load are shown in Table 7-9 and does not warrant a more intensive effort to forecast this class.

Table 7-9 Irrigation Consumers and Percentage of 2003 Load

[TRADE SECRET DATA EXCISED]

Street and Highway Lighting

[TRADE SECRET DATA EXCISED]

7.2.4 Content of Forecasts

The primary elements of the forecast are:

- Number of customers by class
- Total energy usage by class
- Energy use per customer
- Peak demand for the Crow Wing Power, Itasca-Mantrap, and Lake Country Power systems

Customer class energy forecasts are summed to obtain results for the cooperative systems. Data concerning ultimate consumers and annual electrical consumption within the systems are reported in the following subsections. Note that none of the systems serve mining loads or electric transportation, therefore discussion of these categories is not included.

Customer Categories and Annual Consumption

This subsection presents the annual energy forecast and the forecast of the number of customers for Crow Wing Power, Itasca-Mantrap, and Lake Country Power systems.

Figures 7-42 through 7-44 depict the forecast of total customers and residential customers for the period from 2004 to 2023, together with historical data from 1991.

[TRADE SECRET DATA EXCISED]

Figures 7-45 to 7-47 compare the historic rates of growth of the customer classes to the growth rates in the forecast period. The historic and forecast data from which the growth rates were computed are shown in Tables 7-10 to 7-12.

While all customer classes are growing in size, their forecast rates of growth are all slower than in the historic period. The historic rates of growth in the commercial or industrial sectors are not expected to be maintained in the future. There are a number of unique observations on the historic and forecasted growth of customers. Crow Wing Power has shifted seasonal customers to residential, showing a large historic growth in residential, and negative growth in the seasonal category. Changes in the number of irrigation loads for Crow Wing Power and Itasca-Mantrap have resulted in larger percentage growth rates.

The primary drivers of changes in customer growth rates are due to demographic trends in housing stocks, and economic trends for the commercial and industrial sectors.

[TRADE SECRET DATA EXCISED]

Figures 7-48 through 7-50 show the forecast of total energy and residential energy for the period from 2004 to 2023, together with historical data from 1988. The share of energy sales to the residential class is in transition (Figure 7-41).

[TRADE SECRET DATA EXCISED]

Figures 7-51 to 7-53 shows the historic and projected percentage of residential energy of total energy requirements. Crow Wing Power had an increase in percentage from 2003-2005 due to reclassifying the seasonal customers into the residential class.

[TRADE SECRET DATA EXCISED]

Figures 7-54 through 7-56 compare the historic rates of growth of annual energy by customer class to the growth rates in the forecast period from 2004 to 2023. The historic and forecast data from which the growth rates were computed are shown in Tables 7-13 to 7-15.

[TRADE SECRET DATA EXCISED]

7.2.5 Databases for Forecasts

RUS Data

The RUS Form 7 (*Rural Utilities Service Form 7, Financial and Statistical Report)* is the source of historical member system data on the number of consumers by each RUS class, their kWh usage, the revenue collected, and monthly peak demand. The RUS classes are:

- residential
- residential seasonal
- irrigation
- small commercial (1000 kVA or less)
- large commercial (greater than 1000 kVA)
- public street and highway lighting
- public authorities
- sales for resale

GRE Surveys

Periodically, GRE conducts residential surveys to determine consumers per county, type of residential consumers, size of residence, people per residence, age of house, appliance ownership and age, and consumer demographics. These surveys are used as the source for historical appliance data, as documented in power requirements studies.

Proprietary Economic Databases

Woods & Poole is the source of historical and forecast data for county households, county employment, and income.

7.2.6 Assumptions and Special Information

Crow Wing Power, Lake Country Power, and Itasca-Mantrap along with GRE staff determined the following assumptions and special information:

- Alternate forms of energy will be available and competitively priced.
- Data for electrified transportation and mining classes were not available due to the lack of electrical usage in these classes.
- Inflation-adjusted prices of electricity will continue to decline. This will increase system demand.

The forecast for GRE was not coordinated with any other system's forecast.

8.0 ENERGY CONSERVATION AND LOAD MANAGEMENT PROGRAMS

The Applicants have been actively involved in energy conservation and load management programs across all customer classes—residential, commercial-industrial, agriculture, and large power—for over 20 years. Through the biennial Conservation Improvement Program (CIP) and a variety of load management programs, MP and GRE have successfully helped their customers get the most out of their energy dollar in terms of economic, quality of life, and environmental benefits.

With customers' growing need for electric energy, these programs have been effective in reducing the rate of this growth but not eliminating it. CIP and load management activities have helped delay the need for transmission line upgrades for several years; however, a critical point has now been reached in this area so that a transmission upgrade is crucial to ensure MP's and GRE's ability to meet our customers' growing electric energy needs.

Regarding this Certification Application and the success of current and future DSM programs, MP and GRE have explored the feasibility of increasing DSM activities in the Project area to eliminate the need for a transmission line upgrade. MP and GRE concluded, based on technological feasibility and market acceptance criteria, that DSM activities should continue as planned and that the transmission line upgrade is essential to meeting growing customer need for electric energy. Specifically, MP and GRE believe that the transmission line upgrade is more cost-effective and predictable than increasing DSM activities.

The remainder of this section focuses on the regulatory, economic, technological, and market acceptance criteria that affects use of DSM, as reflected in MP's current and proposed CIP plans. As stated in the most recently filed IRPs, MP and GRE are committed to using DSM resources in conjunction with supply side options, which includes transmission upgrades, to meet the growing need for electrical energy in its service area.

8.1 Minnesota Power

MP has optimized the use of its CIP and load management programs based on regulatory, economic, technological, and market acceptance criteria. As detailed in the recently filed Integrated Resource Plan (IRP) and Deputy Commissioner Garvey's Decision on Minnesota Power's 2004 CIP Status Report (dated July 13, 2005, Docket No. E015/CIP-03-819.06), a plan has been developed to effectively use demand side management (DSM) to help meet growing customer electric needs. Additionally, MP has an established history of delivering successful CIP programs to all customer classes.

8.1.1 Background

As required in Minnesota Statute 216B.241 and in compliance with Minnesota Rules 7690.0500 through 7690.0800, investor-owned utilities (IOUs) in Minnesota are required to file a Biennial CIP Plan that details specific programs designed to save energy through conservation and energy efficiency activities. It also requires IOUs to determine the cost-effectiveness of these programs and to spend at least 1.5% of its annual gross revenue on approved CIP programs. In conjunction with this biennial filing, MP is required to ensure that DSM activities achieve savings levels at or above those proposed in the IRP.

MP's 2004 CIP Status Report (Docket No. E015/CIP-03-819.06) indicates that the company has both exceeded the above spending requirement of 1.5% and projected DSM savings levels determined in the IRP. Also, MP's proposed 2006–2007 Biennial Plan (Docket No. E015/CIP-05-797) again exceeds CIP required spending levels and IRP determined energy savings levels.

In preparing the 2006–2007 Biennial CIP Filing, MP personnel talked with customers and their trusted providers, community groups, energy experts, channel partners, and third-party contractors to determine their Projections for CIP activity over the next two years. Input was sought on the effectiveness of existing programs and the potential for new products and processes. The company reviewed the success of current CIP programs and the results of R&D Projects to identify opportunities for new and innovative products and programs and to determine the need to improve or eliminate existing programs. MP then reviewed these potential improvements and innovations against the following criteria: economic justification, technological feasibility, market acceptance, and the Department of Commerce evaluation process. This included both cost-benefit analysis and market player feedback. This is a realistic look at what the "market will bear," based on customer willingness to invest in energy-efficient products and processes, proposed legislation on product efficiency levels, and existing product availability.

8.1.2 Conservation Goals and Objectives

MP's conservation goals and objectives are detailed in its current 2004–2005 Biennial CIP Plan (Docket No. E015/CIP-03-819) and in its proposed 2006–2007 Biennial Plan (Docket No. E015-CIP-05-797). In 2004–2005 and in 2006–2007, MP proposed to spend more than the required spending levels and to exceed IRP determined savings levels.

8.1.3 Existing Load Management and Energy Conservation Programs and Accomplishments

As documented in Exhibit 4 and Appendix A of MP's 2004 Status Report, MP and its provider network, community groups, and customers have successfully exceeded filed energy and spending goals. MP has achieved 36,593,095 kWh in annual savings, which is 120% of the filed CIP goal and 4,237 kW or 106% of our goal. In addition, MP's ratepayers spent over $3.1 million on these programs. The average cost per kW achieved was $733/kW at the busbar in 2004.

Through the help and support of the people and organizations identified in Item 8.1, MP has developed a dynamic yet structured business model (detailed in the Introduction to the 2006–2007 Biennial CIP filing, Docket No. E015/CIP-05-797) and a community-focused market strategy that has created a vibrant CIP environment dedicated to continuous improvement and innovation. Some of our recent program improvements and innovations include the following:

1. The first comprehensive, residential-based ENERGY STAR® program in the State of Minnesota. This program exceeded MP's goal and was recognized nationally by the Department of Energy (DOE) and the Environmental Protection Agency (EPA).

2. A site-based event marketing approach to delivering energy conservation materials and education to the low-income market based on customer preferences. This resulted in a day-long event at the Salvation Army that was co-sponsored by the Duluth Water and Gas Department, a Community Action Program (CAP) agency, and the State Energy Office. MP held site-based events at multi-family and Housing and Redevelopment Authority (HRA) facilities that have attracted qualified low-income customers who have not participated in traditional low-income programs. New lighting products-torchieres and compact fluorescent lights (CFLs) were also introduced to these customers. This was a strategy later recommended by Xcel Energy and the American Council for an Energy Efficient Economy (ACEEE) in their Low-income Work Plan, dated June 30, 2005.

3. Introduction of one of the first functioning microturbine installations in a waste treatment facility that runs on methane from a digestion process.

4. Presentation of the first H. E. gas furnace with an Electronically Commutated Motor (ECM) rebate program in the state, which was developed in conjunction with heating, ventilation, and air conditioning (HVAC) distributors. It incorporated rebate programs offered by gas utilities and loan programs from local communities. This was an effort to provide one-stop shopping for MP customers and introduce MP's Central Air Conditioning (CAC) Proper Installation and Rehabilitation Program in the new and retrofit market.

5. Conducted successful community-based recycling and ENERGY STAR® rebate programs for residential air conditioners (RACs) and dehumidifiers through local retailers, Cities for Climate Protection, public entities and recycling organizations, and other utilities.

6. Completed the research on and installation of new lighting technologies applicable to offices and warehouse facilities. This technology was then incorporated into a PowerGrant Program.

7. Utilized the synergy between the PowerGrant and ENERGY STAR® programs and emphasis on education to complete energy-efficient installations at school facilities; and to offer a school-based fundraiser and energy education program at these same schools. This provided students and the community the opportunity to learn about energy conservation in their school and at home. It saved energy and dollars and also rewarded students for each CFL purchased at a local retailer. The funds were used for school activities.

These are some examples of what MP did in 2004 to engage businesses, communities, and the people who live and work in them to learn about the value of energy conservation and efficiency. These programs demonstrate how MP integrates the core principles of its business model—collaborating, leveraging information, dollars and infrastructure, managing the customer experience, and the Five "I" Marketing Approach (incentives, information, innovation, integration, and impact) across all our CIP programs. This shows that MP has established an aggressive DSM strategy and that it is being used to maximize energy and demand savings throughout its service area and across all market sectors.

8.1.4 Other Demand Side Management Programs Considered

MP uses its CIP Research and Development (R&D) program to identify potential new products and programs. The R&D initiatives provide technological and market-based information that enhances current CIP programs and helps identify new products. Appendix B details the results from our 2004 R&D projects. An updated list of planned 2005 R&D Projects are included in Appendix C of the 2004 CIP Status Report.

MP's Dual Fuel Controlled Access and interruptible programs continue to control system peaks and minimize the need for future growth in transmission and generation. Over 200 MW of interruptible or controlled load are served by these DSM-driven rates.

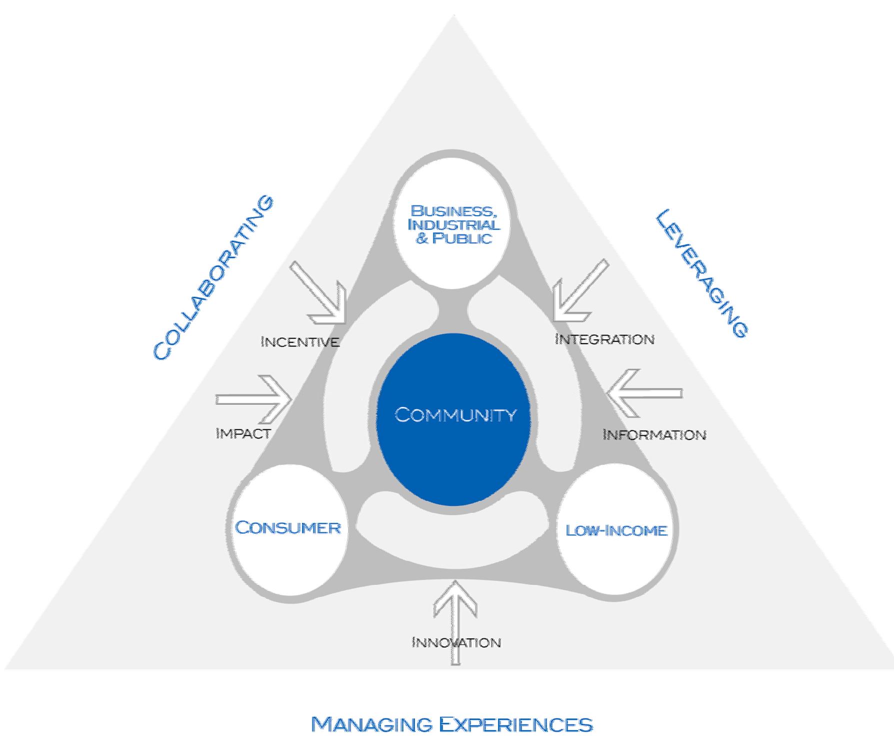
8.1.5 Future Load Management and Conservation Plans

Minnesota Power's 2006–2007 Biennial Conservation Improvement Plan is made up of five major components:

- Consumer Sector
- Low-income Sector
- Business, Industrial, and Public Sector
- Cross-Market Activity Sector
- Renewable Energy Sector

Each sector is part of a synergistic whole, based on a common platform, designed to deliver a comprehensive approach to creating true stakeholder value by helping each customer get the most out of their energy dollar. A graphic representation of this process is shown in Figure 8-1. MP's goal is to enable customers to participate seamlessly within and between sectors. For example, a homeowner may purchase CFLs at a community-wide event and then install high-efficiency lighting in their business. This enables Minnesota Power and its provider network to optimize each point of contact, to deliver the right product at the right time and place, and to leverage dollars and information. The result is long-term energy savings, maximum participation, reduced delivery costs, and market transformation.

Figure 8-1 Minnesota Power Marketing Approach



Consumer Sector

The Triple E Plus Program is the comprehensive platform MP uses to reach and serve its residential customers. It includes a package of products, services, and activities targeting this market.

Triple E Plus was introduced in MP's 2004–2005 Biennial Plan. It is designed to take advantage of the brand recognition inherent in Triple E and ENERGY STAR®, and MP's longstanding relationship with local communities. Successful brands are based on partner-affiliate relationships and a strong word-of-mouth campaign to educate and engage participants. It is referred to as community brand building, which is designed to increase participation in CIP and establish energy efficiency as a community-wide goal.

Triple E Plus provides a pipeline for new energy-saving products. It increases saturation of existing energy-efficient products, creates new markets, and leverages new and existing distribution channels. In 2006–2007, MP is proposing to expand the lighting and HVAC components of Triple E Plus. This will ensure a continued supply of new products to meet market needs and replace products that have achieved market saturation. CIP R&D is critical to identifying and testing new products and markets for the Triple E Plus pipeline. Based on an ACEEE study and MP's experience in working with mass market and niche market distribution channels, it has been found that packaging related technologies under a common brand can positively transform the market for energy-saving products and services, resulting in long-term energy savings.

Low-Income Sector

The Energy Partners Program is the comprehensive platform used to reach low-income customers with the right product or service when and how they want it. Energy Partners utilizes low-income community stakeholders (landlords and public housing agencies, the Salvation Army, utilities, the State Energy Office, CAP Agencies and community-organized low-income task forces) to provide low-income people the opportunity to participate in CIP. Through education and energy-efficient products, people learn to take control of their energy use. They view saving energy as essential to their quality of life. It helps create a community committed to finding ways to save energy for the long term.

The success of the Energy Partner's Program is based on its flexibility. It needs to reach the low-income participant via a multifaceted delivery system and inspire utilities to participate in a comprehensive, seamless program addressing all fuel sources. It seeks commitment from multifamily organizations to co-sponsor events and encourage energy efficiency at the building level, and even individual apartments.

Business, Industrial, and Public Sector

PowerGrant is the primary forum for reaching and serving business, industrial, and public sector customers. PowerGrant provides a comprehensive platform for meeting the needs of a full range of business and public customers from small businesses and farms to educational institutions and both large and small manufacturing facilities.

The Deputy Commissioner's Order in Docket No. E015/CIP-03-819.03 (dated August 11, 2004) requires MP to include the former ICP Program and its participants as a segment of MP's biennial commercial and industrial program. This establishes PowerGrant as the vehicle to serve these large customers. PowerGrant's energy and demand goals for 2006–2007 include anticipated participation from these customers.

PowerGrant's three-pronged marketing approach enables MP to customize a package of products and services that meets the unique needs of distinct business, industrial, and public communities from agriculture and education to healthcare and small and large businesses. MP is able to leverage a dynamic yet structured PowerGrant platform, utilizing a common go-to-market strategy to deliver a portfolio of products that meets the needs of these distinct market segments.

Cross-Market Activity Sector

This sector consists of five programs-Integrated Energy Education and Communications (IEE&C), Energy Analysis, Research and Development, Evaluation and Program Development, and Regulatory Charges. They contain common activities and functions (communications, research, analysis, and evaluation) that are the building blocks for a successful CIP initiative.

The Cross-Market Activity Sector is critical to meeting the needs of businesses, communities, and the people who live and work in them for now and in the future. Identifying new products and markets, evaluating the success of existing CIP programs, and providing effective communications lay the foundation for a vibrant, dynamic CIP plan that achieves energy-saving goals and delivers participant value.

Renewable Energy Sector

The basis for this sector is the continuation of the successful Community-focused Renewable Energy/Distributive Generation Pilot Program that was filed as part of Minnesota Power's 2004–2005 Biennial Plan. This program continues to focus on key infrastructure issues related to small scale renewable technology, from photovoltaics to wind turbines and biomass projects. It provides easy access to information on technologies and incentives that impact decision making and transform the market for renewable energy applications in MP's service area.

Although each of the programs in these sectors is important to an overall successful CIP initiative, they are not viewed as isolated or stand-alone entities. As shown in

Figure 8-1, these programs fit together as part of a synergistic whole, based on MP's core principles, designed to drive long-term energy savings. It depicts MP's holistic approach to creating and delivering stakeholder value through its Five "I" Marketing Approach (incentives, information, innovation, integration, and impact) within a community-focused market strategy. Through this strategy we continue to strive to meet the needs of communities and businesses—and the people who live and work in them.

8.1.6 Other DSM Activities

Customers served by the MP's Dual Fuel, Controlled Access and Interruptible rates continue to grow. By controlling its loads, MP has been able to avoid additional generation and minimize transmission growth. However, growth in these DSM activities is not expected to be sufficient to meet the needs in the future, therefore the Project is proposed.

8.1.7 Cost Comparison of Transmission Project to Conservation Programs

The comparative cost of conservation programs to the Project is:

	Conservation	Project
Cost/kW	$ 733	$340

8.1.8 Effect of Energy Conservation Programs

Section 8.1.3 provided information on the impact of MP's conservation programs in 2004. These data are detailed in the 2004 CIP Status Report.

MP has found, through extensive work with key market players and community stakeholders, that successful conservation programs are driven by the following:

1. Targeting a delivery system to make energy-saving and efficient products available to customers when and where they want them. Experience has shown that you don't differentiate yourself by your products, but rather by how those products are marketed and packaged.

2. Delivering customer-defined value drivers - increased productivity, reduced costs, and increased comfort - to encourage investment in energy-saving products and processes.

3. Focusing on communities and their stakeholders to achieve their economic, environmental, and quality of life goals through energy conservation and efficiency.

Although MP has proven that conservation can be an effective tool to help customers get the most out of their energy dollar, it is not the only tool. It must be combined with effective supply side options (in this case a transmission upgrade) to meet the growing energy needs of customers in north central Minnesota.

8.2 Great River Energy

8.2.1 Background

GRE and its 28 member cooperatives have pursued load management and energy conservation for over 22 years. GRE, the member cooperatives and Elk River Municipal Utilities, are pleased with the overall results of these load management, energy conservation and renewable energy programs. In 2001, following 2001 legislative changes, combined spending on load management and energy conservation by GRE and its member cooperatives totaled over $12.6 million. That spending level represents 1.98 percent of the retail revenue of the 29[8] member cooperatives. Since 2001, spending has increased each year.

Spending in 2002 was $14,558,439 which was over 2.27 percent of the retail revenue, and spending in 2003 was $14,929,776 which was 2.08 percent of the retail revenue. In 2004, CIP spending was budgeted to increase to almost $16.0 million, 2.09 percent of retail revenue. In 2005 spending is budgeted at more than $17.3 million, 2.16 percent of retail revenue. In 2006 spending is budgeted at more than $17.5 million, 2.12 percent of projected retail revenue.

These programs have resulted in significant operational benefits for GRE. During high demand periods during the summer of 2001, GRE estimates that it was able to reduce its summer peak demand by 250 megawatts or 10 percent of estimated uncontrolled peak levels. In 2002 and 2003 approximately 271 MW and 285 MW was reduced during key summer peaks due to CIP load management programs. DSM and LM reduced the 2004 GRE summer peak by over 300 MW. In 2005 and 2006, the peak is projected to be reduced by 318 MW and 336 MW, respectively. GRE Cooperatives provide a tabular Conservation Improvement Program Report in the filing, and this provides a forecast of the number of participants by program. This information is not available for the Badoura area, but only for the entire cooperative.

GRE has a significant amount of load management in place, with over 300 MW controlled in 2004. GRE has included a forecast of achievable levels of DSM and load management programs in its July 1, 2005 IRP that was filed with the DOC. The IRP assumes an aggressive overall system demand reduction to increase from the 2004 level of 345 MW to over 400 MW by 2007. Program levels were not provided in the IRP

[8] Head of the Lakes Cooperative Merged into East Central Energy on January 1, 2003.

by cooperative, but participant information was provided on a cooperative level in the most recently filed CIP.

GRE and its 28 member cooperatives have developed both direct impact and information programs targeted at major electrical end-uses for all customer classes.

GRE has developed energy conservation and load management programs to address all major residential uses of electricity. These programs include cycled air conditioning and ENERGY STAR® high-efficient air conditioner rebates. Air source and ground source heat pumps may also qualify for a rebate. Both of these programs provide capacity and energy savings during GRE's highest peak demand months. The cooperatives also encourage efficient use of electricity for both space heating and water heating. Many customers, especially in rural areas, find that electricity is a much-preferred fuel for both space heating and water heating. GRE encourages efficient use of electricity for these purposes and offers specific programs and rates to shift such loads to off-peak periods. These energy conservation programs are becoming especially important as more customers begin using electricity for these end-uses in response to new residential energy code requirements. GRE has also developed an ENERGY STAR® energy efficient lighting rebate program for residential customers and all 28 member cooperatives participated, and an ENERGY STAR® appliance rebate for refrigerators, dishwashers, and clothes washers.

As was mentioned in Section 7.0, commercial customers account for 39 percent of energy sales to retail customers. Accordingly, GRE has developed a number of programs to address the needs of these customers. Of these commercial programs, the Energy Grant program offers tremendous incentive for commercial customers to increase energy efficiency, which lowers both peak demands and overall energy use. In 2003, the Energy Grant program was expanded to include lighting and motor rebates. Finally, these customers may also participate in load management efforts such as cycled air conditioning and interruptible rates.

8.2.2 Conservation Goals and Objectives

GRE's conservation goals and objectives are fully outlined in its October 2004 CIP filing. The goals and expenditures are higher than required levels and are summarized in the Table 8-1.

Table 8-1 Summary of CIP Programs - GRE

SUMMARY OF CIP PROGRAMS				
Year	**Expenditures ($)**	**CIP % of Retail GOR**	**Energy Savings (kWh)**	**Peak Summer Demand Savings (kW)**
2001	12,638,000	1.98	53,056,713	250,000
2002	14,558,000	2.27	73,908,540	271,300
2003	14,930,000	2.08	113,424,783	284,700
2004*	15,985,000	2.09	159,840,694	300,000
2005*	17,300,000	2.16	211,000,000	317,800
2006*	17,500,000	2.12	264,000,000	336,000

* Projected values

8.2.3 Existing Load Management and Energy Conservation Programs and Accomplishments

GRE and its member cooperatives offer a wide variety of conservation and load management programs. A description of each of these programs is provided in Appendix E. A list of these programs, indicating which programs are energy conservation, load management, and miscellaneous other programs, is provided in Table 8-2. The "miscellaneous" group of programs includes efforts such as program evaluation, research and development, renewable generation and administrative/marketing. This categorization of programs is based in large part on DOC review and Commission approval of Dakota Electric Association's 2004 Annual Conservation Report (Docket No. E-111/M-03-2042).

Table 8-2 GRE Conservation and Load Management Program List

Residential – Conservation

Air Conditioner Tune-Up Program
Air Source Heat Pump
CFL Program
Conservation Loan Program
Electrical Evaluation and Consultation
Energy Education
ENERGY STAR® Appliance Rebate Program
ENERGY STAR® Central Air Conditioner Rebate Program
ENERGY STAR® Room Air Conditioner Program
ENERGY WISE® Home Building Program
Ground Source Heat Pump (GSHP) Program
High-Efficiency Water Heater Rebate Program
Interruptible Air Conditioning
Off-Peak Space Heating – Dual Fuel Space Heating
Off-Peak Water Heating – Electric Thermal Storage (ETS) and Peak Shave Water Heating

Residential - Load Management

Off-Peak Pool Heating and Electric Vehicles
Off-Peak Space Heating – ETS
Voluntary Summer Load Reduction Program

Residential – Renewable

Wellspring Wind Energy Program

Residential – Other

Fluorescent Bulb Recycling Program
Tree Shading

Low-Income and Renter Programs – Conservation

Habitat for Humanity
Low-Income & Renter Energy Education
Low-Income Air Conditioner Tune-Up
Low-Income Air Conditioner with Cycling Program
Low-Income Energy Audit Program
Low-Income Program
Low-Income Refrigerator Replacement Program

Low-Income Water Heater Program
Renter Assistance Program
Renter Program – Lighting & Air Conditioner Tune-Ups
Renters – Grant Allocation

Commercial and Industrial – Conservation

Commercial GSHP
Commercial & Industrial – Agricultural (C&I-A) – Energy Grant Program
Commercial and Industrial Electrical Evaluation and Consultation
Commercial Lighting
Light Emitting Diode Traffic Light Project
Street and Security Lighting
Vending Miser

Commercial and Industrial Programs – Load Management

Commercial & Industrial Demand Controller Program
Interruptible Commercial and Industrial Loads
Interruptible Irrigation
Power Factor Correction Program

Commercial and Industrial Programs – Renewable

Biodiesel Project
Biomass Grant
Customer-Owned Wind Farms
Landfill Gas to Electric Project
Stirling Engine

Miscellaneous

Depreciation of DSM Plant
Distribution Automation
DSM Potential Assessment
Energy Management Database
Energy Management Maintenance
Load Management Master Controller
Phillips Community Energy Cooperative
Program Evaluation
Regulatory Commission – CIP Projects
Research and Development

8.2.4 Other Demand Side Management Programs Considered

In 2003, GRE contracted with expert DSM consultants, Global Energy Partners LLC (Global), an Electric Power Research Institute affiliate company, to conduct a full DSM potential study. This study was reported in GRE's 2003 IRP and GRE's July 2005 IRP and those findings were integrated into its overall DSM programs. Some key results of this study include:

- Global did not identify any economic programs missing from GRE's portfolio.
- Global helped demonstrate to GRE the practical limits to achievable potential because of customer preference and saturation of programs.
- Global showed GRE that some of its existing programs could be modified (e.g. higher rebates or overall budgets) to increase savings and maximize their potential to reduce GRE's capacity and energy needs.

8.3 Ability to Meet Forecast Demands through Conservation and Load Management

While conservation and load management play a part in minimizing future generation and transmission needs, load growth continues despite more than 20 years of conservation efforts. However, because of MP's and GRE's conservation and load management programs, the current infrastructure has been able to meet the needs of its customers as long as it has. MP and GRE believe conservation and load management have deferred the need for filing to upgrade its transmission facilities until now.

The ultimate goal is to create value through energy conservation and load management activities and supply side options for the businesses, communities, and the people who live and work in them. The Applicants believe that balancing DSM activities with options like the proposed transmission line upgrade will help ensure this value for years to come.

9.0 ALTERNATIVES TO THE PROJECT

9.1 No-build Alternative

At present, voltage support and line loading are only a concern a few hours a year when load on the 34.5 kV and 69 kV systems are at or above critical load levels. However, as load continues to grow, the number of hours the area will be at risk will increase. If this inadequacy is not eliminated, a single outage could result in localized voltage collapse. If this were to occur, it could take several hours to restore electric service to the customers served by the local transmission grid. Once load is restored, rotating black-outs may be required to insure voltage would not collapse again until the equipment that caused the outage is repaired and placed back in service. Loads in this area are a concern during both summer and winter, so loss of electric service to the area could result in property damage or life threatening conditions if it cannot be restored in a reasonable time.

Under this alternative, the Commission would not approve the construction of the proposed high voltage transmission line and substation Project. For reasons described above and in Section 7.0 Peak Demand/Annual Consumption Forecasts (regarding continuing population, economic, and electricity usage growth), doing nothing is not a viable alternative. Using only the existing transmission and substation system, as is, would not provide adequate power delivery capacity or reliable service by 2009. No action with respect to the improvement to the area's electric power delivery systems would place the area's residential and commercial customers and their business, safety, and welfare at risk of being without reliable electric service.

9.2 Conservation Alternatives

As thoroughly documented in Section 8.0 – Energy Conservation and Load Management Programs, effective conservation measures employed in the Project area have deferred but cannot eliminate the need to install a new transmission line and two substation additions/modifications in the Project area. Conservation programs will continue to be implemented in the area to maximize efficient use of electricity. Additional conservation programs are not as cost-effective or predictable as the proposed transmission Project.

9.3 Increasing Efficiency of Existing Lines

Reconductoring the existing 34.5 kV and 69 kV lines serving the area would reduce the voltage drop along the line and eliminate line overload issues. However, the voltage improvement would not be significant; therefore, reconductoring would only delay the need for a new source to serve the area by a few years at most. Simple reconductoring is not a reasonable solution. For the Project area under study, the concern is the large amount of load served by a single radial 115 kV transmission line. Loss of this line puts a large amount of load on long radial 34.5 kV lines, such that voltage drop will always be a concern.

9.4 Upgrading/Rebuilding Existing Facilities

9.4.1 Park Rapids Area

GRE recently upgraded a 34.5 kV line between the Hubbard Substation and Long Lake Substation to 115 kV operation. This provided the start of a 115 kV loop into the Park Rapids area. MP and GRE are proposing to rebuild the existing Long Lake-Badoura 34.5 kV line to be operated at 115 kV. This 34.5 kV line will soon be unable to serve a useful function at its present voltage level, as the distance from load results in poor voltage support to the load that is placed on the end of this line. Using this existing 34.5 kV corridor for the rebuild is the recommended plan.

9.4.2 Pequot Lakes Area

MP and GRE are proposing to rebuild portions of the 34.5 kV system to 115 kV operation wherever feasible. Existing 34.5 kV corridors could be used in many cases, except for a portion from Pine River to Pequot Lakes where new right-of-way would be required to reach a nearby MP 230 kV line corridor that has space for an additional 115 kV line.

9.5 Double Circuiting

9.5.1 Park Rapids Area

An existing 34.5 kV line between the Hubbard Substation and the Long Lake Substation serves MP's Hubbard load and GRE's Pine Point, Osage, and, for a short-term (until converted to 115 kV), the RDO industrial load. This line would be a candidate for double-circuiting, as a local 34.5 kV circuit has to be maintained to serve the load. Although double circuiting this line would be feasible this option was rejected for the following reasons:

- Both Long Lake 115 kV sources would come from the Hubbard Substation, including the third alternative 34.5 kV source. This is not favorable from a reliability standpoint if something happens at the Hubbard Substation.

- The 115 kV lines would parallel each other in basically the same north-south corridor for the nearly seven miles, with no more than a mile separation (with a majority of the distance within a half a mile of each other). Damage from severe storms could potentially impact both lines at the same time.

- Long-term, MP and GRE expect a need for a future 115/34.5 kV source between Dorset and Nevis. A Long Lake-Badoura 115 kV line would offer a connection point for this future source.

MP and GRE also considered double circuiting the 34.5 kV line between the Akeley and Long Lake substations, which would nearly parallel the proposed Badoura-Long Lake corridor. However this option was rejected for the following reasons:

- The double circuit design would increase the cost of the transmission compared to the Badoura-Long Lake line section, which is nearly equivalent in line mileage.
- A common structure failure on the Long Lake-Akeley 115 kV line would impact the alternative sources available to Long Lake, as the Akeley-Long Lake 34.5 kV line would also be impacted.

9.5.2 Pequot Lakes Area

MP and GRE are considering using existing transmission corridors for the Badoura-Pequot Lakes area, primarily following the growth corridor of TH 371. In some portions of the Project area, the existing 34.5 kV line could be replaced with a new single circuit 115 kV line. In other portions, the proposed 115 kV line could share right-of-way with the existing 34.5 kV circuit along the TH 371 corridor between the Birch Lake Tap and the Pine River area. Double circuiting with the existing 34.5 kV line is a possibility; however, MP prefers to retain the existing 34.5 kV line with its existing distribution underbuild along this corridor for the following reasons:

- The existing structures carry 34.5 kV subtransmission and 12 kV distribution circuits.
- MP plans to use the 34 kV system to pick up any potential three phase loads as they occur and maintain the existing single phase underbuild on the 34 kV structures. This line presently supplies existing single phase loads and will pick up new single phase loads as they occur.
- It is not feasible to construct a 115 kV circuit with both 34.5 kV and 12 kV distribution underbuild, therefore double circuiting may not eliminate one set of structures.

An alternative considered was double circuiting with the 34.5 kV line between Pine River and Pequot Lakes. This alternative was rejected for the following reasons:

- The corridor is along the DNR’s Paul Bunyan Trail and may restrict the transmission corridor if TH 371 is widened for road improvements.
- Potential TH 371 expansion between Pequot Lakes and Pine River may require future relocation of the 115 kV line, resulting in future expenses.

- MP has an easement for an additional transmission line along it existing 230 kV line south of the Crow Wing Power Pine River Substation near Pine River that could connect to Pequot Lakes.

- The cost of using the existing 34.5 kV corridor may be significant, as there is also local distribution within this corridor that will have to be rebuilt.

The proposed corridor from the CWP Pine River Substation to the MP 230 kV line contains a CWP double circuit three phase distribution line from the Pine River Substation to just south of Pine River, and a single circuit three phase distribution line the rest of the way to the MP 230 kV line. The 115 kV circuit in this corridor could be double circuited with one, three-phase distribution circuit as an underbuild. In the corridor with the double circuit, CWP could bury one of the distribution circuits to accommodate a transmission line design that uses a single transmission structure.

9.6 Alternate Line Tap Locations or Different Voltages

9.6.1 Park Rapids Area

MP and GRE looked at alternative locations to a new 115 kV line in the Long Lake area. Section 9.5 addresses alternative locations to Hubbard and Akeley. In the GRE Long Range Plan, GRE originally recommended a 230/115 kV tap called Wolf Lake with a 115 kV line built to the Long Lake Substation. Tapping the 230 kV line with a new substation would result in a large investment that really isn’t necessary. Any other location beyond those identified would not make economic sense.

9.6.2 Pequot Lakes Area

MP and GRE reviewed potential routes for the transmission lines for locations of substations. Basically the evaluation looked at the potential growth area with the following assumptions made:

- A second 115 kV source is needed into Pequot Lakes.

- A source is needed into Birch Lake, preferably one that involves a load tap changing transformer for voltage control.

- Load has to be removed in the Pine River area to a new source at a load-serving voltage. Transmission lines 115 kV and less are considered voltage levels that distribution loads can easily be added.

- The growth corridor is along TH 371 and to the east of TH 371 in the lake region.

- CWP identified a new substation site needed for distribution concerns east of Backus near Lake Ada. It would not be possible to serve this load from the nearby 34.5 kV system.

- Forecasts shows that the Walker area will need a future 115 kV line.

- Long-term, GRE has identified a potential 115 kV need in the Blind Lake area and Hill City if load continues to grow at its current pace; this situation could involve a potential Hill City-Blind Lake-Backus 115 kV line.

Depending upon the route that is eventually selected, it was determined that using existing 115 kV termination points at Badoura and Pequot Lakes would answer many of the concerns stated above. MP and GRE did look at tapping the Badoura-Riverton 230 kV line near Pine River, but such an investment basically duplicates the existing Badoura 230/115 kV Substation and would not significantly reduce any of the proposed 115 kV line construction to meet the above criteria. A new source from the 34.5 kV and 69 kV systems was not considered because a connection to these systems would have to come from a different region and would be too distant when voltage drop is already an issue.

A new 230 kV line was not considered, as the line is needed for local load-serving for substations such as the CWP Pine River Substation. Distribution substations are cost-effective at 115 kV levels, as a 115 kV switch and 115 kV distribution transformer can fit on small sites at reasonable cost. At 230 kV levels the substations get rather expensive, as more protection (e.g., breakers) and more space for 230 kV separation are needed.

The Badoura-Riverton 230 kV line route has the capability of accommodating a new 115 kV line. This option was considered for establishing a Badoura-Pine River-Pequot Lakes 115 kV line. However, this would put the 115 kV line west of the growth corridor, resulting in construction of 115 kV radial fingers to where the load is. With this option, radial lines would be built to the Pine River load and to Birch Lake through another 115 kV outlet at Badoura. Basically, what the Project could accomplish with one line would be replaced with two separate line Projects that only increase the mileage of new line being built, with no additional benefits and limited options for long-term growth to the east of TH 371.

9.7 Generation Alternatives

9.7.1 Park Rapids Area

Generation and distributed generation were considered as an alternative to new transmission for the Park Rapids area. Based on load flow steady state analysis, initially 20 MW of generation would be required in Park Rapids. This estimate is based on the minimum generation necessary to maintain voltage and prevent line overloads after loss of the radial 115 kV line supplying the Long Lake Substation provided numerous switching events are completed to move portions of the areas load to the Badoura, Akeley and Hubbard substations. In order to eliminate the transfer of load to other substations, the generation would need to be increased to levels that could support all the load served out of the Long Lake substation or over 50 MW.

The generation could be located at one location, or distributed at two or more locations. However, the most cost-effective method would be to connect the generators to the electric grid and operationally locate them in one place due to costs associated with interconnecting to the electric grid as well as communication and control issues

Because this area has natural gas, the generators could be sized to meet future load. However, if the generation were to be distributed at sites away from the Park Rapids area, natural gas may not be available, therefore more costly fuels such as diesel or propane would be used. Because of this situation, combined with the efficiencies of having the generation located at one site, cost estimates for generation were based a 20 MW unit located at one site.

For generation to prevent an outage in the Park Rapids area if the existing 115 kV source to the Long Lake Substation were lost, it must be on-line when an outage occurs. However, this is unlikely because of the high cost of natural gas, diesel and/or propane fuel.

Because generation may not be on-line during a contingency, it is likely that area loads would be lost due to under voltage load shedding (depending on load levels). The generators would then need to be started, synchronized and load restored. This would take approximately ten to thirty minutes, provided automatic switches are installed to allow load to be transferred to other substations and load not transferred picked up in sections. Depending on the length of time required to get loads back on line, there is a possibility of loss of load diversity[9]. This could result in a significant increase in electric load immediately after restoration, and a possibility that more than **20** MW of generation would be required to meet the Park Rapids area needs even after load is transferred to other substations.

Generation would not be as reliable as transmission because of these operating issues, and short outages would likely occur as the generation is started, load transferred and load picked up. Additional generation would need to be added in future years to keep up with load growth. Lastly, generation would not eliminate the need for additional transmission; it would only delay its need. It would be prudent to add transmission now and remove the security risk associated with this type of generation because of the high operating costs of generation and the risk of load being shed post contingency for loss of the Long Lake Substation's only electric connection to the regional grid..

[9] Loading significantly above typical peaks can occur when load is reconnected after an outage due to loss of load diversity. For example, typically only a small portion of electric heat would be on at any point in time. This is because some homes would be at the level set by the thermostat and their furnaces cycled off. This load diversity could be lost if a significant number of homes cool below the thermostat set point prior to electric service being restored. If this were to occur, on-line electric heat load may result in loads above typical peak due to loss of load diversity.

9.7.2 Pequot Lakes Area

Generation and distributed generation were also considered as an alternative to new transmission into the Pequot Lakes area. Based on load flow steady state analysis, the projected generation sites would initially be located as follows:

- 8 MW at Pine River by 2007
- 8 MW at Nisswa by 2007
- 6 MW at Emily by 2007
- 8 MW at Birch Lake or Wabedo by 2007

Because some areas do not have natural gas, the generators would need to be fueled by diesel, gasoline or propane. Depending on the fuel type, these generators may or may not meet the Minnesota statutory definition[10] to be classified as distributed generation even though they would meet the Institute of Electrical and Electronics Engineers (IEEE) definition[11]. Typically these generators would be 1.5 to 2 MW in size; therefore several units would be required. It is unlikely that these generators would be on-line in anticipation of an outage occurring because of the high cost of this type of fuel.

Because the generation may not be on-line during a contingency, it is likely that area load would be lost due to under voltage load shedding (depending on load levels). The generators would then need to be started, synchronized and load restored. This would take up to thirty minutes, provided automatic switches are installed to allow load to be picked up in sections. Depending on the length of time required to get loads back on line, there is a possibility of loss of load diversity. This could result in a significant increase in electric load immediately after restoration, and a possibility that additional generation would be required to meet the Pequot Lakes-Birch Lake area needs.

9.7.3 Adequacy of Generation

To estimate how long generation would delay the need for a transmission improvement, hourly historic load data for flows on the 34.5 kV feeder serving the Pine River and Pequot Lakes area from April 1, 2004 to March 31, 2005 was used. The hourly load data was scaled up by the annual load growth rates provided by the load forecast. A load duration curve was then derived for future years and the number of hours the load was above the critical load level was determined. Based on this, it was determined that it would be prudent to have a transmission fix in service to provide support to Pine River and Pequot Lakes by 2012, a delay of approximately three years.

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[10] Minn. Stat. §216B.169, subd. 1 (c) defines distributed generation as high-efficiency, low-emissions, distributed generation of no more than 10 MW of interconnected capacity certified by the Commission. Recently enacted Minn. Stat. §216B.2426 requires the Commission to ensure that distributed generation is considered in this Biennial Transmission Projects Report Certification proceeding.

[11] IEEE Std 1547-2003 defines a distributive resource as having an aggregate capacity of 10 MVA or less that are not directly connected to a bulk power transmission system.

In addition to the historic load duration curves, load flow analysis was also used to estimate how far into the future the generation addition would be able to support this area's electric system. Generation additions were modeled at the locations listed above and load flow simulations were performed. The critical contingencies were then simulated (loss of the Pequot Lakes 115 kV line and loss of the 34.5 kV 507 Feeder at Pequot Lakes). And load was scaled up as directed by the load forecast until voltage could no longer be maintained within acceptable limits or lines exceed their thermal rating. This analysis also indicated that the generation alternative failed by 2012.

9.7.4 Economic Analysis of the Generation Alternative

An economic analysis was conducted to determine if generation was a reasonable solution. Results of this analysis indicate that the initial cost of installing generation would be $18,670,000 for the 20 MW in the Park Rapids area and $9,355,000 for the generation necessary to support the Pequot Lakes, Pine River Birch Lake and Emily area or a total of $28,025,000.

However, because the generation does not eliminate the need for the Project, the cost associated with delaying the Project until 2012 also needs to be factored in. Assuming that the generation would be placed in service in 2007 and the Project constructed in 2012, the total cost of the generation alternative would be $59,275,907 in 2005 dollars. Due to the cost of this alternative and operating issues associated with getting the generation on-line and load restored, generation is not a reasonable solution to address the area's reliability needs.

9.8 Transmission Line Requiring New Right-of-Way

9.8.1 Park Rapids Area

As discussed in Section 9.6, a Wolf Lake 230/115 kV option was considered. This option would require new right-of-way and would involve building a 115 kV line from Wolf Lake to the Osage 34.5 kV line. The Osage line would be converted to 115 kV to provide a source to the Long Lake Substation.

9.8.2 Pequot Lakes Area

As discussed in Section 9.6, a new 230/115 kV substation tapping the 230 kV line (#91 Line) near Pine River and the use of an existing Badoura-Riverton 230 kV line corridor were considered. Due to the tight constraints for a 115 kV line going through in the Pine River area, the alternatives discussed above and the Project all require new 115 kV line from the Crow Wing Power Pine River Substation to the existing Badoura-Riverton 230 kV line corridor.

9.9 Summary of Alternatives Considered

Tables 9-1 and 9-2 provide a comparison between the Project and alternatives considered to solve the inadequacy in the electric system supplying the loads in the Park Rapids and Pequot Lakes areas.

Table 9-1 Comparison of Alternatives and the Project - Park Rapids Area

Alternative	Transmission Distance	Improve Security	Improve Reliability	Long –Term Solution	Cost
Reconductor (Section 9.3)	20 miles	No	No	No	$3,050,000
Wolf Lake 230/115 kV Substation, Wolf Lake-Long Lake 115 kV Transmission (Section 9.6)	20 miles	Moderate	Yes	Yes	$18,400,000
*Generation (Section 9.7)	None	No	No	No	$18,670,000
Akeley to Long Lake (Section 10.0)	16 miles	Yes	Yes	Yes	$10,905,000
The Project Badoura-Long Lake (Section 3.0)	17.5 miles	Yes	Yes	Yes	$9,795,000

Table 9-2 Comparison of Alternatives and the Project - Pequot Lakes Area

Alternative	Transmission Distance	Improve Security	Improve Reliability	Long –Term Solutions	Cost
Reconductor (Section 9.3)	39 miles	No	No	No	$11,938,000
Pine River 230/115 kV Substation, Pine River-Pequot Lakes, Badoura-Birch Lake 115 kV Transmission (Section 9.6)	28 miles	Yes	Yes	Minimal, radial lines to Pine River and Birch Lake and impacts further 115 kV development to east	$23,703,000
*Generation (Section 9.7)	None	No	No	No	$9,355,000
Badoura-Pequot Lakes & Tap to Birch Lake, (Section 10.0)	49 miles	Yes	Yes	Minimal, radial lines to Pine River and Birch Lake and impacts further 115 kV development to east	$28,176,000
The Project Badoura--Pine River-Pequot Lakes & Tap to Birch Lake (Section 3.0)	39 miles	Yes	Yes	Yes, allows for further 115 kV development to the east	$26,093,000

* Does not include cost to construct the Project in 2012, which would be required to meet Badoura needs.

10.0 DETAILED DESCRIPTION OF TRANSMISSION CORRIDOR ALTERNATIVE

10.1 Detailed Description of the Corridor Alternative

10.1.1 Probable Location of the Corridor Alternative

The alternative corridor is located primarily in Cass and Hubbard counties (Figure 10-1). The corridor from Pequot Lakes to Park Rapids is comprised of nine segments totaling 61.3 miles: A, G, and J (diagonal corridor), C, E, I, H, K and M. The segments are described below.

Segment A (5.5 miles)

The corridor alternative begins at the Pequot Lakes Substation and exits to the north following the Riverton to Badoura 230 kV line, traveling cross-country in a northwesterly direction until it intersects with CR 1, approximately three miles south of Pine River.

Segment C (3.4 miles)

New right-of-way would start at a new tap on the Riverton to Badoura 230 kV line and then run north to the Pine River Substation.

Segment E (2.5 miles)

New right-of-way would start southwest of the Pine River Substation and travel west to the Riverton to Badoura 230 kV line.

Segment G (8.2 miles)

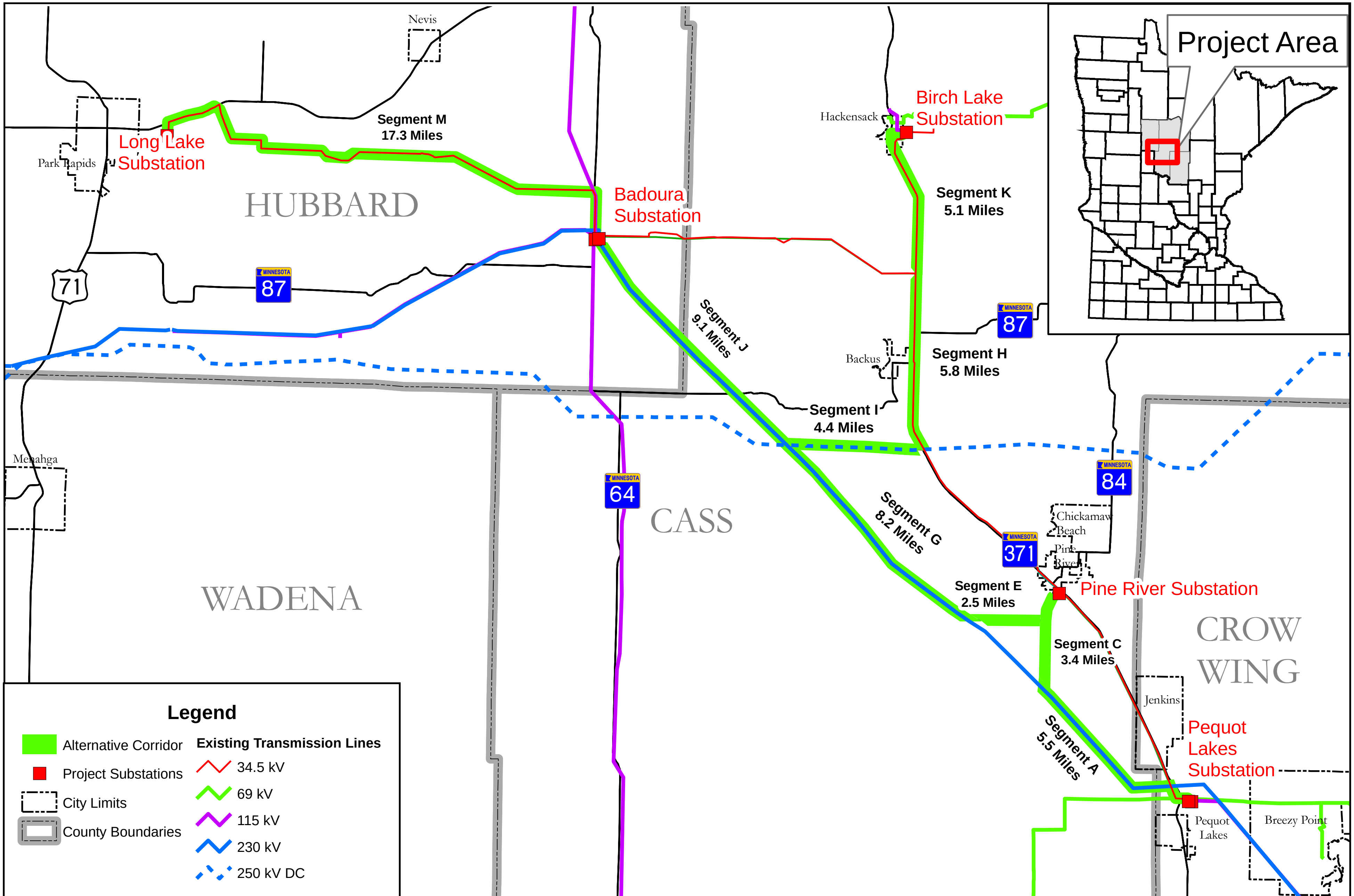
This segment follows the Riverton to Badoura 230 kV line from the intersection with Segment E until it intersects with the MP DC line.

Segment H (5.8 miles)

This segment follows a 34.5 kV line that starts at the intersection point with the MP DC line and continues to parallel TH 371 on the east side until the Birch Lake 34.5 kV Tap (approximately two miles north of Backus).

Segment I (4.4 miles)

This segment follows the MP DC transmission line from its intersection with the Riverton to Badoura 230 kV line until its intersection with the 34.5 kV line that parallels TH 371 (approximately three miles south of Backus).



0 1.5
Miles

Figure 10-1 - Alternative Corridor Project Map
Badoura 115 kV Transmission Project
Cass, Crow Wing, and Hubbard Counties, MN

Segment J (9.1 miles)

This segment follows the Riverton to Badoura 230 kV line from the intersection with the MP DC line and runs cross-country until it terminates at the Badoura Substation.

Segment K (5.1 miles)

This segment follows a 34.5 kV line that starts at the Birch Lake 34.5 kV Tap (just north of Backus) and continues to parallel TH 371 on the east side until just south of Hackensack where it turns northeast and runs cross-country to Third Street before terminating at the Birch Lake Substation.

Segment M (17.3 miles)

The last segment follows the Badoura to Long Lake 34.5 kV line that exits the Badoura 115 kV Substation paralleling CR 64 northerly for approximately 2.5 miles. It then crosses CR 64 and travels westerly before meeting 174th Street. It parallels 174th Street on the south side until it turns south at Crown Point Road, where the line crosses the road and continues west cross-county. The line then intersects with CR 11 and turns north paralleling CR 11 until it intersects with 178th Street. The line turns west and parallels 178th Street until it intersects with CR 20, then follows CR 20 north until it intersects with TH 34. It then turns west and follows TH 34 around the north end of Long Lake until it intersects with 169th Avenue. The line turns south and follows 169th Avenue until it reaches the Long Lake Substation (just east of Park Rapids).

10.1.2 Summary of Public, Tribal and Governmental Input on Alternative

The public, tribal, and governmental interests were provided maps and notification of the alternative corridor along with the Project. The summary of input on the Project in Section 5.1 addresses the alternatives as well.

10.2 Analysis/Mitigation of Economic, Environmental and Social Consequences

10.2.1 Physiographic Setting

The alternative corridor also starts in Crow Wing County, passes through Cass County and ends in Hubbard County. Physiographic setting in this area is characteristic of the Pine Moraines and Outwash Plains subsection as described in Section 5.3. Elevations generally range between 1,250 and 1,500 feet across the area. The lowest elevation is 1,232 feet near the Pine River, and the highest elevation is 1,565 feet located between the Badoura Substation and TH 371. Minimal surficial and subsurface disturbances will occur for all proposed corridors. No impacts to the physiographic setting are anticipated.

10.2.2 Human Settlement

In general, the human settlement setting for the alternative corridor is the same as for the proposed corridor. Segments A, G and J do not pass through any towns or population concentrations. However, the necessary connections to the Pine River Substation and Birch Lake Substation would result in the connecting corridors crossing the towns of Pine River, Backus and Hackensack along existing ROW, depending on the alternative configuration. See Section 5.4 for a description of the existing human settlement environment for the Project. There are no impacts to human settlement anticipated as a result of the Project.

10.2.3 Socioeconomic Setting

In general, the socioeconomic setting for the alternative corridor is the same as for the proposed corridor. The demographic and socioeconomic conditions are essentially the same with the exception that the alternative corridor would cross a greater percentage of rural conditions. See Section 5.5 for a description of the existing socioeconomic environment for the Project.

<u>Environmental Consequences and Mitigation</u>

Any impacts to social and economic resources should be of a short-term nature. Revenue would likely increase for some local businesses, such as hotels, restaurants, gas stations and grocery stores, due to workers associated with construction of the Project. Other local businesses, such as ready-mix concrete and gravel suppliers, hardware stores, welding and machine shops, packaging and postal services and heavy equipment repair and maintenance service providers would also likely benefit from construction of the Project. Impacts to social services would be unlikely because of the short-term nature of the construction Project. Construction crews would be approximately 20-30 personnel for the Project. Construction workers would likely reside temporarily in the nearby towns (Park Rapids, Hackensack, and Pine River).

There will also be some long-term beneficial impacts from the new lines. These benefits include an increase to the counties' tax base resulting from the incremental increase in revenues from utility property taxes based on the value of the Project. The availability of reliable power in the area will have a positive effect on local businesses and the quality of service provided to the general public.

10.2.4 Noise, Radio and Television

The alternative corridor would utilize similar structures and conductors and connect into the same substations as the Project as discussed in Section 5.6. Therefore, noise, radio and television impacts are not expected to noticeably differ based on the final route. The improvements at all substations would be designed and constructed to comply with state noise standards. Although radio and television interference sometimes occurs, the Applicants investigate all such problems and correct those problems caused by the Applicants' facilities. The Applicants do not expect that there would be any impacts from the operation of the new line.

10.2.5 Electric/Magnetic Fields

The alternative corridor would utilize similar structures and conductors and connect into the same substations as the Project as discussed in Section 5.7. Therefore, EMF impacts are not expected to noticeably differ based on the final route. To the extent practicable, the Applicants would locate the proposed transmission lines to maximize the distance to residences and buildings.

10.2.6 Land Use

Land use in Segments A, C, H, K and M was discussed in Section 5.8. Land use in segments G, I and J consist of northern forest state lands, cottages and residential properties. The necessary connections to the Pine River Substation and Birch Lake Substation would result in the connecting corridors crossing the towns of Pine River, Backus and Hackensack along existing right-of-way, depending on the alternative configuration.

Environmental Consequences and Mitigation

Impacts to land use as a result of the Project are expected to be minimal. Because Segments A, G and J follow the existing 230 kV transmission line, construction within transmission ROW would minimize placement of structures in other land uses. Some placement of structures outside of existing right-of-way may be necessary due to expanded ROW needs associated with the upgraded facility. The Applicants would work with the Backus and Pine River Municipal airports to ensure that structures comply with airport safety zones and ordinances.

10.2.7 Cultural Resources

The alternative corridor consists of Segments A, C, E, G, I, H, J, K, and M. Segments A, C, H, K and M were discussed in Section 5.9 and according to the SHPO database, all of these segments contain recorded historic structures and/or archaeological sites within the specific sections crossed by the alternative corridor (see Table 5-3). As indicated in Table 10-1, Segments E and G each contain a recorded property and Segments I and J do not have any recorded historic properties or archaeological sites within the sections crossed by the alternative corridor.

Table 10-1 Recorded Structures and/or Archaeological Sites - Alternative Corridor

Segment	Historic/Architecture	Archaeology
E	1 property CA-WLS-001	0 sites
G	1 property CA-PRT-001	0 sites
I	0 properties	0 sites
J	0 properties	0 sites

Environmental Consequences and Mitigation

The alternative segments would have similar environmental consequences and mitigation measures as discussed in Section 5.9.2. Route selection would occur after Project certification and, at that point, more detailed analysis would occur to determine if any impacts may occur. In addition, it is likely that most eligible features could be spanned.

10.2.8 Hydrologic Features

This section describes the hydrologic resources within the alternative corridor segments, including wetlands, lakes, streams, floodplains and groundwater.

Existing Environment

Most of the alternative corridor segments lie within the Pine River watershed of the Upper Mississippi River Basin but a portion of Segment J lies within the Crow Wing River watershed of the Upper Mississippi River Basin. Within the portion of the segments in Hubbard County, surface water flows generally towards the Crow Wing River; within Cass and Crow Wing counties, the water generally flows towards the Pine River.

The regulatory environment for hydrologic features in the Project area is described in Section 5.10.

NWI Wetlands

Wetland resources for the alternative corridor were identified by reviewing USFWS NWI mapping. NWI wetlands are shown in Figure 10-2. Within Segment E, there are 22 NWI wetlands totaling 147 acres; palustrine scrub/shrub types make up the majority of the area. Within Segment G, there are 130 NWI wetlands totaling 678 acres; palustrine scrub/shrub types make up the majority of the area. In Segment I, there are 32 NWI

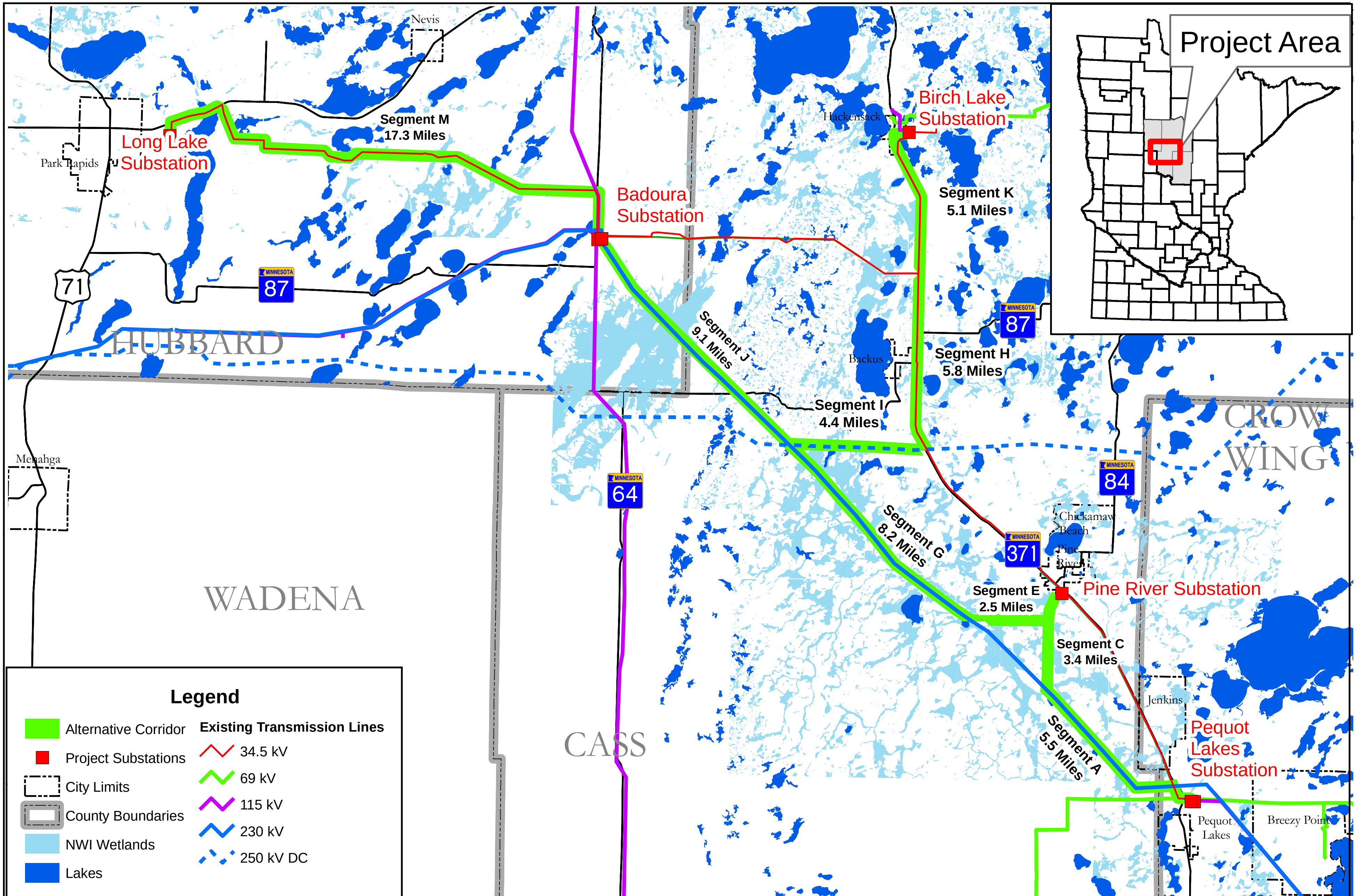


Figure 10-2 - National Wetlands Inventory Map - Alternative Corridor
Badoura 115 kV Transmission Project
Cass, Crow Wing, and Hubbard Counties, MN

wetlands totaling 161 acres; palustrine scrub/shrub and palustrine emergent types make up the majority of the area. In Segment J, there are 102 NWI wetlands totaling 552 acres; palustrine scrub/shrub type wetlands make up the majority. Within Segment C, there are 51 NWI wetlands totaling 408 acres; palustrine scrub/shrub and palustrine emergent type wetlands make up the majority of the area. Table 10-2 shows the wetland resources for the segments in the corridor. Wetland resources for Segments A, C, H and K are described in Section 5.10.

Table 10-2 NWI Wetlands in Alternative Segments

Wetland Type	No. of Basins	Area (Acres)	Percent of Corridor
SEGMENT E			
Lacustrine	0	0	0.0
Palustrine	-	-	-
Emergent	6	24	16.3
Forested	1	5	3.1
Scrub/shrub	15	118	80.6
Unconsolidated bottom	0	0	0.0
Riverine	0	0	0.0
Total	**22**	**147**	
SEGMENT G			
Lacustrine	0	0	0.0
Palustrine	-	-	-
Emergent	39	113	16.7
Forested	15	127	18.7
Scrub/shrub	57	418	61.7
Unconsolidated bottom	19	20	2.9
Riverine	0	0	0.0
Total	**130**	**678**	
SEGMENT J			
Lacustrine	0	0	0.0
Palustrine	-	-	-
Emergent	27	55	10.0
Forested	0	0	0.0
Scrub/shrub	43	469	84.9
Unconsolidated bottom	32	28	5.1
Riverine	0	10	0.0
Total	**102**	**552**	
SEGMENT I			
Lacustrine	0	0	0.0
Palustrine	-	-	-
Emergent	15	45	28.0
Forested	5	27	16.9
Scrub/shrub	9	86	53.6
Unconsolidated bottom	3	2	1.5
Riverine	0	0	0.0
Total	**32**	**161**	

PWI Waters

The alternative corridor crosses six PWI water bodies (all in Cass County except for 320W in Segment J, which is in Hubbard County) as shown on Figure 10-3. Table 10-3 shows the PWI resources in the alternative segments.

303 (d) Impaired Waters

There are no MPCA-listed impaired waters within the alternative corridor.

Table 10-3 PWI Waters in Alternative Segments

Segment	Name	Type	Location
G	Unnamed (636 P)	Lake	T138N, R31W, Sections 10 and 15
	South Fork of Pine River	River/Stream	T137N, R30W, Sections 3 and 9
J	Unnamed (700 P)	Lake	T138N, R31W, Section 4
	Unnamed (320W)	Wetland	T139N, R32W, Sections 14, 23, 24 and 25
I	Abel Lake (443 P)	Lake	T138N, R31W, Sections 11 and 14
	South Fork of Pine River	River/Stream	T138N, R31W, Section 11

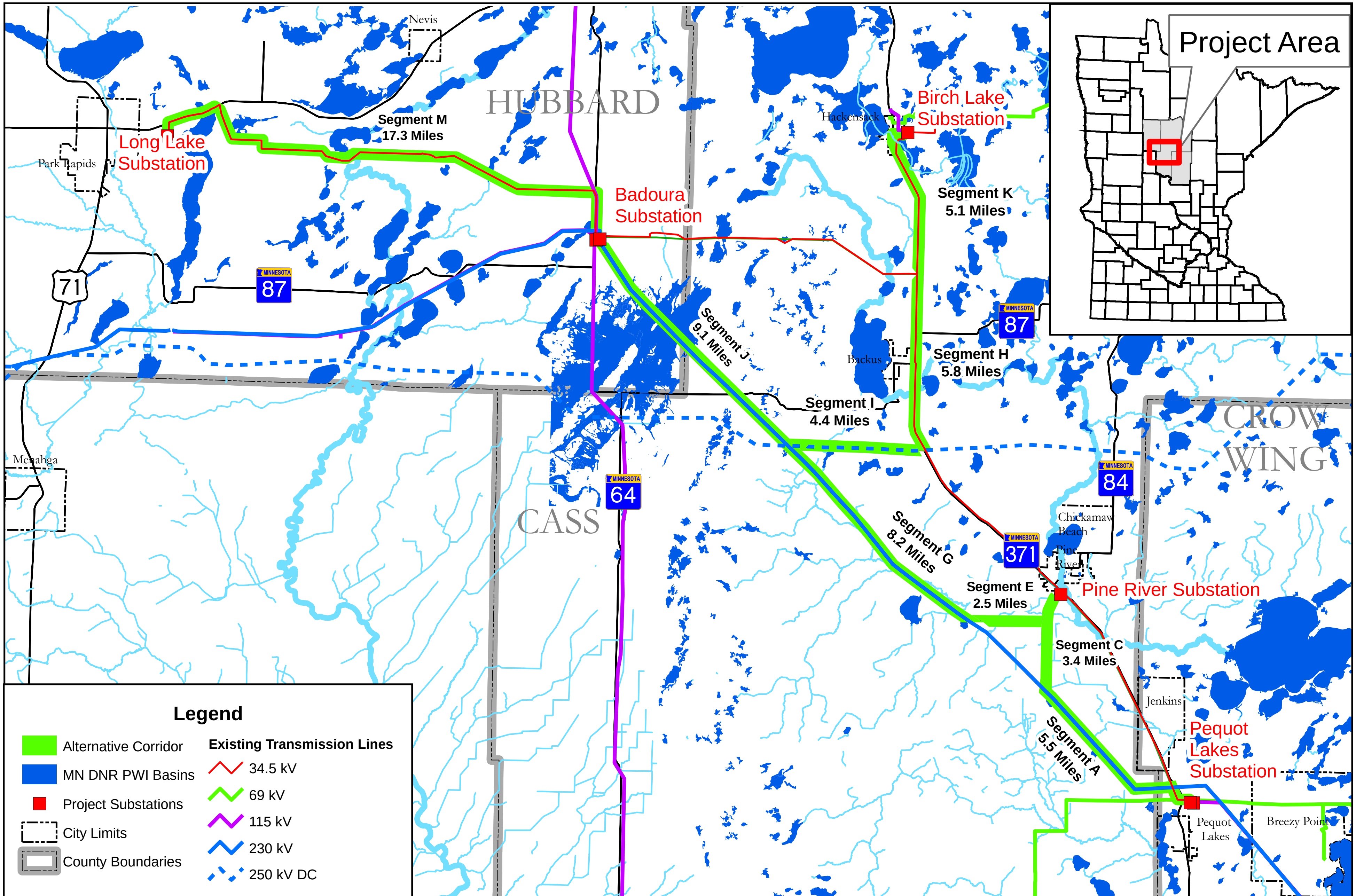
Floodplains

The portions of Hubbard, Cass and Crow Wing counties within the alternative corridor have not been mapped by the FEMA for floodplains. It is possible that the segments cross the 100-year floodplains associated with the Pine River and/or Behler Creek, as well any floodplains associated with the lakes in the vicinity.

Environmental Consequences and Mitigation

Impacts to hydrologic resources could occur by directly filling wetlands, floodplains or Public Waters due to construction of the Project or by otherwise negatively altering their functions and values. The Applicants would perform a wetland delineation of the selected route, concentrating on areas of disturbance near proposed transmission structures. Depending on the results of the delineation, Project components may be moved to avoid affecting wetlands within the corridor.

The Applicants anticipate that most wetland areas and surface water features, such as rivers and streams, would be avoided by spanning the transmission line over the water bodies. There are several PWI and NWI basins that are wider than 1,000 feet within the



0 1.5 3
Miles

Figure 10-3 - Water Resources Map - Alternative Corridor
Badoura 115 kV Transmission Project
Cass, Crow Wing, and Hubbard Counties, MN

minnesota power
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GREAT RIVER ENERGY
HDR

alternative corridor (particularly PWI 320W in Segment J) and may not be spanned completely. However, rebuilding in-place or paralleling the existing 230 kV transmission lines that currently skirt the majority of the hydrologic features would minimize any new impacts to wetlands and water bodies.

To further protect hydrologic features, BMPs for sediment and erosion control would be implemented. To minimize contamination of water due to accidental spilling of fuels or other hazardous substances, all construction equipment would be equipped with spill cleanup kits.

In the unlikely event that impacts to hydrologic features are unavoidable, the Applicants would work with the jurisdictional agencies (USACE, DNR and/or BWSR) to determine the best ways to minimize the impacts and create appropriate mitigation measures.

10.2.9 Flora and Fauna

The vegetation, wildlife and special status species resources within the alternative corridor segments are described in this section.

<u>Existing Environment</u>

Vegetation

The alternative corridor segments are found within the Northern Lakes and Forests Ecoregion, which is dominated by mature conifer and northern hardwood forests and interspersed with lake and wetland plant communities. Table 10-4 shows the Landsat land cover data for the alternative corridor segments.

Table 10-4 Landsat Land Cover Types in Alternative Segments

Land Cover Type	Segment E		Segment G		Segment I		Segment J	
	Area (acres)	Percent of Corridor	Area (acres)	Percent of Corridor	Area (acres)	Percent of Corridor	Area (acres)	Percent of Corridor
CONIFEROUS FOREST	21	4.4	161	7.7	63	6.5	449	21.1
DECIDUOUS FOREST	87	18.3	651	31.0	413	42.6	803	37.7
GRASSLAND/SHRUBBY GRASSLAND	247	51.7	899	42.9	386	39.8	448	21.1
WETLANDS	64	13.4	223	10.6	35	3.6	360	16.9
OPEN WATER	0	0.0	1	0.1	0	0.0	9	0.4
CULTIVATED LAND/RURAL FARMSTEAD	58	12.2	164	7.8	72	7.5	58	2.7
URBAN/INDUSTRIAL (CITIES & TOWNS)	0	0.0	0	0.0	0	0.0	0	0.0

The alternative corridor crosses the Badoura State Forest in Hubbard County (both Segments J and M), the Foothills State Forest in Segments G, I and J and is within half a mile of the Foothills State Forest near Hackensack. Section 5.11 describes the vegetation in these state forests.

Wildlife

The wildlife species found in the alternative corridor is similar to those found in the proposed corridor. See Section 5.11 for a description of wildlife resources within the Project area.

Special Status Species

A review of the Minnesota Natural Heritage Database identified no special status species within the 2,000-foot wide alternative corridor. Four special status species were listed within one mile of the corridor: one bald eagle site (described in Section 5.11), two Blanding's turtle sites and one Greater prairie-chicken site. The Blanding's turtle and Greater prairie-chicken sites are located within Badoura State Forest. The Blanding turtle is a state threatened species with no federal status; habitat is primarily shallow marshes but can also include upland grasslands. The Greater prairie chicken is a state special concern species with no federal status; this species is found in tall-grass prairie remnants. All of these special status species could potentially be in the alternative corridor.

<u>Environmental Consequences and Mitigation</u>

Vegetation

Impacts to vegetation may occur due to the placement of structures. The area around the structure may also be temporarily disturbed due to construction activities. Because the corridor follows existing 34.5 kV and 230 kV lines, construction in previously undisturbed communities will be minimized. Vegetation clearing would be necessary due to expanded ROW needs associated with the upgraded facility.

Wildlife

There is minimal potential for the displacement of wildlife and loss of habitat from construction of the Project. Wildlife that inhabits natural areas, such as those near water bodies and state forests, could be impacted in the short-term within the immediate area of construction. The distance that animals will be displaced will depend on the species. Impacts to wildlife are anticipated to be short-term since the route primarily will be constructed along an existing transmission ROW.

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

Additionally, electrocution of large birds, such as raptors, is a concern related to distribution lines. Electrocution occurs when birds with large wingspans come in contact with either two conductors or a conductor and a grounding device. The Applicants would use design standards that provide adequate spacing to eliminate the risk of raptor electrocution. As such, electrocution is not a concern related to the Project. The Applicants would work with regulatory agencies to identify potential risks to wildlife species and will develop appropriate mitigative measures.

Special Status Species

No impacts to special status species are expected as a result of this Project. The minimal loss of bald eagle, Blanding's turtle and/or Greater prairie-chicken habitat that could occur would not have population level effects. As stated above, the Applicants would use design standards that provide adequate spacing to eliminate the risk of raptor electrocution.

10.3 Cost and Efficiency Analysis of Transmission Alternative

The costs for all Project alternatives are discussed generally in Section 9.0 and specific cost comparisons are provided in Tables 9-1 and 9-2.

Other information regarding costs was discussed in previous sections as follows:

- Construction Costs/Cost Analysis Assumptions – Section 4.1
- Annual Operational and Maintenance Costs – Section 4.2
- Service Life and Depreciation – Section 4.3
- Effects on Rates – Section 4.4

10.3.1 Effect of Transmission Alternative on Service Reliability

Park Rapids Area

The goal of any alternative is to provide a second 115 kV source to the Long Lake Substation. The Park Rapids area is compact and contains a rather large amount of load. Due to voltage collapse, the 34.5 kV system can not handle the loss of the only 115 kV source into the Long Lake Substation. MP and GRE are proposing that the Long Lake Substation receive a second 115 kV source and second 115/34.5 kV transformer, so that loss of a single transmission element will not interrupt service to the Park Rapids area. The Akeley to Long Lake transmission alternative is valid for this area; however, the Badoura-Long Lake 115 kV line stands out among all of the other alternatives in terms of reliability, cost, and corridor impact.

Pequot Lakes Area

The goal of any transmission alternative is to provide a 115 kV source to the Pequot Lakes and Birch Lake substations, to remove the GRE Pine River load from the 34.5 kV system, and to meet future load serving needs. The TH 371 corridor and the lake area east are considered to have significant growth potential. Any transmission improvement would benefit the area. MP and GRE coordinated its planning needs and determined that if all of the needs are addressed, then any plan would work. The Badoura to Pequot Lakes transmission alternative is valid for this area; however, the Project is preferred to all other alternatives in terms of reliability, cost and corridor impact.

10.4 Required Permits/Approvals

Permits and other approvals required would be the same for the alternative corridor as for the Project, which were discussed in Section 3.5.

11.0 SUMMARY

11.1 Satisfaction of Statutory Criteria

As discussed below, all Minn. Stat. 216B.243 factors are covered by the analysis provided in this Application. Minn. Rules pt. 7848.1400, subp. 2(v). Minn. Stat. Sec. 216B.243 specifies the procedures and content required for the issuance of a Certificate of Need for a large energy facility such as the 115 kV transmission Project proposed by MP and GRE. Subdivision 3 requires that the Applicants justify the need for the Project, generally, and show specifically that the demand giving rise to the need for the Project cannot be met more cost effectively through conservation and load-management measures.

The initial threshold (conservation/DSM measures cannot cost effectively satisfy demand) is discussed primarily in Sections 2.0, 7.0, and 8.0 of this Application. The Applicants have emphasized that population and development growth are fueling the increased demand, not increased usage by individual customers. MP and GRE have also established that the increase in demand is of such a magnitude that no reasonable application of conservation/DSM measures can offset the increase. Given these circumstances, the Applicants focused the rest of the Application on determining the best means of satisfying the projected increase in demand.

Once the above threshold of need is passed, Minn. Stat. Sec. 216.243 (Subd.3) requires that the Commission evaluate the following in assessing need:

The accuracy of the long-range energy demand forecasts on which the necessity for the facility is based.

The Applicant's forecasting processes are discussed in Section 7.0. The Applicants are aware of nothing that would cause the present forecasts to be less accurate than previous forecasts.

The effect of existing or possible energy conservation programs under sections 216C.05 to 216C.30 and this section or other federal or state legislation on long-term energy demand.

With the exception of the conservation and load reduction programs discussed primarily in Sections 7.0 and 8.0 of this Application, there are no existing or proposed state or federal programs that would require evaluation by the Commission in its determination of need for the Project.

The relationship of the proposed facility to overall state energy needs, as described in the most recent state energy policy and conservation report prepared under section 216C.18.

The most recent state energy policy and conservation report does not directly discuss the Project, as the report focuses primarily on statewide energy needs and policies. The goal of the report, however, is to help assure that through conservation, rate structures, and prudent construction, there is adequate generating and transmission capacity to meet the state's foreseeable needs for energy. The Project is fully consistent with that goal.

Promotional activities that may have given rise to the demand for this facility.

In Sections 2.4 to 2.6, the Applicants show that population and development growth in the Project area is causing the increase in demand, not promotional activities.

Benefits of this facility, including its uses to protect or enhance environmental quality, and to increase reliability of energy supply in Minnesota and the region.

The advantages and disadvantages of the various options considered for satisfying the projected demand are discussed in Section 9.0. The Applicants believe the Project can be constructed with minimal environmental impact. MP and GRE also submit that it is the most reliable option and the only option contributing to overall reliability of the regional electric system.

Possible alternatives for satisfying the energy demand or transmission needs including but not limited to potential for increased efficiency and upgrading of existing energy generation and transmission facilities, load-management programs, and distributed generation.

The Applicants reviewed various alternatives for satisfying the projected increase in demand (see Section 9.0), including transmission (upgrading/rebuilding existing facilities) and generation and distributed generation (in compliance with recently enacted Minn. Stat. Sec. 216B.2426) options. Energy efficiency and load management programs were discussed in Section 8.0, but it is apparent that these measures cannot sufficiently reduce demand to the point where new transmission or distributed generation is not required. As discussed in more detail in Sections 2.0, 4.0, and 9.0, the proposed 115 kV line is the most efficient and least-cost alternative for providing the needed capacity.

The policies, rules and regulations of other state and federal agencies and local governments.

Throughout this Application, MP and GRE have referred to various rules, regulations and policies affecting all or parts of the Project (for example, local government permits). In all cases, the Project could comply with the applicable requirements and the

Applicants have stated that they are not aware of any other regulatory requirements with which they would be unable to comply. In addition, as required under recently enacted Minn. Stat. Sec. 216B.253, subd. 7(b), MP and GRE will notify the Commissioner of Agriculture if the Project will impact cultivated agricultural land, as that term is defined in Minn. Stat. Sec. 1161.01, subd. 4.

Any feasible combination of energy conservation improvements required under section 216B.241, that can (i) replace all or part of the energy to be provided by the proposed facility, and (ii) compete with it economically.

Minn. Stat. Sec. 216B.241 sets out levels of investment that utilities such as MP and GRE must make for energy conservation improvements. Programs considered by the Applicants are reviewed in Section 8.0. Energy conservation improvements could satisfy some of the forecasted demand. However, the potential energy savings from these programs are far less than the forecasted increase in demand, and relying on conservation and load reduction programs would not prevent future line and transmission outages. Therefore additional transmission or distributed generation is required even under the best-case scenario of conservation and DSM measures.

11.2 Satisfaction of Chapter 7848 Criteria

MP and GRE have responded in this Application to all of the criteria set forth in Minn. Rules Chapter 7848. The completeness checklist included in Section 1.0 (Table 1-1) provides references to those portions of the Application that address each of the requirements of Chapter 7848.

11.3 Closing Summary

MP and GRE have been evaluating and addressing voltage support and line capacity issues in the Pequot Lakes and Park Rapids area over the last decade. The inadequacies in the region were discussed during the 2003, 2004, and 2005 State Transmission Plan meetings, and in the 2003 Minnesota Biennial Transmission Projects Report.

Continuing economic growth in the Pequot Lakes and Park Rapids area has caused a considerable increase in electrical use in the region. The addition of new electrical services and the increase in demand from existing services are causing electricity delivery concerns in this area. The existing electrical system, consisting of transmission lines and substations, is approaching its physical limit. Loss of a facility may result in potential long-term outages. This situation has become a concern for summer and winter peak periods, and with continued growth, the number of critical hours during the year will continue to increase.

The North American Electric Reliability Council, which develops standards for implementing secure and safe electrical delivery, mandates that certain levels of service be maintained to insure that the transmission grid operates efficiently and reliably. In severe cases the transmission grid could collapse, which could result in regional blackouts. 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.

MP and GRE are responsible for meeting these mandates by constructing, operating and maintaining a reliable transmission system in north central Minnesota.

MP and GRE have clearly established that the future electric demand in the Project area will greatly exceed the capacity of its existing facilities to deliver the necessary load. The Applicants have also established that, for this area, enhanced transmission facilities are the preferred method for meeting the anticipated increase in demand. Generation alternatives were rejected due to operating issues and high operating costs. Finally, among the transmission options, MP and GRE have established that the Project is superior in all respects, including system capacity and reliability, economics, and minimization of losses and environmental impact.

12.0 REFERENCES

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APPENDIX A

AGENCY CORRESPONDENCE

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
ARMY CORPS OF ENGINEERS CENTRE
190 FIFTH STREET EAST
ST. PAUL MN 55101-1638

June 3, 2005

REPLY TO
ATTENTION

Operations Division
Regulatory Branch (MVP-2005-3045-WAB)

Ms. Carole Schmidt
Great River Energy
17845 E. Highway 10
PO Box 800
Elk River, MN 55330

Dear Ms. Schmidt:

We have received your letter dated 18 May 2005 requesting comments regarding the Badoura 115 kV Transmission Project in Crow Wing, Cass and Hubbard counties. In lieu of a specific response, please consider the following general information concerning our regulatory program that may apply to the proposed project.

If the proposal involves activity in navigable waters of the United States, it may be subject to the Corps of Engineers' jurisdiction under Section 10 of the Rivers and Harbors Act of 1899 (Section 10). Section 10 prohibits the construction, excavation, or deposition of materials in, over, or under navigable waters of the United States, or any work that would affect the course, location, condition, or capacity of those waters, unless the work has been authorized by a Department of the Army permit.

If the proposal involves deposition of dredged or fill material into waters of the United States, including discharges associated with mechanical land clearing, it may be subject to the Corps of Engineers' jurisdiction under Section 404 of the Clean Water Act (CWA Section 404). Waters of the United States include navigable waters, their tributaries, and adjacent wetlands (33 CFR § 328.3). CWA Section 301(a) prohibits discharges of dredged or fill material into waters of the United States, unless the work has been authorized by a Department of the Army permit under Section 404. Information about the Corps permitting process can be obtained online at http://www.mvp.usace.army.mil/regulatory.

The Corps' evaluation of a Section 10 and/or a Section 404 permit application involves multiple analyses, including (1) evaluating the proposal's impacts in accordance with the National Environmental Policy Act (NEPA) (33 CFR part 325), (2) determining whether the proposal is contrary to the public interest (33 CFR § 320.4), and (3) in the case of a Section 404 permit, determining whether the proposal complies with the Section 404(b)(1) Guidelines (Guidelines) (40 CFR part 230).

If the proposal requires a Section 404 permit application, the Guidelines specifically require that "no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences" (40 CFR § 230.10(a)). Time and money spent on the proposal prior to applying for a Section 404 permit cannot be factored into the Corps' decision whether there is a less damaging practicable alternative to the proposal.

If an application for a Corps permit has not yet been submitted, the project proposer may request a pre-application consultation meeting with the Corps to obtain information regarding the data, studies or other information that will be necessary for the permit evaluation process. A pre-application consultation meeting is strongly recommended if the proposal has substantial impacts to waters of the United States, or if it is a large or controversial project.

For further information or to request a pre-application consultation meeting, please contact Bill Baer at (218) 829-2711, project manager in the Brainerd Regulatory Field Office.

Sincerely,

Bill Baer

for

Robert J. Whiting
Chief, Regulatory Branch

Minnesota Department of Natural Resources

Division of Lands & Minerals
2115 Birchmont Beach Road NE
Bemidji, MN 56601

RECEIVED JUN 2 0 2005

June 17, 2005

Carole Schmidt
Great River Energy
17845 E. Highway 10
PO Box 800
Elk River, MN 55330

Dear Ms. Schmidt:

Thank you for contacting the Minnesota Department of Natural Resources (DNR) on May 18, 2005 concerning the Badoura 115 kV Transmission Line Project being considered in Crow Wing, Cass and Hubbard Counties. Your letter indicated that Great River Energy & Minnesota Power will be seeking certification for this project and that you are currently gathering data to be used in preparation for several applications and approvals.

This is a reply to your inquiry about permits needed to cross state land. A "License for Utility to Cross State Land" is required for any state land administered by DNR anticipated to be crossed by this transmission line. A separate "License for Utility to Cross Public Waters" is required if public waters are crossed by this project. Cass and Hubbard Counties are located in the NW Region while Crow Wing is located in the NE Region. As this is one project, we would likely issue one land crossing license covering all the land crossings in both the NW & NE Regions. A separate water crossing license would probably be issued for all the water crossings related to the project. Both the land and water crossing licenses would be subject to Department review and approval. Utility licenses will be not issued until after environmental review is completed.

Future questions regarding land and water license applications can be directed to Joe Rokala at 218-999-7894 (for Crow Wing County) and/or Cindy Buttleman at 218-755-4067 (for Hubbard & Cass Counties). Prior to submitting your license applications, please contact either Joe or myself to review the license application process in more detail.

Please note that your letter has been forwarded to the Department's Environmental Review section in St. Paul. Future questions about environmental concerns related to your proposal can be directed to Matt Langan, DNR Environmental Review section, at 651-297-3359.

If I can be of further assistance, please contact me.

Sincerely,

Cindy Buttleman
Lands & Minerals Regional Supervisor

Cc: Alan Jones, Forestry – St. Paul
Joe Rokala, Land & Minerals – Grand Rapids
Mike Chapman, Forestry - Backus
Mark Carlstrom, Forestry – Park Rapids
Greg Kvale, Forestry - Brainerd
Matt Langan, Ecological Services – St. Paul

MINNESOTA HISTORICAL SOCIETY

State Historic Preservation Office

June 29, 2005

Ms. Carole Schmidt
Great River Energy
17845 E. Highway 10
PO Box 800
Elk River, MN 55330

Re: Badoura 115 kV Transmission Project
Cass, Crow Wing, Hubbard Counties
SHPO Number: 2005-2130

Dear Ms. Schmidt:

Thank you for your letter regarding the above referenced project.

Consideration of cultural resource issues will be important as the project planning for this effort moves forward. The project is a large one, including areas with varying potentials for archaeological properties. We would recommend that you retain a cultural resource consultant to develop an appropriate strategy for identification, evaluation, and treatment of historic properties.

We look forward to working with you as the planning process proceeds.

Sincerely,

Kelly Gragg-Johnson

Dennis A. Gimmestad
Government Programs & Compliance Officer

Leech Lake Band of Ojibwe

George Goggleye, Chairman
Arthur "Archie" LaRose, Secretary/Treasurer

District I Representative	District II Representative	District III Representative
Burton "Luke" Wilson	*Lyman L. Losh*	*Donald "Mick" Finn*

September 12, 2005

RECEIVED SEP 19 2005

Great River Energy
Attn: Carole Schmidt
17845 E. Highway 10
P. O. Box 800
Elk River, MN 55330

RE: **Proposed Badoura 115kV Transmission Project**
Crow Wing, Cass, and Hubbard Counties, Minnesota
LLBO Land Claim Area
LL-THPO Number: 05-198-NCRI

Dear Ms. Schmidt:

Thank you for the opportunity to comment on the above-referenced project. It has been reviewed pursuant to the responsibilities given the Tribal Historic Preservation Officer by the National Historic Preservation Act of 1966, as amended in 1992 and the Procedures of the Advisory Council on Historic Preservation (38CFR800).

I have reviewed the documentation; after careful consideration of our records, I have determined that the Leech Lake Band of Ojibwe does not have any concerns regarding sites of religious or cultural importance in this area.

Should any human remains or suspected human remains be encountered, all work shall cease and the following personnel should be notified immediately in this order: County Sheriff's Office and Office of the State Archaeologist.

You may contact me at (218) 335-2940 if you have questions regarding our review of this project. Please refer to the LL-THPO Number as stated above in all correspondence with this project.

Respectfully submitted,

Gina M. Papasodora
Tribal Historic Preservation Officer

Leech Lake Tribal Historic Preservation Office * *Established in 1996*
6530 U.S. 2 NW * Cass Lake, Minnesota 56633
(218) 335-2940 * FAX (218) 335-2974
llthpo@hotmail.com

RECEIVED SEP 1 6 2005

If you have questions of the particular utilities, contact the individuals listed below.

Minnesota Power
30 West Superior Street
Duluth, Minnesota 55802
Utility Contact: Eric Olson
Email Address: eolson@allete.com
Phone: 218-723-3947
www.mnpower.com

Great River Energy
17845 East Highway 10
P.O. Box 800
Elk River, Minnesota 55330-0800
Utility Contact: Kandace Olsen
Email Address: kolsen@grenergy.com
Phone: 763-241-2293
www.greatriverenergy.com

The Lac Vieux Desert Band of Lake Superior Chippewa Indians have no interest in

Project #: Baldwin Ave

giiwegiizhigookway Martin/THPO/NAGPRA

Date 9/13/2005

KEWEENAW BAY INDIAN COMMUNITY

Keweenaw Bay Tribal Center
107 Beartown Road
Baraga, Michigan 49908
Phone (906) 353-6623
Fax (906) 353-7540

September 6, 2005

Carole Schmidt
Great River Energy
17845 E. Highway 10
PO Box 800
Elk River, Minnesota 55330

Re: Badoura Tower 115kV Transmission Project

Dear Ms. Schmidt:

The Keweenaw Bay Indian Community (KBIC) received your requests for comments or interest on the above-mentioned projects. KBIC has no interests documented at this time in the proposed project areas. If the scope of work changes in any way or if artifacts or human remains are discovered, please notify KBIC immediately so we can assist in making an appropriate determination.

Please forward a copy of any request for future opportunities to review and comment to Summer Sky Cohen, Coordinator, Tribal Historic Preservation Office, at the address listed below. Please keep us informed of future projects as KBIC plans to increase our efforts to identify and document sites in the area.

Thank you for this opportunity to review and comment.

Respectfully,

Summer Sky Cohen, Officer
Tribal Historic Preservation Office
Keweenaw Bay Indian Community
107 Beartown Road
Baraga, Michigan 49908
906.353.6272
906.353.6869 fax

History/Architecture

PROPERTY NAME	ADDRESS	Twp	Range	Sec	Quarters	USGS	Report	NRHP	CEF	DOE	Inventory Number
COUNTY	**Cass**										
CITY/TOWNSHIP: Backus											
John W. Bailey House	NE corner Washburn Ave. & Lakeside Ave.	139	30	30	SW-SE-SE	Backus					CA-BKC-001
Morris Patten House	SE corner Rosalind Ave. & Lakeside Ave.	139	30	31	NW-NE-NE	Backus					CA-BKC-002
Robert Steady House	xxx Lakeside Ave.	139	30	31	NE-NW-NE	Backus					CA-BKC-003
school	off Lakeside Dr.	139	30	30	NE-SW-SE	Backus					CA-BKC-004
CITY/TOWNSHIP: Hackensack											
Hackensack Consolidated School	SE corner Lake Ave. & 3rd St.	140	30	19	SW-SE-NE	Hackensack					CA-HSC-001
Sacred Heart Catholic Church	xxx 1st St.	140	30	19	SW-NW-NE	Hackensack					CA-HSC-002
Village Building		140	30	19	W-W-NE	Hackensack					CA-HSC-003
CITY/TOWNSHIP: Pine River											
house	Mill St. & Barclay Ave.	137	29	6	NE-NW-NW	Pine River					CA-PRC-001
park building	xxx 5th St.	138	29	31	SW-NW-SE	Pine River					CA-PRC-002
Marlow Theatre	Barclay Ave. & 2nd St.	138	29	31	SW-SE-SW	Pine River					CA-PRC-003
creamery	xxx Norway Ave.	138	29	31	SE-SE-SW	Pine River					CA-PRC-004
Johnson Lumber Company Shed	xxx Roosevelt Ave.	138	29	31	SE-SW-SE	Pine River					CA-PRC-005
Brainerd & Northern Minnesota Railroad Depot	xxx Front St.	137	29	6	NW-NW	Pine River	XX-2003-2H		Y		CA-PRC-006
Norway Lake Dam	Mn. Hwy. 84 at Norway Brook	138	29	31	NE-SE-SW	Pine River					CA-PRC-007
Bridge No. 6499	Mn. Hwy. 84 over Norway Brook	138	29	31	NE-SE-SW	Pine River					CA-PRC-008
Johnson Lumber Company Boxcar Shed	xxx Roosevelt Ave.	138	29	31	SE-SW-SE	Pine River					CA-PRC-009
house	southeast corner of Jefferson Ave. and First St.	138	29	31	SW-SW	Pine River	XX-2003-2H				CA-PRC-044

PROPERTY NAME	ADDRESS	Twp	Range	Sec	Quarters	USGS	Report	NRHP	CEF	DOE	Inventory Number

COUNTY Cass

CITY/TOWNSHIP: Pine River

PROPERTY NAME	ADDRESS	Twp	Range	Sec	Quarters	USGS	Report	NRHP	CEF	DOE	Inventory Number
White Farmstead	2747 23rd Ave. SW	137	29	6	SW-NW	Pine River	XX-2003-2H				CA-PRC-052
house	223 Evelyn Ave.	138	29	31	NW-NW		XX-2003-2H				CA-PRC-053

CITY/TOWNSHIP: Pine River Twp.

PROPERTY NAME	ADDRESS	Twp	Range	Sec	Quarters	USGS	Report	NRHP	CEF	DOE	Inventory Number
Mildred School	off Mn. Hwy. 371	138	30	22	SE-NW-SW	Mildred					CA-PRT-001

CITY/TOWNSHIP: Wilson Twp.

PROPERTY NAME	ADDRESS	Twp	Range	Sec	Quarters	USGS	Report	NRHP	CEF	DOE	Inventory Number
Bridge 1847	TR 118 over the south fork of the Pine River	137	29	7	NE-NW-NW	Pine River					CA-WLS-001

COUNTY Crow Wing

CITY/TOWNSHIP: Jenkins

PROPERTY NAME	ADDRESS	Twp	Range	Sec	Quarters	USGS	Report	NRHP	CEF	DOE	Inventory Number
commercial building	Lilac Ave. & Rose St.	137	29	27	SE-SE-SW	Jenkins					CW-JKC-001
school	Cottage St. & Pine Tree Ave.	137	29	34	SE-NE-NW	Jenkins					CW-JKC-002
church	2nd Ave. & 2nd St.	137	29	27	SW-SW-SE	Jenkins					CW-JKC-003
general store	Lilac Ave. & Rose St.	137	29	34	NE-NE-NW	Jenkins					CW-JKC-004
house	Second St., west side between Lilac Ave. and Second Ave.	137	29	27	SW-SE	Jenkins	XX-2003-2H				CW-JKC-011
house	33556 Summer Ave.	137	29	34	SE-NW		XX-2003-2H				CW-JKC-014
house	3030 Central St.	137	29	34	NE-NW	Jenkins	XX-2003-2H				CW-JKC-015
house	3173 Lilak St.	137	29	34	NE-NW						CW-JKC-016

CITY/TOWNSHIP: Jenkins Twp.

PROPERTY NAME	ADDRESS	Twp	Range	Sec	Quarters	USGS	Report	NRHP	CEF	DOE	Inventory Number
farmstead	33371 CR 145	137	29	34	SE-SE	Jenkins	XX-2003-2H				CW-JKT-002

PROPERTY NAME	ADDRESS	Twp	Range	Sec	Quarters	USGS	Report	NRHP	CEF	DOE	Inventory Number

COUNTY Crow Wing

CITY/TOWNSHIP: Jenkins Twp.

farmstead	33188 Old Highway 371	137	29	35	SW-SW						CW-JKT-004

CITY/TOWNSHIP: Pequot Lakes

creamery	xxx Sutler St.	136	29	15	NE-NW-NE	Nisswa					CW-PLC-001
bulk oil depot		136	29	15	NW-NE-NE	Nisswa					CW-PLC-002
service station	xxx Oriel St.	136	29	10	SE-SE-SE	Nisswa					CW-PLC-003
school	Co. Rd. 112 & Co. Hwy. 11	136	29	14	NW-NW-N	Nisswa					CW-PLC-004
H.H. Broach House (Shawano)	xxx Pequot Ave.	136	29	15	NE-SE-SW	Nisswa		Y			CW-PLC-005
Church of St. Alice	30957 Old Highway 371	136	29	15	NE-NE-NE	Nisswa					CW-PLC-006
A.L. Cole Memorial Building	4285 Tower Square	136	29	10	SW-SE	Nisswa	XX-2003-2H	Y			CW-PLC-007

CITY/TOWNSHIP: Sibley Twp.

farmstead	33188 Old Highway 371	137	29	35	SW-SW	Jenkins	XX-2003-2H				CW-JKT-007
house	31407 Front St.	136	29	10	NW-SE	Nisswa	XX-2003-2H				CW-PLC-014
farmstead	4762 Main St.	136	29	11	SE-SW	Nisswa	XX-2003-2H				CW-SIB-010
Pequot Firetower	CR 11, north side east of Pequot Lakes	136	29	11	SW-SE		XX-2003-2H				CW-SIB-012

COUNTY Hubbard

CITY/TOWNSHIP: Badoura Twp.

Badoura Town Hall	SE corner Co. Rd. 110 & Co. Rd. 22	139	32	8	NW-NW-N	Nevis	HB-86-1H				HB-BAD-001
Badoura State Nursery	off Mn. Hwy. 64	139	32	16	E	Oshawa	HB-86-1H				HB-BAD-002

PROPERTY NAME	ADDRESS	Twp	Range	Sec	Quarters	USGS	Report	NRHP	CEF	DOE	Inventory Number
COUNTY	**Hubbard**										
CITY/TOWNSHIP: Henrietta Twp.											
Dorset House	off Mn. Hwy. 226	140	34	10	SE-NE-SE	Dorset	HB-86-1H				HB-HEN-001
Hamilton's Island Park Lodge	off Co. Hwy. 107	140	34	29	SW-NW-NE	Park Rapids	HB-86-1H				HB-HEN-005
Island Park Lodge		140	34	29	SW-NW-NE	Park Rapids	HB-86-1H				HB-HEN-006
Pinehurst	off Long Lake Rd. W.	140	34	29	SW-SE-SE	Dorset	HB-86-1H				HB-HEN-007
CITY/TOWNSHIP: Nevis Twp.											
Camp Recreation	off Co. Hwy. 80	140	33	30	E-W-NW	Dorset	HB-86-1H				HB-NVT-001
CITY/TOWNSHIP: Park Rapids											
resort	U.S. Hwy. 71 & Main Ave.	140	35	23	SE-NE-NE	Park Rapids					HB-PRC-001
house	823 Main Ave. N.	140	35	23	SE-NE-NE	Park Rapids					HB-PRC-002
church	SE corner North St. & Lake Ave.	140	35	23	NW-NE-SE	Park Rapids					HB-PRC-003
Ellersick House	614 Main Ave. N.	140	35	23	NE-NE-SE	Park Rapids					HB-PRC-004
house	605 Main St. N.	140	35	23	NE-NE-SE	Park Rapids					HB-PRC-005
house	209 Lake St. N.	140	35	23	NW-SE-SE	Park Rapids					HB-PRC-006
Forestry Area Headquarters Office	xxx 1st St.	140	35	23	SW-SW-SE	Park Rapids					HB-PRC-007
Forestry Area Headquarters Office Oil House		140	35	23	SW-SW-SE	Park Rapids					HB-PRC-008
house	xxx Main St. N.	140	35	23	SE-SE-SE	Park Rapids					HB-PRC-009
house		140	35	23	SE-SE-SE	Park Rapids					HB-PRC-010
Riverside Methodist Church	SE corner Park Ave. N. & Beach Rd.	140	35	24	SW-SW-SW	Park Rapids					HB-PRC-011
Bridge No. 5120	Mn. Hwy. 34 over Fish Hook River	140	35	25	NW-NE-NW	Park Rapids					HB-PRC-012
Brearley House	NE corner Washington Ave. & 2nd St.	140	35	25	NW-NW-N	Park Rapids					HB-PRC-013
Doran Feed House & House	xxx 2nd St. E.	140	35	25	NE-NW-NW	Park Rapids					HB-PRC-014

COUNTY **Hubbard**

CITY/TOWNSHIP: Park Rapids

PROPERTY NAME	ADDRESS	Twp	Range	Sec	Quarters	USGS	Report	NRHP	CEF	DOE	Inventory Number
Rima House	203 3rd St. E.	140	35	25	NW-NW-N	Park Rapids					HB-PRC-015
Park Rapids Grain Elevator	NW corner 3rd St. E. & Riverside Ave.	140	35	25	SE-NW-NW	Park Rapids					HB-PRC-016
Rice House	xxx Riverside Ave.	140	35	25	NE-NW-NW	Park Rapids					HB-PRC-017
Burlington Northern Depot	xxx 3rd St.	140	35	25	SE-NW-NW	Park Rapids					HB-PRC-018
Nary House	xxx Forest Ave.	140	35	25	SW-SE-NW	Park Rapids					HB-PRC-019
First Baptist Church	SW corner 1st St. W. & Park Ave.	140	35	26	NE-NE-NE	Park Rapids					HB-PRC-020
Park Rapids Carnegie Library	101 2nd St. W.	140	35	26	NE-NE-NE	Park Rapids			Y		HB-PRC-021
Park Rapids Post Office	301 Park Ave.	140	35	26	NE-NE-NE	Park Rapids			Y		HB-PRC-023
Cutler House	3xx Park Ave.	140	35	26	SE-NE-NE	Park Rapids					HB-PRC-024
commercial building	NE corner Main St. S. & 3rd St.	140	35	26	SE-NE-NE	Park Rapids					HB-PRC-025
Baehr Building	xxx Main St. S.	140	35	26	NE-NE-NE	Park Rapids					HB-PRC-026
Trinity Lutheran Church	NE corner 3rd St. W. & Court Ave. S.	140	35	26	NW-NE-NE	Park Rapids					HB-PRC-028
school	xxx 4th St. W.	140	35	26	SW-NE-NE	Park Rapids					HB-PRC-029
Park Rapids Water Tower	NE corner 2nd St. W. & Front Ave.	140	35	26	NE-NW-NE	Park Rapids					HB-PRC-030
school (moved)	1xx Fair Ave.	140	35	26	NE-NE-NW	Park Rapids					HB-PRC-031
village hall/fire station/library	2nd St. W. & Main St.	140	35	26	NE-NE-NE	Park Rapids					HB-PRC-032
Park Rapids Armory	SW corner Park Ave. & 2nd St.	140	35	26	NE-NE-NE	Park Rapids					HB-PRC-033
Park Rapids Jail	205 2nd St. W.	140	35	26	NE-NE-NE	Park Rapids		Y			HB-PRC-034
Hubbard County Courthouse	xxx Court St.	140	35	26	NW-NW-NE	Park Rapids		Y			HB-PRC-035
Park Rapids Hydro Plant	off Riverside Ave.	140	35	25	SW-NE-NW	Park Rapids					HB-PRC-036

CITY/TOWNSHIP: Todd Twp.

PROPERTY NAME	ADDRESS	Twp	Range	Sec	Quarters	USGS	Report	NRHP	CEF	DOE	Inventory Number
Northern Pine Assembly Grounds	off Co. Hwy. 99	140	35	12	S-S-SW	Park Rapids					HB-TOD-001
White City Resort	off Co. Hwy. 116	140	35	14	SW-NE	Park Rapids					HB-TOD-002

PROPERTY NAME	ADDRESS	Twp	Range	Sec	Quarters	USGS	Report	NRHP	CEF	DOE	Inventory Number

COUNTY **Hubbard**

CITY/TOWNSHIP: Todd Twp.

CITY/TOWNSHIP: White Oak Twp.

PROPERTY NAME	ADDRESS	Twp	Range	Sec	Quarters	USGS	Report	NRHP	CEF	DOE	Inventory Number
White Oak Baptist Church	NE corner Mn. Hwy. 64 & Co. Rd. 119	140	32	27	SW-SW-SW	Crystal Lake					HB-WOT-001
White Oak Town Hall	SE corner Mn. Hwy. 64 & Co. Rd. 119	140	32	34	NW-NW-N	Crystal Lake					HB-WOT-002
commercial building	NW corner Mn. Hwy. 64 & Co. Rd. 119	140	32	28	SE-SE-SE	Crystal Lake					HB-WOT-003

Archaeological Site Locations

Site Number	Site Name	Twp.	Range	Sec.	Quarter Sections	Acres	Phase	Site Description	Traditio	Context	Reports	NR	CEF	DOE
County:	**Cass**													
21CA0022	Norway Lake	138	29	30	NE-NE	0	3	AS, EW	W-1	Ps-1	CA-81-02			
	Norway Lake	138	29	30	NE-NE	0	3	AS, EW	W-1	Ps-1	MULT-95-01			
21CA0060		140	31	1	SE-SE-NE	0.5	1, 7	CEM		P-2				
21CA0064	Old Backus	138	30	6	C-S-SE	140	1, 5	AS, CEM, HD	W-1	Oj-1, NL-1		Yes		
	Old Backus	139	30	31	N-NE	140	1, 5	AS, CEM, HD	W-1	Oj-1, NL-1		Yes		
21CA0161	Sanburn Lake	139	30	22	NE-NW-SE-SE	3	1	AS	W-1	Ps-1	TRW-87-01			
21CA0170	Bowen Lake	138	30	5	E-NE-NE-NE	2	1	AS	W-1	MW-1, LW-1	TRW-93-01			
	Bowen Lake	138	30	5	E-NE-NE-NE	2	1	AS	W-1	MW-1, LW-1	CA-93-03			
21CA0178	Bowen Lake Mounds	139	30	32	NE-SE-NE	1	1	EW	W-1					
21CA0214	Barclay Trading Post	137	29	6	C-S-SW	1	1, 7	HD, AS, SR		IC-2				
21CA0218	Shady Point	138	29	30	C-S-SW	5	2	AS	W-1,	HR-2, Ps-1, Bd-1, Br-2,	CA-81-02			
	Shady Point	138	29	30	C-S-SW	5	2	AS	W-1,	HR-2, Ps-1, Bd-1, Br-2,	CA-81-01			
21CA0219	Arboleda	138	29	30	S-SE-SW	4	1	AS	W-1	Ps-1	CA-81-02			
	Arboleda	138	29	30	S-SE-SW	4	1	AS	W-1	Ps-1	CA-81-01			
21CA0220	Brill	138	29	30	SW-SE-SE	3	1	AS	W-1		CA-81-02			
21CA0221	Sky Harbor	138	29	30	NE-SE-SE	3	1	AS	W-1		CA-81-02			
21CA0647	Saw Blade	137	29	8	NW-NW-NW	0.5	1	AS						
21CAay		138	30	24	NE-SE	0	7	CEM						

Site Number	Site Name	Twp.	Range	Sec.	Quarter Sections	Acres	Phase	Site Description	Traditio	Context	Reports	NR	CEF	DOE
County:	**Cass**													
21CAbb		139	30	7	SW	0	7	CEM						
21CAbc		139	30	33	NW-NW	0	7	CEM						
21CAbu		138	29	30	C-E-NE-NE	0	1	AS			CA-81-02			
21CAbv		138	29	31	C-W-W-NW, C-E-E-NE	0	1	AS			CA-81-02			
21CAbw		138	29	30	C-SW-NW	0	7	AS			CA-81-02			
21CAbx		138	30	25	C-SE-SE	0	1	AS			CA-81-02			
County:	**Crow Wing**													
21CW0007	Upper Hay Lake Mounds/Fort Poulak (same as 21CW14)	137	29	35	SW-NW-NW,S-NW, N-NE-SW,W-SW-N E,W-NW-NW-SE	150	3,1	EW, CEM, AS	W-1	Bd-1, SO-1	CW-93-02	Yes		
	Upper Hay Lake Mounds/Fort Poulak (same as 21CW14)	137	29	35	SW-NW-NW,S-NW, N-NE-SW,W-SW-N E,W-NW-NW-SE	150	3,1	EW, CEM, AS	W-1	Bd-1, SO-1	CW-95-05	Yes		
	Upper Hay Lake Mounds/Fort Poulak (same as 21CW14)	137	29	35	SW-NW-NW,S-NW, N-NE-SW,W-SW-N E,W-NW-NW-SE	150	3,1	EW, CEM, AS	W-1	Bd-1, SO-1	CW-96-01	Yes		
	Upper Hay Lake Mounds/Fort Poulak (same as 21CW14)	137	29	35	SW-NW-NW,S-NW, N-NE-SW,W-SW-N E,W-NW-NW-SE	150	3,1	EW, CEM, AS	W-1	Bd-1, SO-1	CW-97-05	Yes		
	Upper Hay Lake Mounds/Fort Poulak (same as 21CW14)	137	29	35	SW-NW-NW,S-NW, N-NE-SW,W-SW-N E,W-NW-NW-SE	150	3,1	EW, CEM, AS	W-1	Bd-1, SO-1	MULT-73-03	Yes		
21CW0014	Upper Hay Lake Mounds/Fort Poulak (same as 21CW7)	137	29	35	S-NW, N-NE-SW, NW-NW-SE, SW-NW-NE	150	3	EW, CEM, AS	W-1	Bd-1, SO-1	CW-96-01	Yes		
	Upper Hay Lake Mounds/Fort Poulak (same as 21CW7)	137	29	35	S-NW, N-NE-SW, NW-NW-SE, SW-NW-NE	150	3	EW, CEM, AS	W-1	Bd-1, SO-1	MULT-72-01	Yes		

Site Number	Site Name	Twp.	Range	Sec.	Quarter Sections	Acres	Phase	Site Description	Traditio	Context	Reports	NR	CEF	DOE
County:	**Crow Wing**													
21CW0014	Upper Hay Lake Mounds/Fort Poulak (same as 21CW7)	137	29	35	S-NW, N-NE-SW, NW-NW-SE, SW-NW-NE	150	3	EW, CEM, AS	W-1	Bd-1, SO-1	CW-95-05	Yes		
	Upper Hay Lake Mounds/Fort Poulak (same as 21CW7)	137	29	35	S-NW, N-NE-SW, NW-NW-SE, SW-NW-NE	150	3	EW, CEM, AS	W-1	Bd-1, SO-1	MULT-73-03	Yes		
21CW0128	Hay Lake Lodge	137	29	36	NW-SW-SW	1	1	LS			CW-93-02			
21CW0129	Machintosh	137	29	36	SE-NW-SW	1	1	LS			CW-93-02			
21CW0130	Conner	137	29	36	SE-NW-SW	0.5	1	LS			CW-93-02			
21CW0131	Wedin	137	29	36	NE-NE-SW	1	1	LS			CW-93-02			
21CW0132	Nicholas	137	29	36	NE-NE-SW	1	1	LS			CW-93-02			
21CW0241	Hay Creek Island	137	29	36	NW-SE-NE-NE	0.5	1	LS					Yes	
21CW0242	Hay Creek Ridge	137	29	36	NW-NW-SE-NE	0.5	1	LS					Yes	
21CW0243	Hay Lake Trail	137	29	36	SE-NW-SW-NE	0.5	1	LS	A-2	AP-2			Yes	
21CWq	Whitefish Lake Outlet Mounds	137	29	14	N	0	1	EW	W-1					
County:	**Hubbard**													
21HB0001		139	32	17	SW-SE-NW, NE-SE-SW-NW	0		CEM, AS	W-1,					
21HB0002		139	32	4	W-SE-SE, NE-NE-SW-SE	5		LS						
21HB0004	Dickson Mounds	140	35	14	N-SE-SW, SW-NW-SW-SE	45	1	EW	W-1		HB-96-08			
21HB0017	Nagel Lake	139	32	8	N-NW-NE	0		LS						
	Nagel Lake	139	32	8	S-NW-NE,S-NE,N-NW-SE	0		LS						
21HB0020	Fifth Crow Wing Lake	140	33	29	NW-NW-SW-SW	8	1	EW, AS	W-1		MCH-83-01			
	Fifth Crow Wing Lake	140	33	29	NW-NW-SW-SW	8	1	EW, AS	W-1		MCH-82-01			
	Fifth Crow Wing Lake	140	33	30	NE-SE-SE	8	1	EW, AS	W-1		MCH-83-01			
	Fifth Crow Wing Lake	140	33	30	NE-SE-SE	8	1	EW, AS	W-1		MCH-82-01			

Site Number	Site Name	Twp.	Range	Sec.	Quarter Sections	Acres	Phase	Site Description	Traditio	Context	Reports	NR	CEF	DOE

County: Hubbard

Site Number	Site Name	Twp.	Range	Sec.	Quarter Sections	Acres	Phase	Site Description	Traditio	Context	Reports	NR	CEF	DOE
21HB0031		140	35	13	SW-NE-SE-SE	1	1	LS			HB-89-02			
21HB0049		140	35	25	SW-SE-SW	0.5	8	LS			HB-01-99			
		140	35	36	NW-NE-NW	0.5	8	LS			HB-01-99			
21HB0050		140	35	25	SE-SW-SW	0.5	2	LS			HB-01-99			
		140	35	36	NE-NW-NW	0.5	2	LS			HB-01-99			
21HB0058		139	32	3	SW-NW-SW	0.3	1	AS,SR		TR-1	HB-02-01			
21HBI		139	32	17	C-NE-SW	11		AS						
21HBp		139	33	4	NE-SW	0		AS						

GREAT RIVER ENERGY®
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18 May 2005

Mr. Dennis Gimmestad
Minnesota State Historic Preservation Office
345 Kellogg Boulevard West
St. Paul, MN 55102-1906

RE: Badoura 115 kV Transmission Project

Dear Mr. Gimmestad:

Minnesota Power (MP) and Great River Energy (GRE) are currently gathering data to be used in preparation of several regulatory applications necessary to obtain approvals and permits for the construction of the proposed Badoura 115 kV Transmission Project in Crow Wing, Cass and Hubbard counties. The project is needed to meet the growing electrical needs of the area. MP and GRE intend to seek certification of the proposed project under the Minnesota Public Utilities Commission's (Commission) biennial transmission planning process outlined in Minnesota Rules, Chapter 7848.

The proposed project would connect the Pequot Lakes Substation located north of Pequot Lakes, the Pine River Substation located southwest of Pine River, the Badoura Substation, the Long Lake Substation located east of Park Rapids, and the Birch Lake Substation located east of Hackensack (see attached map). At this point Minnesota Power and Great River Energy have not identified a route for the project, but are evaluating transmission alternatives within identified study corridors. Potentially affected sections within the proposed study corridors are provided in the attached table.

MP and GRE request your review of this project to identify potential impacts to cultural and archaeological resources from the project and any permits that the project might require. At this point it is unknown whether the project will require federal permits or use federal funding. Your input on the project will assist MP, GRE, our environmental consultant (HDR) and the Commission in their review of the project.

We would appreciate a response to this request by Friday, June 17, 2005. Written responses may be directed to:

Carole Schmidt
Great River Energy
17845 E. Highway 10
PO Box 800
Elk River, Minnesota 55330

We will be seeking ongoing feedback from you and your agency as this project proceeds through review and permitting. If you require further information or have questions regarding this matter, please feel free to call us at the numbers provided below. Thank you for your attention to this important project.

Sincerely,

GREAT RIVER ENERGY	MINNESOTA POWER
Carole L. Schmidt	Robert E. Lindholm
Carole L. Schmidt	Robert E. Lindholm
Environmental Scientist	Manager, Environmental Services
763-241-2272	218-722-5642, ext. 3342

Attachments:
Project Location Map
Potentially Affected Sections Table

cc: Suzanne Steinhauer, HDR
Larry Bubacz – Minnesota Power
Blake Francis – Minnesota Power

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Sections Potentially Affected by Badoura Transmission Project

County	Township Name	Township	Range	Sections
Crow Wing	Pelican	136N	28W	5-8, 18,19
Crow Wing	Jenkins	136N	29W	1-3, 10-15, 22-27
Crow Wing	Ideal	137N	28W	30-32
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Cass	Walden	137N	30W	1-3, 11, 12
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Cass	Pine River	138N	30W	3-10, 13-29, 33-36
Cass	Bull Moose	138N	31W	1-17, 21-24
Cass	McKinley	138N	32W	1
Cass	Powers	139N	30W	3-10, 15-22, 27-34
Cass	Deerfield	139N	31W	1-20, 24, 28-34, 36
Cass	Birch Lake	140N	30W	4-10, 15-23, 26-34
Cass	Hiram	140N	31W	1, 11-14, 22-26, 31-36
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Hubbard	Crow Wing Lake	139N	33W	1-6
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Hubbard	Straight River	139N	35W	1, 2, 12
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Hubbard	Nevis	140N	33W	18-36
Hubbard	Henrietta	140N	34W	7-10, 13-36
Hubbard	Todd	140N	35W	11-14, 22-27, 35-36

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18 May 2005

Mr. Dan Stinnett
MN Threatened and Endangered Species Review
U.S. Fish and Wildlife Service
4101 East 80th Street
Bloomington, MN 55425-1665

RE: Badoura 115 kV Transmission Project

Dear Mr. Stinnett:

Minnesota Power (MP) and Great River Energy (GRE) are currently gathering data to be used in preparation of several regulatory applications necessary to obtain approvals and permits for the construction of the proposed Badoura 115 kV Transmission Project in Crow Wing, Cass and Hubbard counties. The project is needed to meet the growing electrical needs of the area. MP and GRE intend to seek certification of the proposed project under the Minnesota Public Utilities Commission's (Commission) biennial transmission planning process outlined in Minnesota Rules, Chapter 7848.

The proposed project would connect the Pequot Lakes Substation located north of Pequot Lakes, the Pine River Substation located southwest of Pine River, the Badoura Substation, the Long Lake Substation located east of Park Rapids, and the Birch Lake Substation located east of Hackensack (see attached map). At this point Minnesota Power and Great River Energy have not identified a route for the project, but are evaluating transmission alternatives within identified study corridors. Potentially affected sections within the proposed study corridors are provided in the attached table.

MP and GRE request that the U.S. Fish and Wildlife Service comment on potential effects to known federally-listed threatened or endangered species in accordance with Section 7 of the Endangered Species Act of 1973, as amended, for the proposed 115 kV transmission project. Your input on the project will assist MP, GRE, our environmental consultant (HDR) and the Commission in their review of the project. We would appreciate a response to this request by Friday, June 17, 2005. Written responses may be directed to:

Carole Schmidt
Great River Energy
17845 E. Highway 10
PO Box 800
Elk River, Minnesota 55330

We will be seeking ongoing feedback from you and your agency as this project proceeds through review and permitting. If you require further information or have questions regarding this matter, please feel free to call us at the numbers provided below. Thank you for your attention to this important project.

Sincerely,

GREAT RIVER ENERGY

Carole L. Schmidt
Carole L. Schmidt
Environmental Scientist
763-241-2272

MINNESOTA POWER

Robert E. Lindholm
Robert E. Lindholm
Manager, Environmental Services
218-722-5642, ext. 3342

Attachments:
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Potentially Affected Sections Table

cc: Suzanne Steinhauer, HDR
Larry Bubacz – Minnesota Power
Blake Francis – Minnesota Power

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Hubbard	Todd	140N	35W	11-14, 22-27, 35-36

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18 May 2005

Mr. Robert Whiting, Branch Chief
St. Paul District
190 Fifth Street East
St. Paul, MN 55101-1638

RE: Badoura 115 kV Transmission Project

Dear Mr. Whiting:

Minnesota Power (MP) and Great River Energy (GRE) are currently gathering data to be used in preparation of several regulatory applications necessary to obtain approvals and permits for the construction of the proposed Badoura 115 kV Transmission Project in Crow Wing, Cass and Hubbard counties. The project is needed to meet the growing electrical needs of the area. MP and GRE intend to seek certification of the proposed project under the Minnesota Public Utilities Commission's (Commission) biennial transmission planning process outlined in Minnesota Rules, Chapter 7848.

The proposed project would connect the Pequot Lakes Substation located north of Pequot Lakes, the Pine River Substation located southwest of Pine River, the Badoura Substation, the Long Lake Substation located east of Park Rapids, and the Birch Lake Substation located east of Hackensack (see attached map). At this point Minnesota Power and Great River Energy have not identified a route for the project, but are evaluating transmission alternatives within identified study corridors. Potentially affected sections within the proposed study corridors are provided in the attached table.

MP and GRE request that the Corps comment on the possible effects of the proposed project on floodplains, wetlands, and other important natural resources that occur in the proposed study area. This request is made pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. Your input on the project will assist MP, GRE, our environmental consultant (HDR) and the Commission in their review of the project.

We would appreciate a response to this request by Friday, June 17, 2005. Written responses may be directed to:

Carole Schmidt
Great River Energy
17845 E. Highway 10
PO Box 800
Elk River, Minnesota 55330

We will be seeking ongoing feedback from you and your agency as this project proceeds through review and permitting. If you require further information or have questions regarding this matter, please feel free to call us at the numbers provided below. Thank you for your attention to this important project.

Sincerely,

GREAT RIVER ENERGY

Carole L. Schmidt

Carole L. Schmidt
Environmental Scientist
763-241-2272

MINNESOTA POWER

Robert E. Lindholm

Robert E. Lindholm
Manager, Environmental Services
218-722-5642, ext. 3342

Attachments:
Project Location Map
Potentially Affected Sections Table

cc: Suzanne Steinhauer, HDR Engineering
Larry Bubacz – Minnesota Power
Blake Francis – Minnesota Power

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Hubbard	Todd	140N	35W	11-14, 22-27, 35-36

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18 May 2005

Ms. Sarah Hoffmann
Minnesota Department of Natural Resources
Natural Heritage and Nongame Research Program
500 Lafayette Road, Box 25
St. Paul, MN 55155

RE: Badoura 115 kV Transmission Project

Dear Ms. Hoffmann:

Minnesota Power (MP) and Great River Energy (GRE) are currently gathering data to be used in preparation of several regulatory applications necessary to obtain approvals and permits for the construction of the proposed Badoura 115 kV Transmission Project in Crow Wing, Cass and Hubbard counties. The project is needed to meet the growing electrical needs of the area. MP and GRE intend to seek certification of the proposed project under the Minnesota Public Utilities Commission's (Commission) biennial transmission planning process outlined in Minnesota Rules, Chapter 7848.

The proposed project would connect the Pequot Lakes Substation located north of Pequot Lakes, the Pine River Substation located southwest of Pine River, the Badoura Substation, the Long Lake Substation located east of Park Rapids, and the Birch Lake Substation located east of Hackensack (see attached map). At this point Minnesota Power and Great River Energy have not identified a route for the project, but are evaluating transmission alternatives within identified study corridors. Potentially affected sections within the proposed study corridors are provided in the attached table.

MP and GRE would like the Minnesota DNR to comment on potential effects of the proposed 115 kV transmission project and to identify federally- and state-listed threatened or endangered species and rare natural features. A copy of the Minnesota Natural Heritage Information System Data Request Form is enclosed to facilitate your review. Your input on the project will assist MP, GRE, our environmental consultant (HDR) and the Commission in their review of the project.

We would appreciate a response to this request by Friday, June 17, 2005. Written responses may be directed to:

Carole Schmidt
Great River Energy
17845 E. Highway 10
PO Box 800
Elk River, Minnesota 55330

We will be seeking ongoing feedback from you and your agency as this project proceeds through review and permitting. If you require further information or have questions regarding this matter, please feel free to call us at the numbers provided below. Thank you for your attention to this important project.

Sincerely,

GREAT RIVER ENERGY

Carole L. Schmidt

Carole L. Schmidt
Environmental Scientist
763-241-2272

MINNESOTA POWER

Robert E. Lindholm

Robert E. Lindholm
Manager, Environmental Services
218-722-5642, ext. 3342

Attachments:
Project Location Map
Potentially Affected Sections Table

cc: Suzanne Steinhauer, HDR Engineering
Larry Bubacz – Minnesota Power
Blake Francis – Minnesota Power

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Sections Potentially Affected by Badoura Transmission Project

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Hubbard	Todd	140N	35W	11-14, 22-27, 35-36

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18 May 2005

Mr. Alan Jones
Minnesota Department of Natural Resources
State Forest Management
500 Lafayette Road
St. Paul, MN 55155-4044

RE: Badoura 115 kV Transmission Project

Dear Mr. Jones:

Minnesota Power (MP) and Great River Energy (GRE) are currently gathering data to be used in preparation of several regulatory applications necessary to obtain approvals and permits for the construction of the proposed Badoura 115 kV Transmission Project in Crow Wing, Cass and Hubbard counties. The project is needed to meet the growing electrical needs of the area. MP and GRE intend to seek certification of the proposed project under the Minnesota Public Utilities Commission's (Commission) biennial transmission planning process outlined in Minnesota Rules, Chapter 7848.

The proposed project would connect the Pequot Lakes Substation located north of Pequot Lakes, the Pine River Substation located southwest of Pine River, the Badoura Substation, the Long Lake Substation located east of Park Rapids, and the Birch Lake Substation located east of Hackensack (see attached map). At this point Minnesota Power and Great River Energy have not identified a route for the project, but are evaluating transmission alternatives within identified study corridors. Potentially affected sections within the proposed study corridors are provided in the attached table.

MP and GRE request that the Minnesota DNR provide information on any permits that the proposed 115 kV transmission project would require to cross a state forest and also identify potential impacts from the project that the DNR would consider when reviewing the proposed project. Your input on the project will assist MP, GRE, our environmental consultant (HDR) and the Commission in their review of the project.

We would appreciate a response to this request by Friday, June 17, 2005. Written responses may be directed to:

Carole Schmidt
Great River Energy
17845 E. Highway 10
PO Box 800
Elk River, Minnesota 55330

We will be seeking ongoing feedback from you and your agency as this project proceeds through review and permitting. If you require further information or have questions regarding this matter, please feel free to call us at the numbers provided below. Thank you for your attention to this important project.

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GREAT RIVER ENERGY	MINNESOTA POWER
Carole L. Schmidt	Robert E. Lindholm
Carole L. Schmidt	Robert E. Lindholm
Environmental Scientist	Manager, Environmental Services
763-241-2272	218-722-5642, ext. 3342

Attachments:
Project Location Map
Potentially Affected Sections Table

cc: Suzanne Steinhauer, HDR Engineering
Larry Bubacz – Minnesota Power
Blake Francis – Minnesota Power

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Hubbard	Henrietta	140N	34W	7-10, 13-36
Hubbard	Todd	140N	35W	11-14, 22-27, 35-36

APPENDIX B

EXPECTED MAGNETIC FIELD

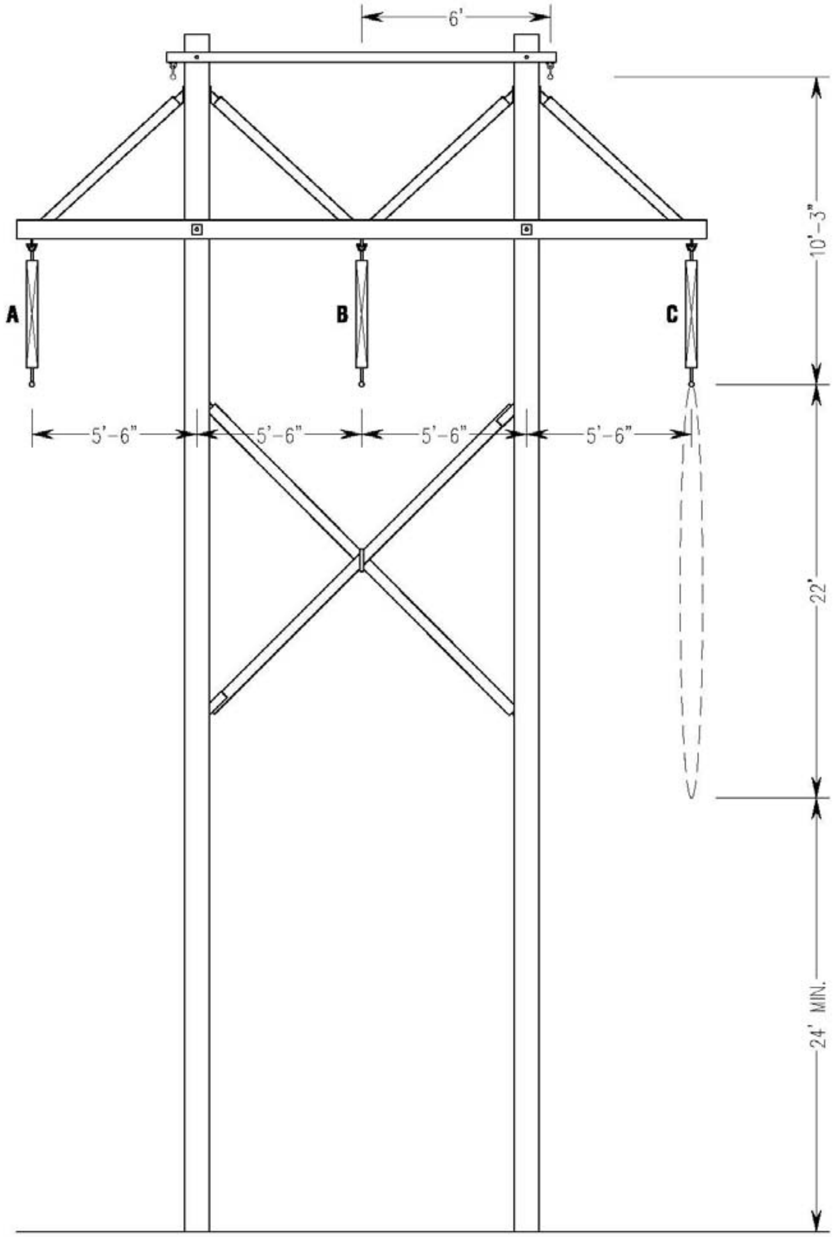
APPENDIX B

Expected Magnetic Field

The magnetic field was calculated for the structures being considered for the Badoura Project. The structure drawings in the figures below show the phase arrangements used in the model. The calculations were done at two different assumed current carrying capacities: (1) the flow at the conductors' thermal limit and (2) at the expected steady state system intact peak load current flow as determined from load flow modeling using the 2009 Peak Load model.

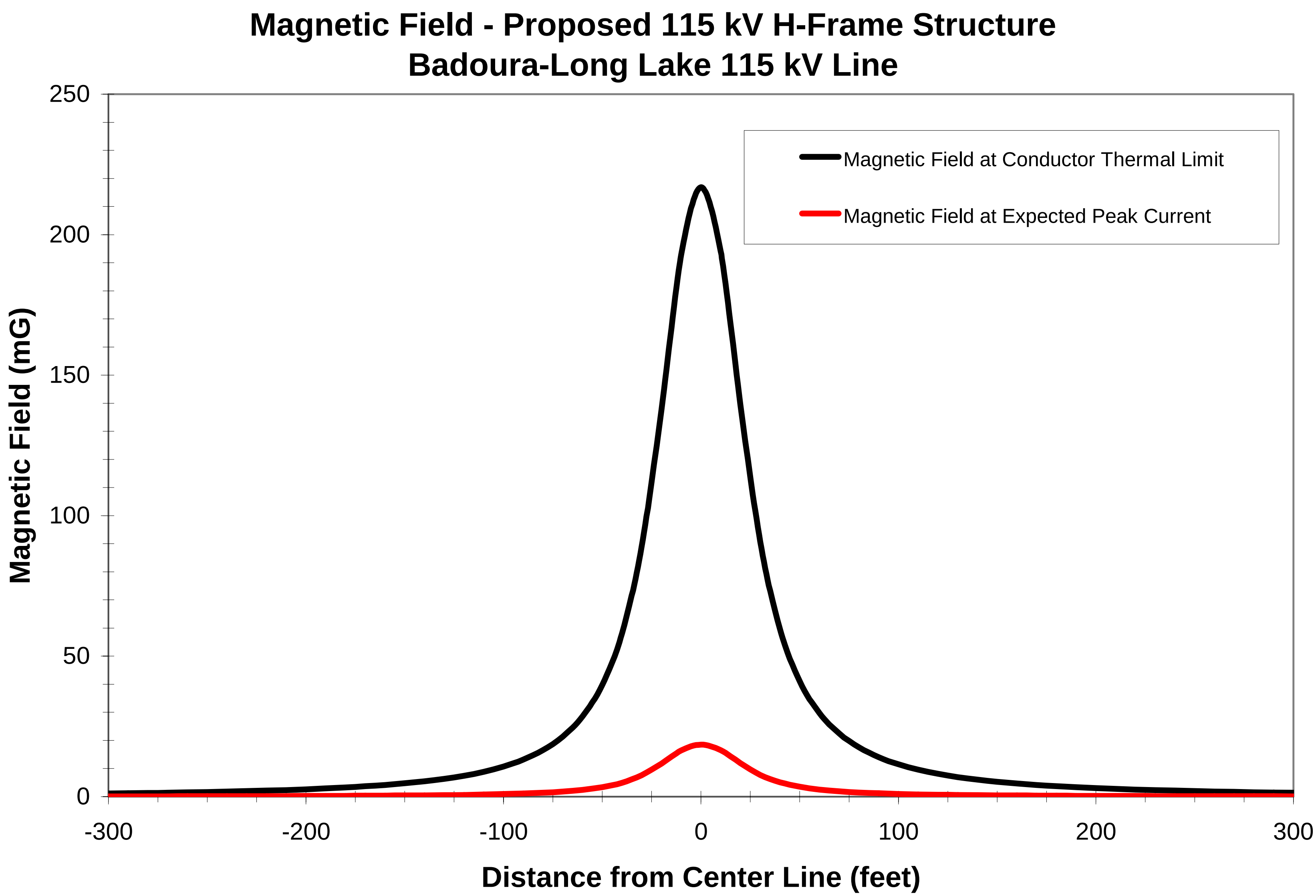
The magnetic field produced by the transmission line is directly dependent on the current flowing on its conductors as evidenced in the attached graphs. The current flow at expected 2009 peak load conditions and its associated magnetic field is significantly less than the magnetic field associated with the higher current flow at the conductors' thermal limit.

Badoura to Long Lake - 115kV Transmission H-Frame Structure

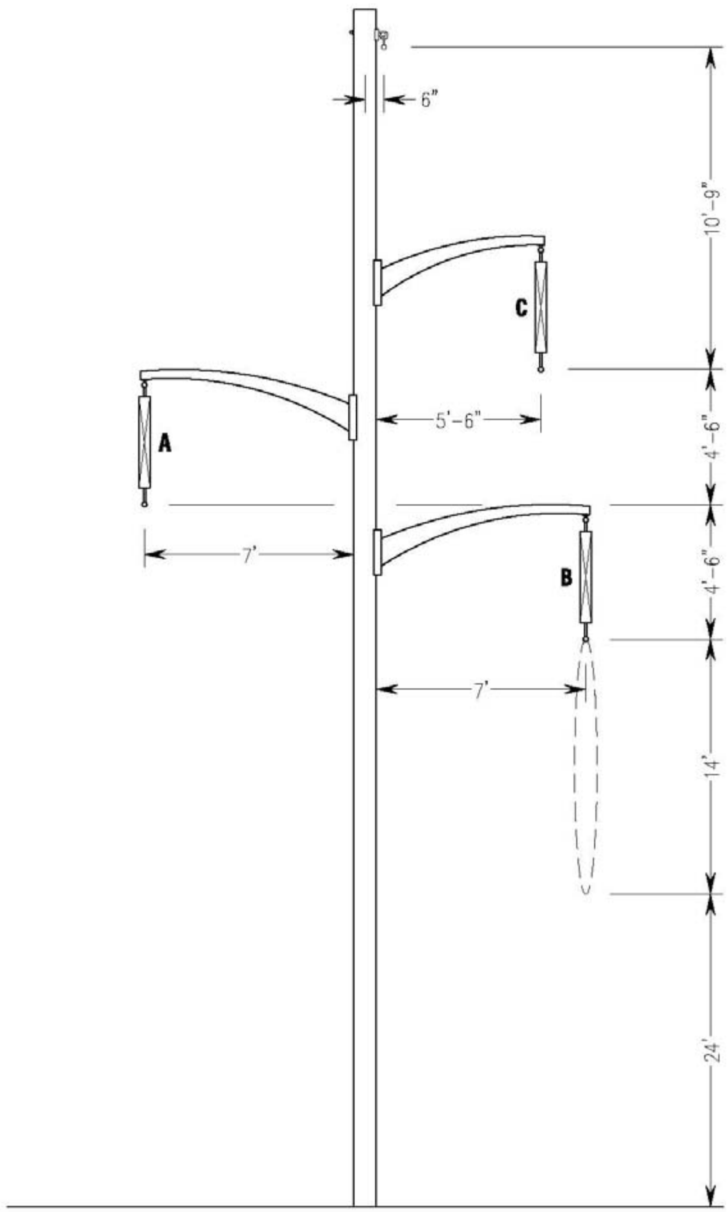


At Conductor Thermal Limit		At Substation Transformer Capacity*	
– Phase A –		– Phase A –	
Voltage (kV)	Voltage Phase Angle	Voltage (kV)	Voltage Phase Angle
115	0°	115	0°
Current (amps)	Current Angle	Current (amps)	Current Angle
914	0°	78	0°

* Includes GRE proposed 115/69kv 60MVA tower transformer


Magnetic Field - Proposed 115 kV H-Frame Structure
Badoura-Long Lake 115 kV Line
Magnetic Field (mG)
250
200
150
100
50
0
Magnetic Field at Conductor Thermal Limit
Magnetic Field at Expected Peak Current
-300
-200
-100
0
100
200
300
Distance from Center Line (feet)

Badoura to Long Lake - 115kV Transmission SPT Structure



At Conductor Thermal Limit

– Phase A –

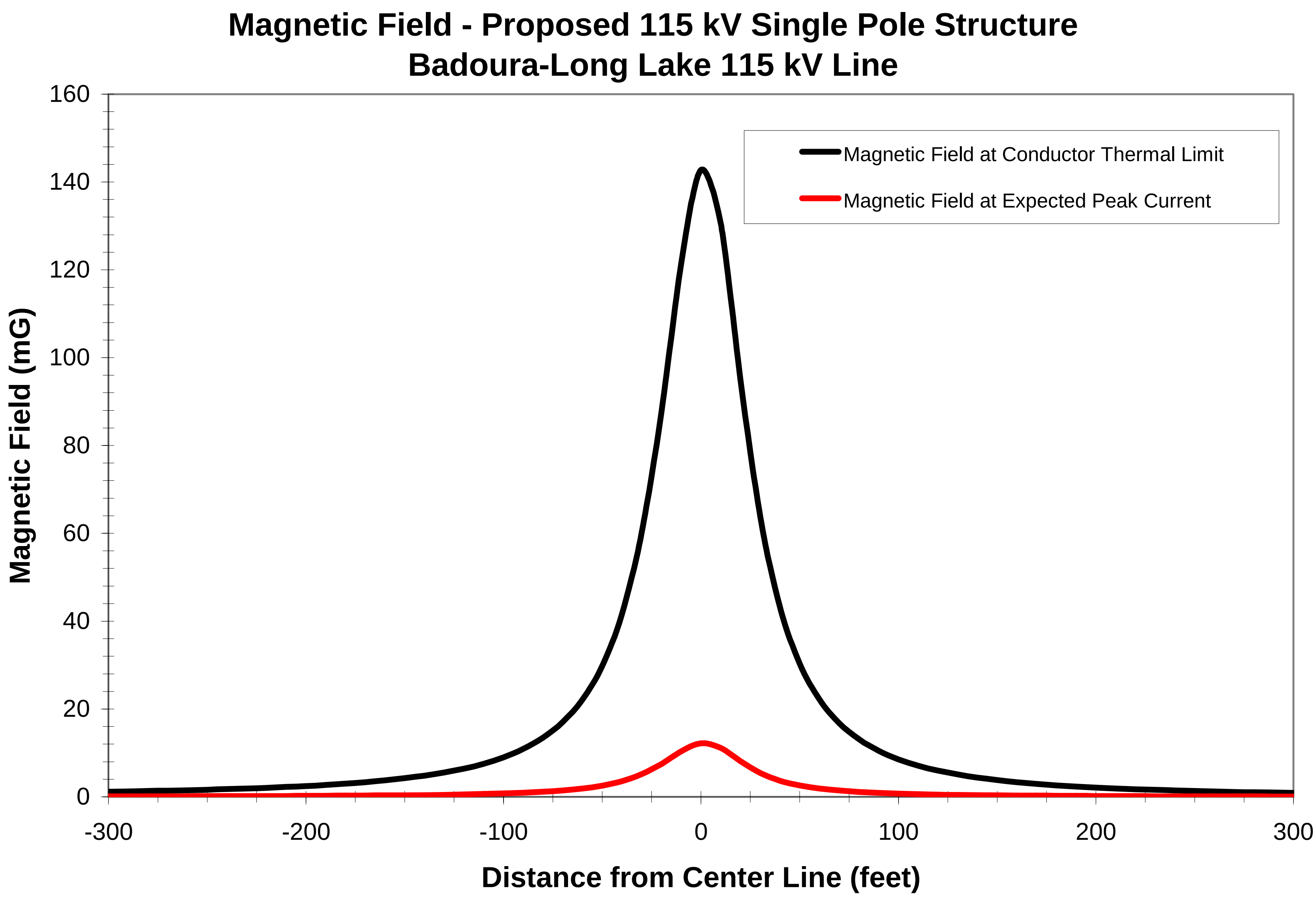
Voltage (kV)	Voltage Phase Angle
115	0°
Current (amps)	**Current Angle**
914	0°

At Substation Transformer Capacity*

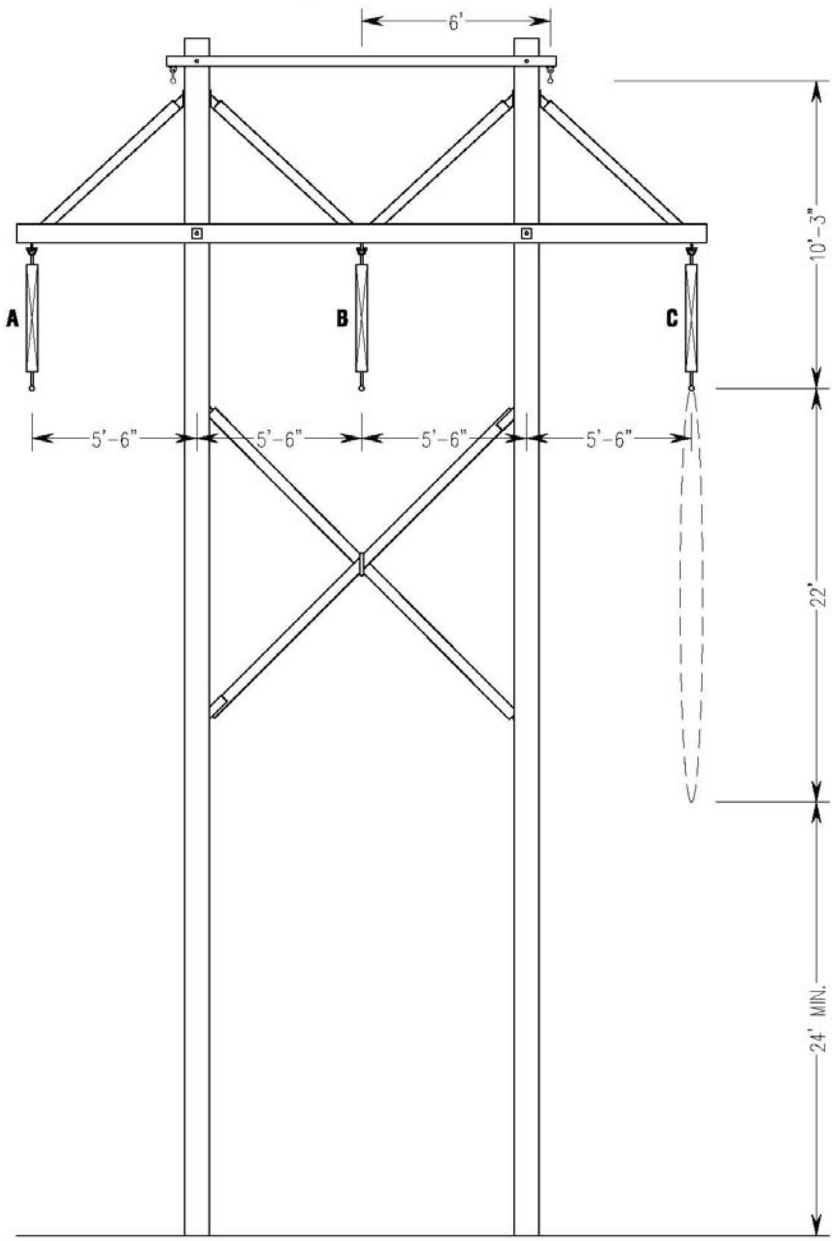
– Phase A –

Voltage (kV)	Voltage Phase Angle
115	0°
Current (amps)	**Current Angle**
78	0°

* Includes GRE proposed 115/69kv 60MVA tower transformer


Magnetic Field - Proposed 115 kV Single Pole Structure
Badoura-Long Lake 115 kV Line
Magnetic Field at Conductor Thermal Limit
Magnetic Field at Expected Peak Current
Magnetic Field (mG)
0
20
40
60
80
100
120
140
160
-300
-200
-100
0
100
200
300
Distance from Center Line (feet)

Badoura to Birch Lake to Pine River to Pequot Lakes - 115kV Transmission H-Frame Structure



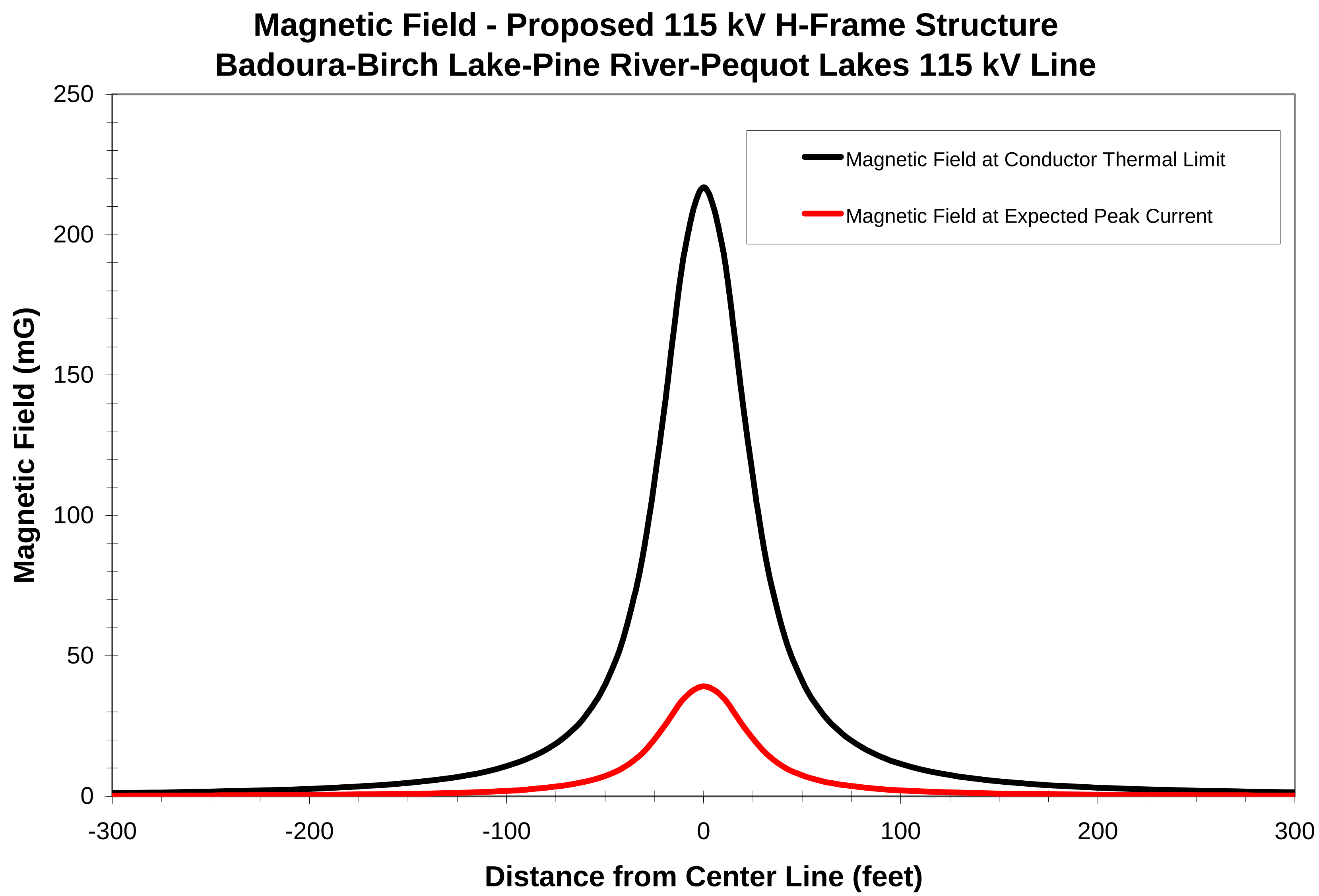
At Conductor Thermal Limit – Phase A –

Voltage (kV)	Voltage Phase Angle
115	0°
Current (amps)	**Current Angle**
914	0°

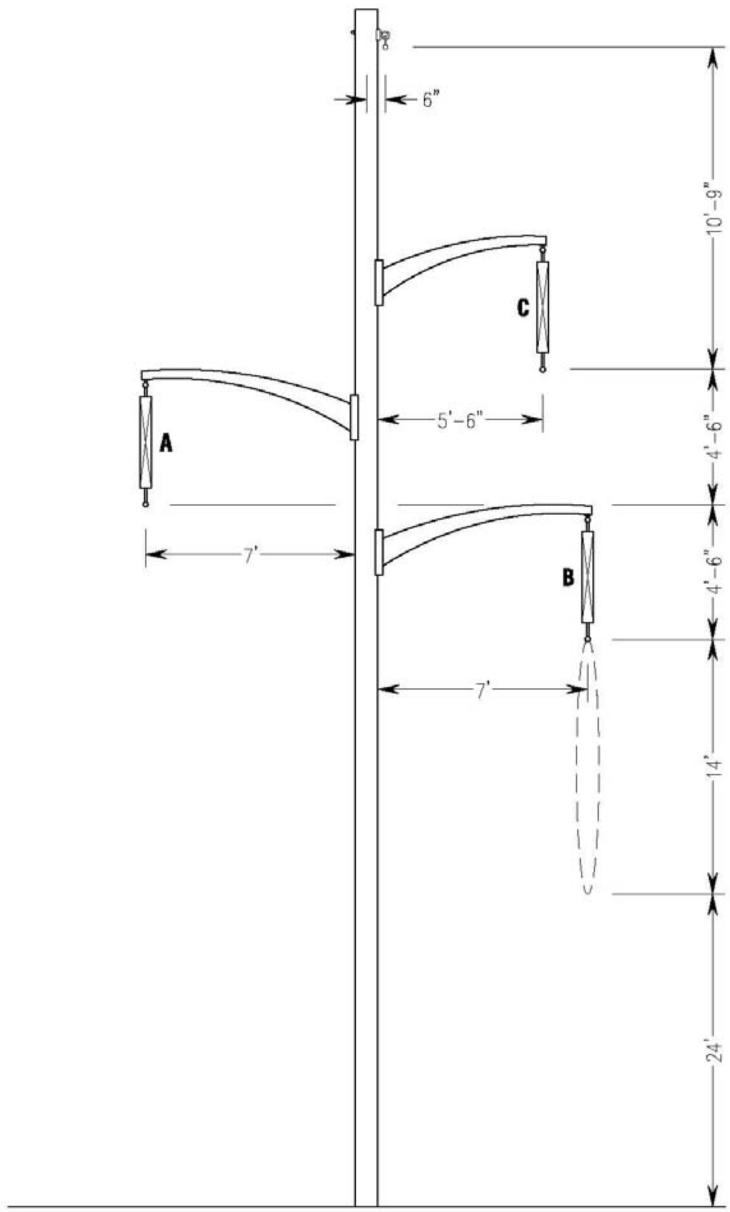
At Substation Transformer Capacity* – Phase A –

Voltage (kV)	Voltage Phase Angle
115	0°
Current (amps)	**Current Angle**
165	0°

* Includes GRE proposed 115/69kv 60MVA tower transformer

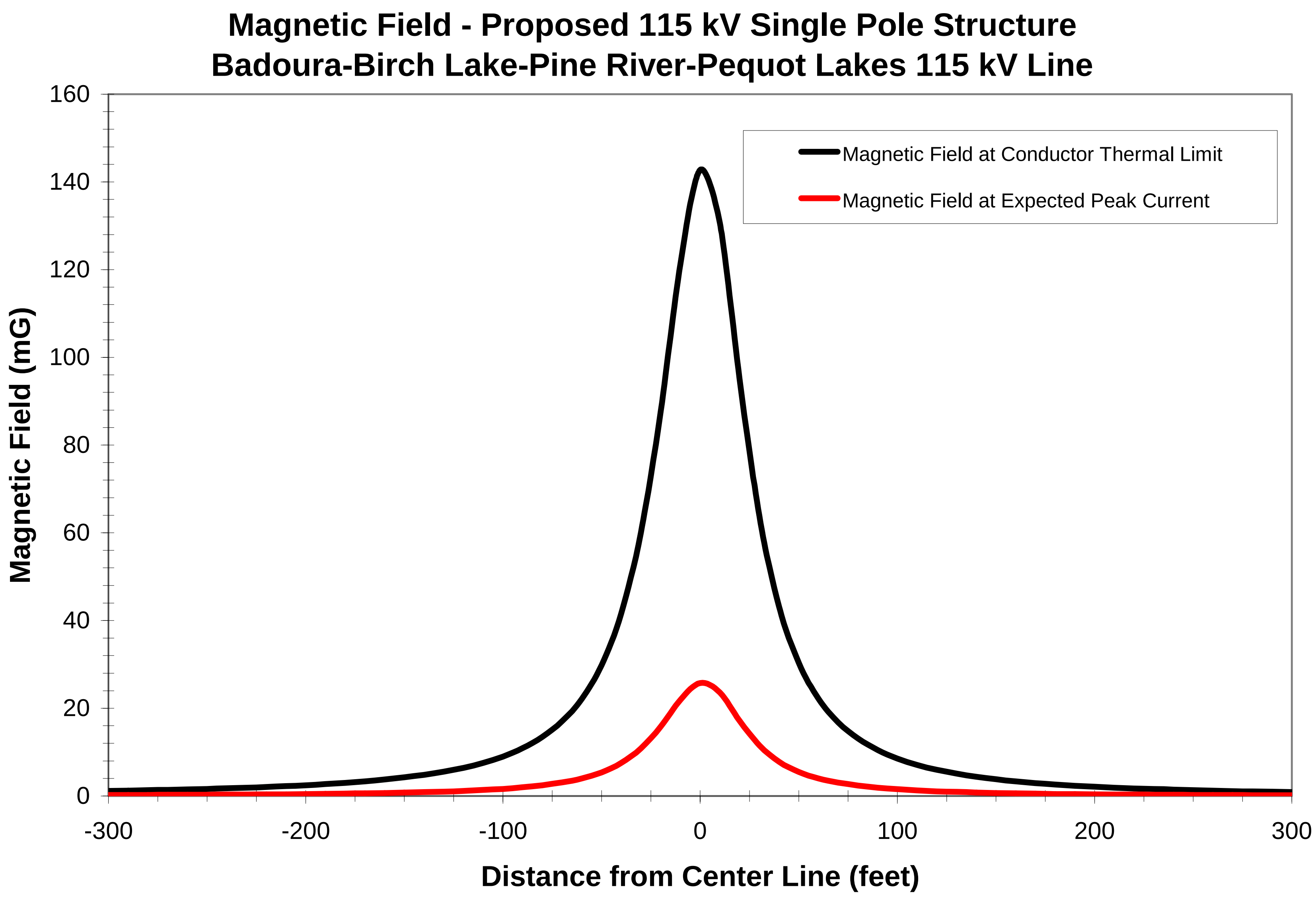

Magnetic Field - Proposed 115 kV H-Frame Structure
Badoura-Birch Lake-Pine River-Pequot Lakes 115 kV Line
Magnetic Field at Conductor Thermal Limit
Magnetic Field at Expected Peak Current
Magnetic Field (mG)
0
50
100
150
200
250
-300
-200
-100
0
100
200
300
Distance from Center Line (feet)

Badoura to Birch Lake to Pine River to Pequot Lakes - 115kV Transmission SPT Structure

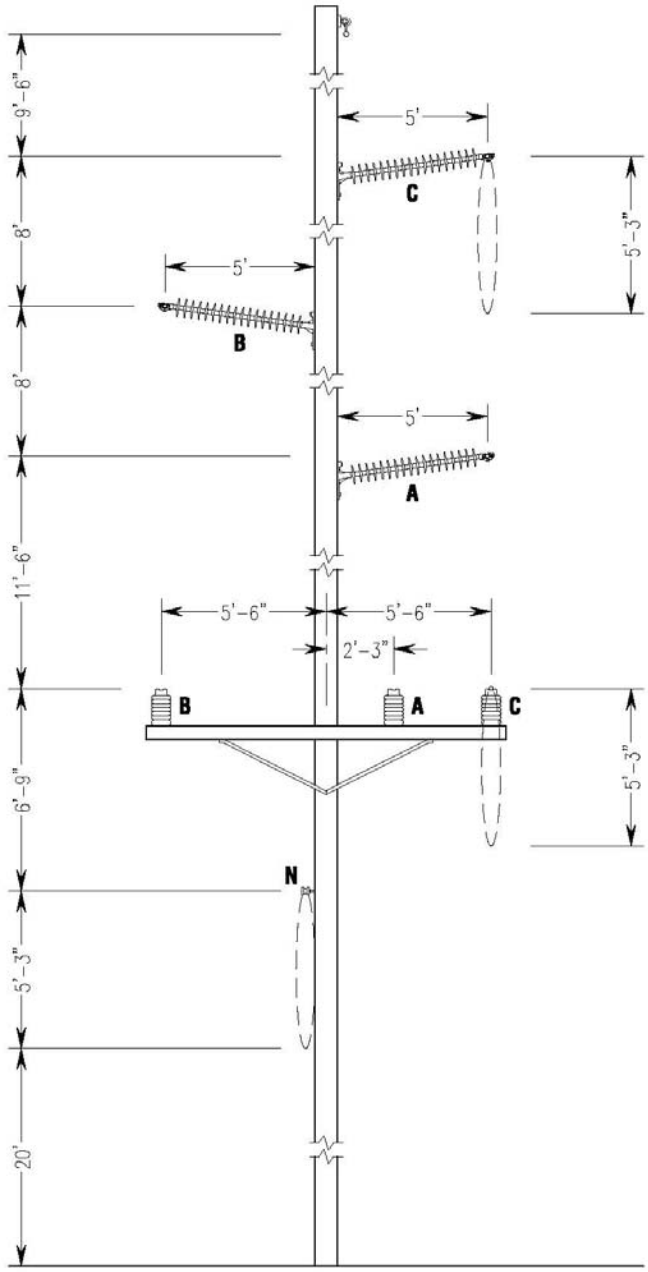


At Conductor Thermal Limit		At Substation Transformer Capacity*	
– Phase A –		– Phase A –	
Voltage (kV)	Voltage Phase Angle	Voltage (kV)	Voltage Phase Angle
115	0°	115	0°
Current (amps)	Current Angle	Current (amps)	Current Angle
914	0°	165	0°

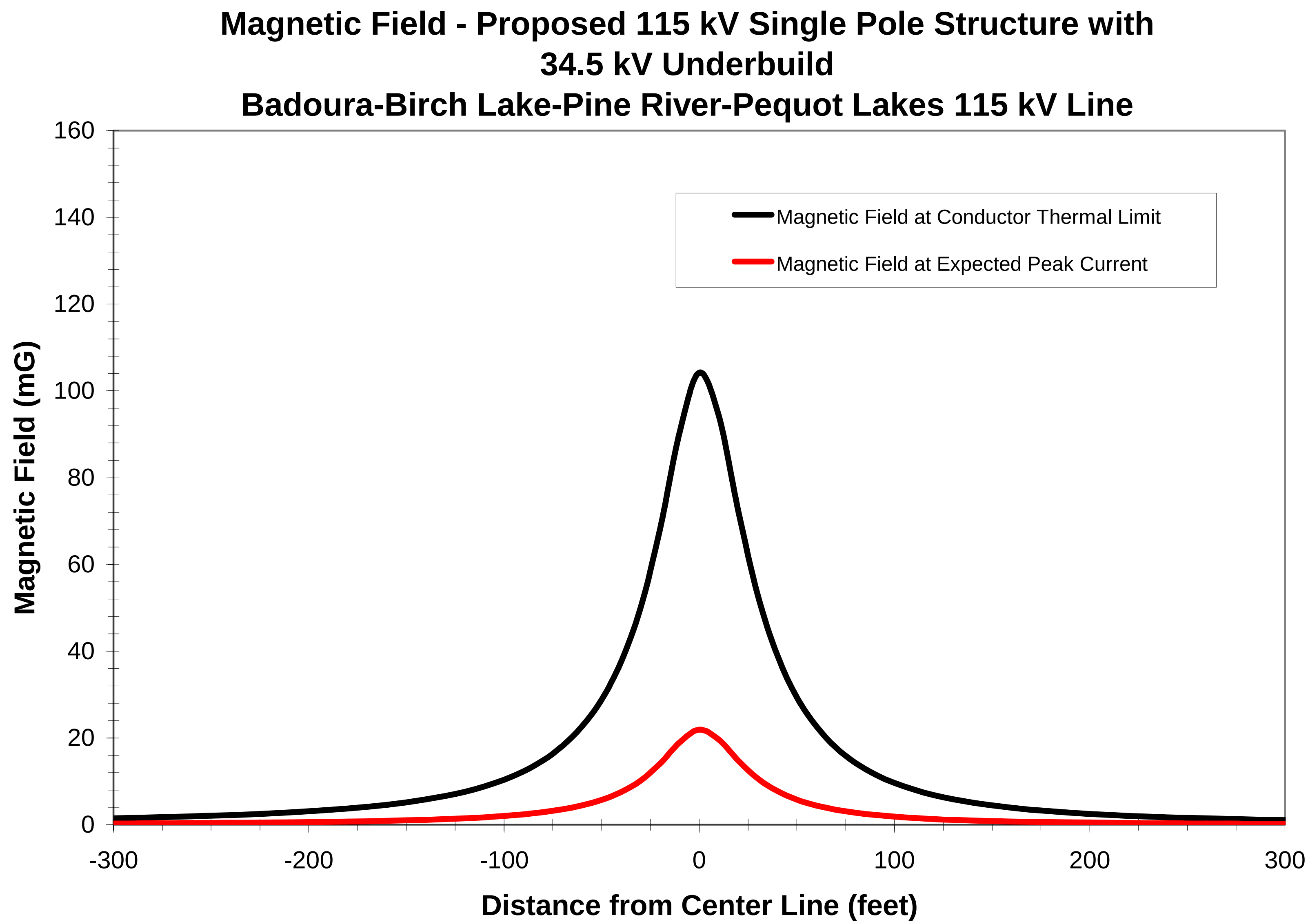
* Includes GRE proposed 115/69kv 60MVA tower transformer

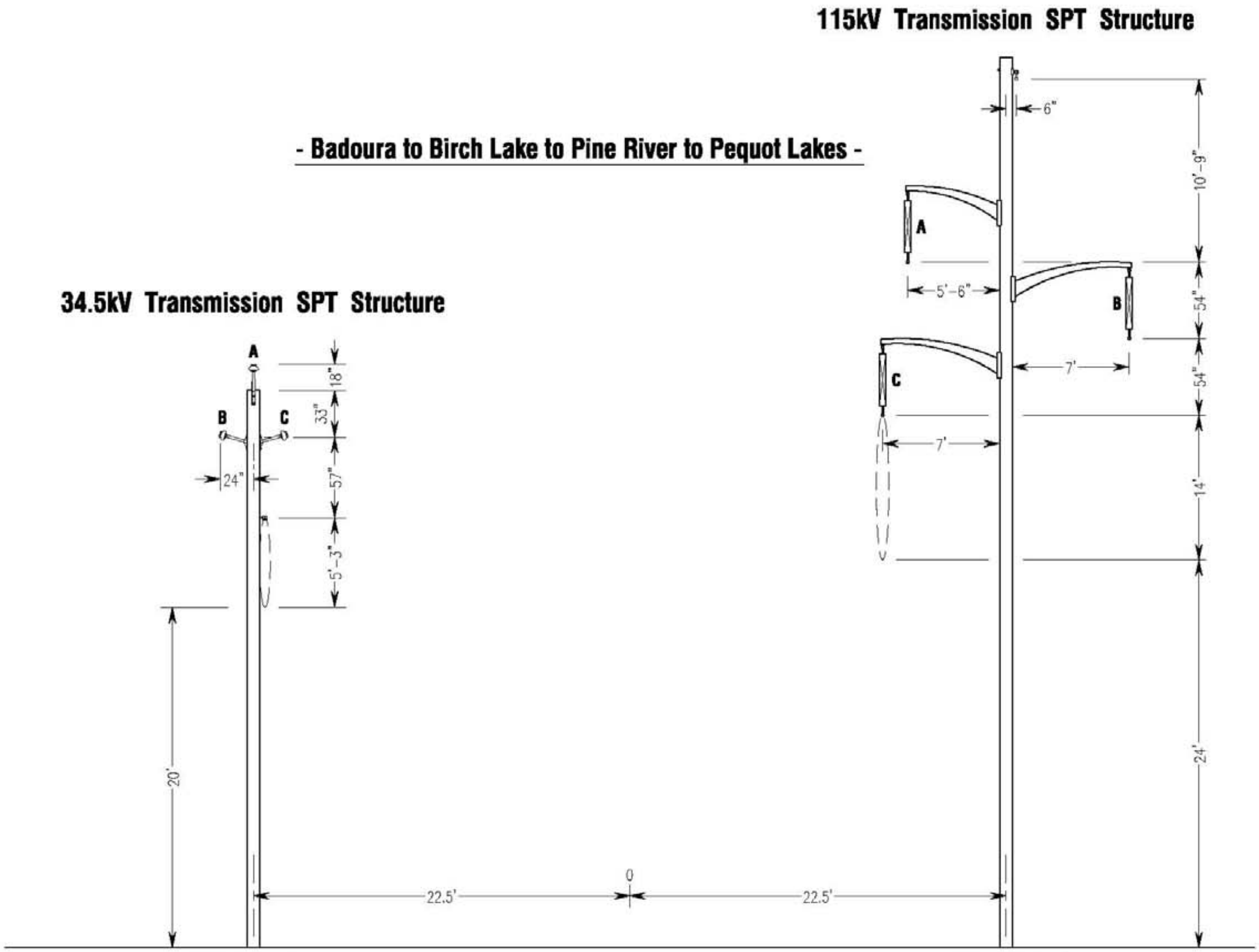

Magnetic Field - Proposed 115 kV Single Pole Structure
Badoura-Birch Lake-Pine River-Pequot Lakes 115 kV Line
Magnetic Field at Conductor Thermal Limit
Magnetic Field at Expected Peak Current
Magnetic Field (mG)
160
140
120
100
80
60
40
20
0
-300
-200
-100
0
100
200
300
Distance from Center Line (feet)

Badoura to Birch Lake to Pine River to Pequot Lakes - 115kV Transmission SPT/DBL Circuit Structure



- 115kV LINE -		- 34.5kV UNDERBUILD -	
At Conductor Thermal Limit	At Normal Peak Load	At Conductor Thermal Limit	At Normal Peak Load
– Phase A –	– Phase A –	– Phase A –	– Phase A –
Voltage (kV) 115 / Volt. Ph. Angle 0°	Voltage (kV) 115 / Volt. Ph. Angle 0°	Voltage (kV) 34.5 / Volt. Ph. Angle 330°	Voltage (kV) 34.5 / Volt. Ph. Angle 330°
Current (amps) 914 / Current Angle 0°	Current (amps) 165 / Current Angle 0°	Current (amps) 572 / Current Angle 330°	Current (amps) 132 / Current Angle 330°


Magnetic Field - Proposed 115 kV Single Pole Structure with
34.5 kV Underbuild
Badoura-Birch Lake-Pine River-Pequot Lakes 115 kV Line
Magnetic Field at Conductor Thermal Limit
Magnetic Field at Expected Peak Current
Magnetic Field (mG)
Distance from Center Line (feet)
0
20
40
60
80
100
120
140
160
-300
-200
-100
0
100
200
300

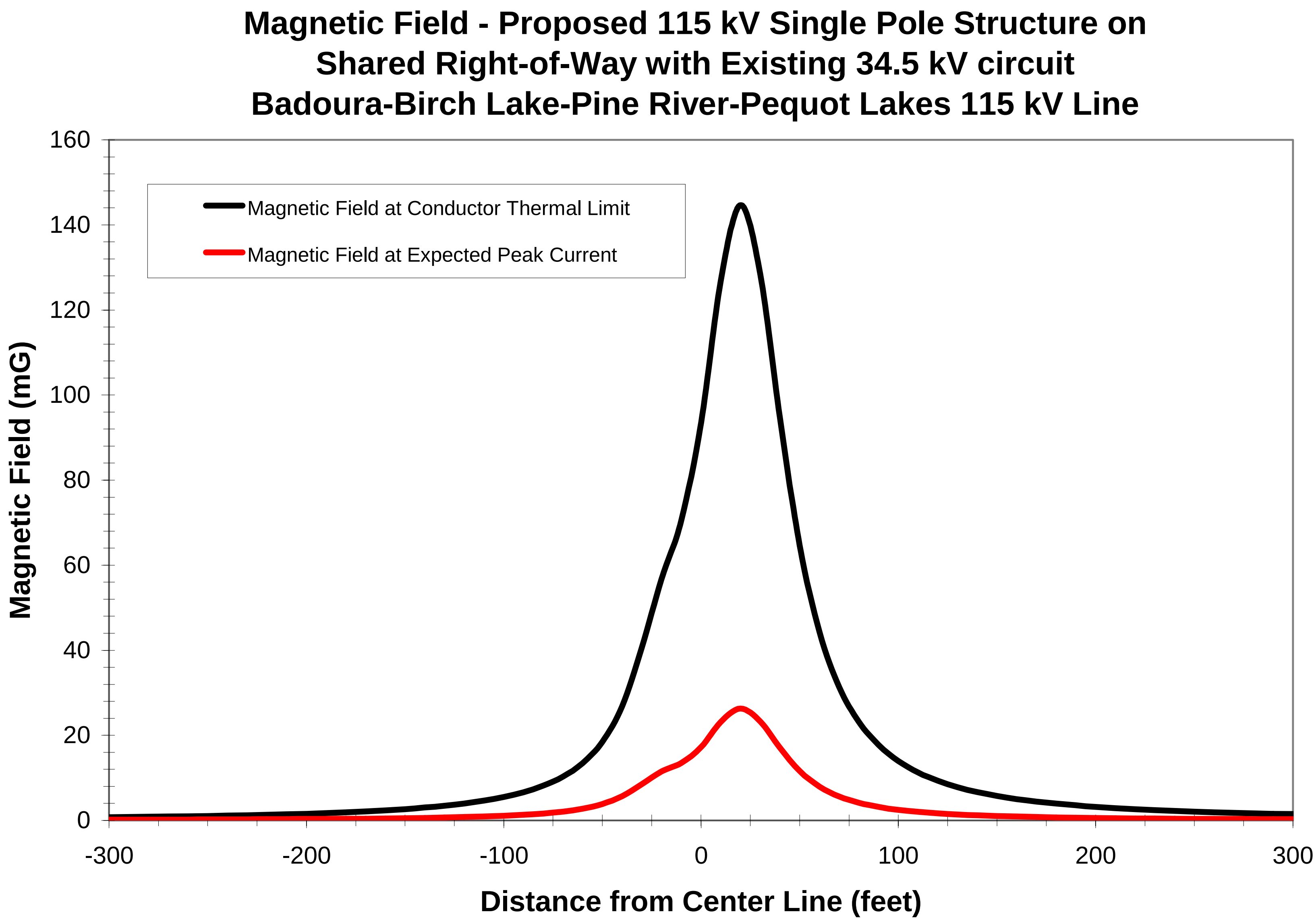


- 34.5kV LINE -

At Conductor Thermal Limit		At Normal Peak Load	
– Phase A –		– Phase A –	
Voltage (kV)	Volt. Ph. Angle	Voltage (kV)	Volt. Ph. Angle
34.5	330°	34.5	330°
Current (amps)	Current Angle	Current (amps)	Current Angle
572	330°	132	330°

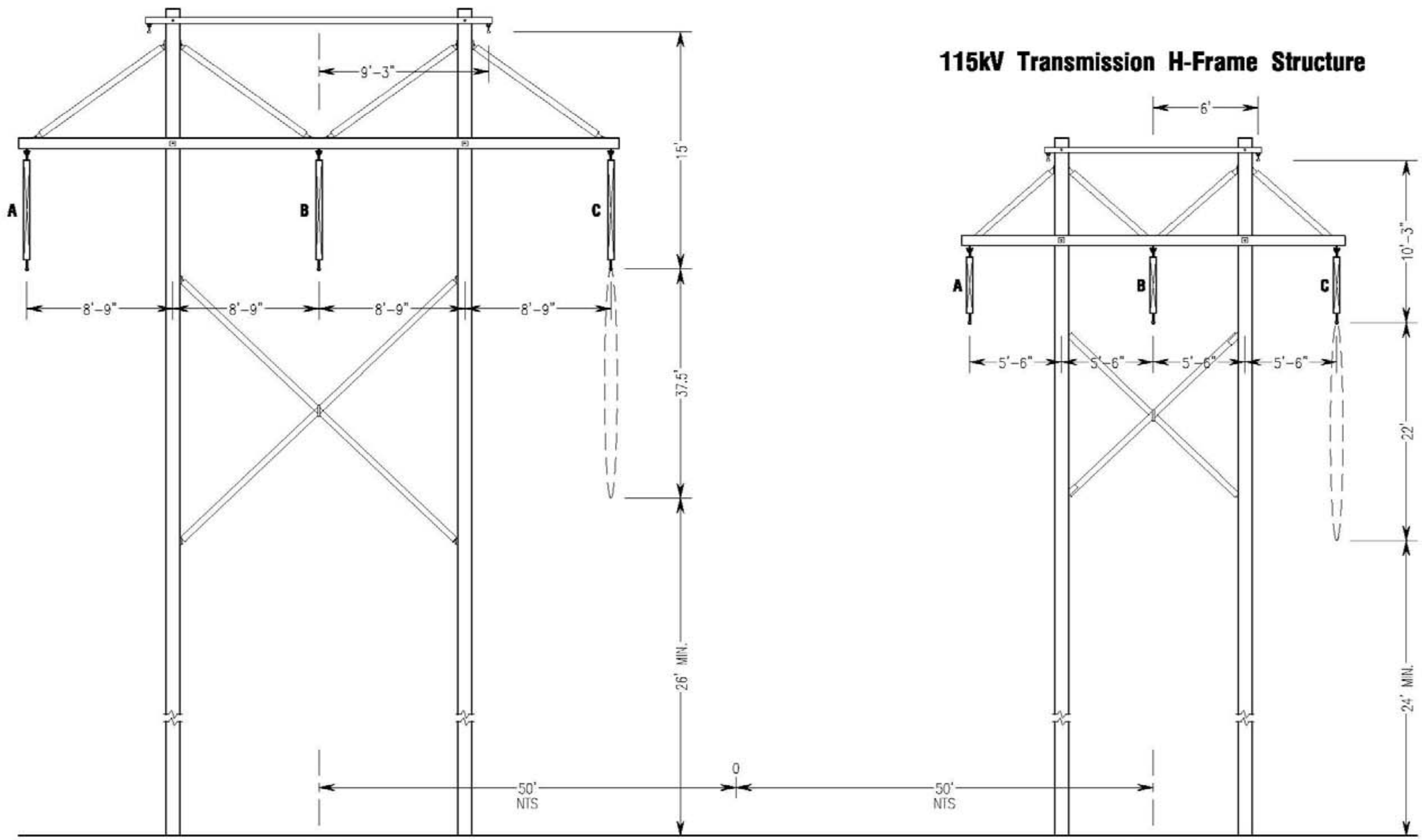
- 115kV LINE -

At Conductor Thermal Limit		At Normal Peak Load	
– Phase A –		– Phase A –	
Voltage (kV)	Volt. Ph. Angle	Voltage (kV)	Volt. Ph. Angle
115	0°	115	0°
Current (amps)	Current Angle	Current (amps)	Current Angle
914	0°	165	0°


Magnetic Field - Proposed 115 kV Single Pole Structure on
Shared Right-of-Way with Existing 34.5 kV circuit
Badoura-Birch Lake-Pine River-Pequot Lakes 115 kV Line
Magnetic Field at Conductor Thermal Limit
Magnetic Field at Expected Peak Current
Magnetic Field (mG)
160
140
120
100
80
60
40
20
0
-300
-200
-100
0
100
200
300
Distance from Center Line (feet)

230kV Transmission H-Frame Structure **- Badoura to Birch Lake to Pine River to Pequot Lakes -**

115kV Transmission H-Frame Structure

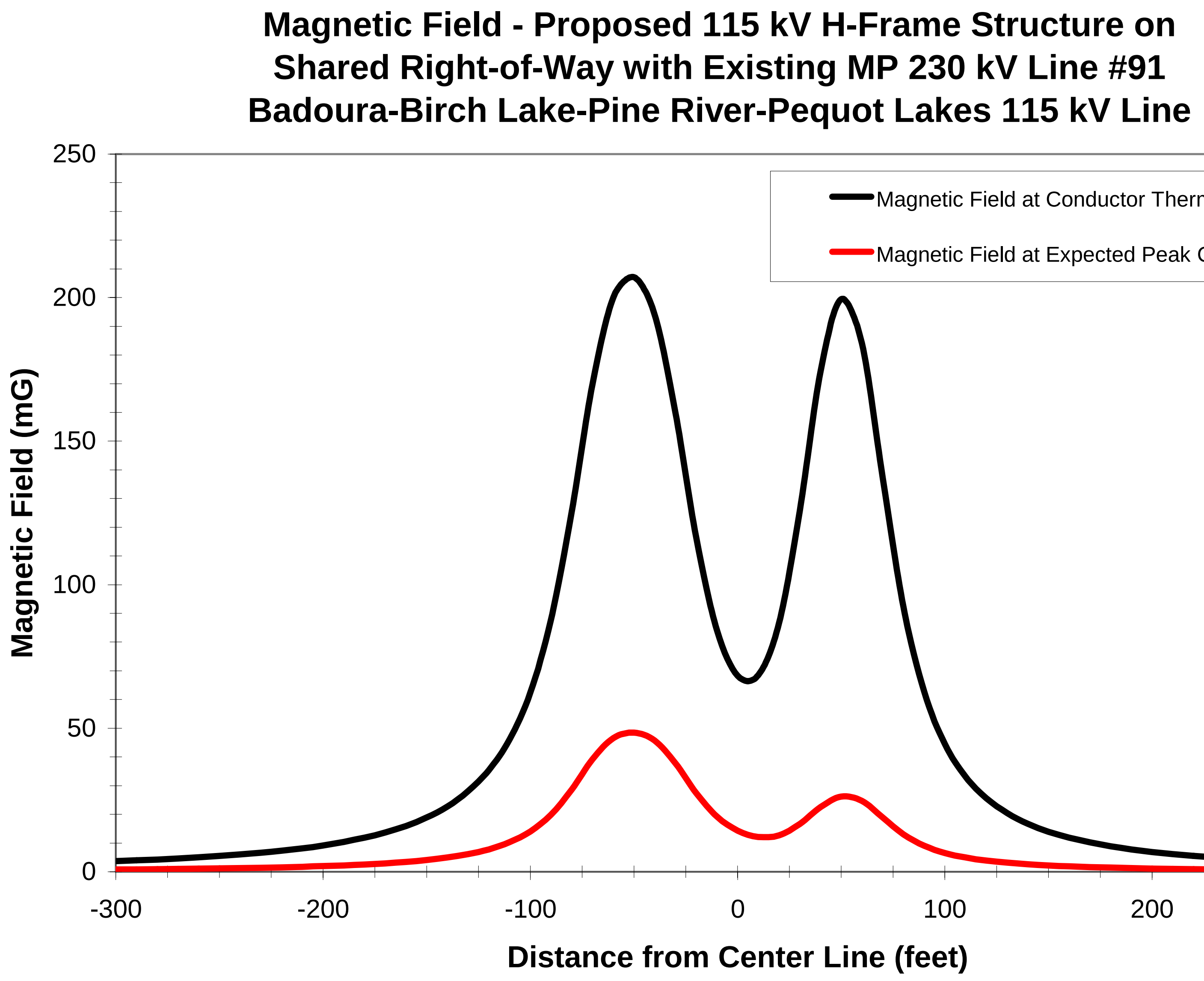


- 230kV LINE -

At Conductor Thermal Limit		At Normal Peak Load	
– Phase A –		– Phase A –	
Voltage (kV)	Volt. Ph. Angle	Voltage (kV)	Volt. Ph. Angle
230	0°	230	0°
Current (amps)	Current Angle	Current (amps)	Current Angle
821	0°	189	0°

- 115kV LINE -

At Conductor Thermal Limit		At Normal Peak Load	
– Phase A –		– Phase A –	
Voltage (kV)	Volt. Ph. Angle	Voltage (kV)	Volt. Ph. Angle
115	0°	115	0°
Current (amps)	Current Angle	Current (amps)	Current Angle
914	0°	126	0°


Magnetic Field - Proposed 115 kV H-Frame Structure on
Shared Right-of-Way with Existing MP 230 kV Line #91
Badoura-Birch Lake-Pine River-Pequot Lakes 115 kV Line
Magnetic Field at Conductor Therm
Magnetic Field at Expected Peak C
Magnetic Field (mG)
250
200
150
100
50
0
-300
-200
-100
0
100
200
Distance from Center Line (feet)

APPENDIX C

GRE 2004 CONSERVATION IMPROVEMENT PROGRAM

Appendix C – Program Descriptions

Program Index

RESIDENTIAL - CONSERVATION

AIR CONDITIONER TUNE-UP PROGRAM

Brown County Rural Electric

Description:

Members who tune up their central air conditioner unit are eligible for a $20 rebate on their electric bill. The tune up must be performed by a licensed contractor.

Support:

Brown County Rural Electric provides a $20 rebate to members.

Energy Savings: 180 kWh Demand Savings: 1.0 kW

Elk River Municipal Utilities

Description:

Air conditioners are oftentimes in need of a "tune up" to operate at peak efficiencies. Filters are not changed when necessary, condensing coils and cooling coils get dirty and operate less efficiently, and they may even be operating on low pressures which require longer run time to satisfy the thermostat. Beginning in 2002, ERMU launched an air conditioning tune-up program to encourage customers to keep their air conditioners operating at peak efficiency. Local HVAC contractors perform the following: clean the condenser coil, check Freon level and pressure, check filter, inspect cooling coil and clean if necessary, assure drain line is open, visually inspect the system, and inform/educate the homeowner about the importance of frequent maintenance. Once the tune-up is complete, the homeowner pays the contractor and submits equipment report and receipt to ERMU for up to $65 reimbursement. The goal is to concentrate on low income, but all residential systems at least three years old are eligible. Air conditioning is a critical load to ERMU and its wholesale power supplier's efforts to improve system load factor, reduce peak capacity requirements, improve system efficiencies, and help keep rates low. The goal of this program is to reduce energy consumption of the air conditioner by at least 15 percent.

Support:

ERMU will reimburse homeowner up to $65 to have a certified HVAC contractor provide the AC tune-up. Any expense associated with repair or replacement will be the responsibility of the homeowner. If the homeowner qualifies as low income, loan funds will be made available for repairs with payment included as part of the utility bill at no interest.

Energy Savings: 225 kWh Demand Savings: 0.5

Runestone Electric Association

Description:

Through the member newsletter and bill stuffers Runestone Electric Association (REA) members are encouraged to have an A/C tune-up on their existing and working central air conditioner for a cost that is determined in conjunction with Ellingson Plumbing & Heating (a subsidiary of REA). The member contacts REA and then Ellingson schedules the tune ups. The A/C tune-up includes: clean condenser coil; check Freon levels and pressure, check furnace filter, check furnace belt in lube motor, test all controls, blow out drain line, visual inspection of system and educate homeowner on efficient operation of unit.

Support:

The member has the option of putting the cost of the tune-up on their electrical account in one lump sum or over installments of three monthly payments.

Energy Savings: 100 kWh Demand Savings: 0.3

AIR SOURCE HEAT PUMP (ASHP)

Member Cooperatives

Description:

ASHPs provide summer cooling and spring/fall heating in residential or commercial installations. ASHPs are sized for cooling. In the cooling mode, the ASHP functions as a central air conditioner, and is load managed during the summer per the cycled air conditioning control strategy. The cycling provides approximately 1 kW of demand reduction per ASHP and approximately 75 kWh of energy savings per summer season. In the heating mode, the ASHP combined with a fossil fuel furnace, provides very efficient space heating down to approximately 15 to 20 degrees Fahrenheit. At these temperatures and below, the ASHP automatically shuts off and the secondary heating system typically a natural gas or liquid propane furnace heats the home. If conditions should require load control, our wholesale electric provider also has the ability to shut off the ASHP during the heating season. ASHPs help the distribution cooperative and our wholesale electric provider improve load factor, reduce peak capacity requirements, and improve system efficiencies.

Support:

The potential for energy savings with an air source heat pump is significant in both the summer and winter. GRE and its member cooperative will continue to educate and promote the importance of energy efficiency when selecting an HVAC system. The distribution cooperative provides a rebate to the customer for installing a high-efficient ENERGY STAR® ASHP and provides a reduced energy rate to the customer during the heating season. Beginning in 2004, the SEER rating requirement increased from 12 to 13.

Energy Savings: 2,500 kWh Demand Savings: 1 kW

COMPACT FLUORESCENT LIGHT (CFL) PROGRAM

Member Cooperatives

Description:

Lighting makes up 10 percent of a typical home's electricity consumption; the home light program is an energy conservation program that provides a rebate to encourage the conversion from incandescent lighting to more energy efficient lighting – particularly compact fluorescent lighting. A single CFL can save more than 400 kWh and $60 in energy costs over the bulb's lifetime. Recent advancements in CFL technology provide for more installation opportunities.

Through September, the distribution cooperatives provided a $4 rebate to residential customers that purchase an ENERGY STAR® rated CFL. All 28 member cooperatives participated in the national ENERGY STAR *Change a Light, Change* *the World* campaign, from October 1 through November 30, 2003. Cooperative members could purchase up to SIX CFLs for as little as $0.99 per bulb.

Support:

The distribution cooperative continues to educate its customers and builders on Energy Star and the value and benefits of high efficiency lighting through its various media and customer education opportunities.

Energy Savings: 66 kWh — Demand Savings: 0.03 kW

Elk River Municipal Utilities

Description:

Compact fluorescent light bulbs save 75 percent on energy and last up to 10 times longer than incandescent bulbs. The problem remains their cost. CFLs cost 10 to 20 times more than an incandescent bulb, so the typical consumer is reluctant to purchase them. Several years ago, they had a high failure rate, so the typical consumer doesn't think CFLs are a good value. Beginning in 2002, ERMU launched an educational campaign to inform the public about improved reliability and to reinforce the value of switching to CFLs. Additionally, it provides incentives ($5 coupon) to entice customers to purchase compact fluorescent lamps to help offset the additional cost of switching to CFLs.

Support:

Three coupons with a value of $5 each are mailed to customers. They can be redeemed for the purchase of up to three compact fluorescent lamps at various Elk River stores. Support materials include featuring CFLs at the Elk River Business Expo, a special mailing including an informational brochure with three coupons, and newspaper ads.

Energy Savings: 66 — Demand Savings: 0.03

CONSERVATION LOAN PROGRAM

Member Cooperatives

Description:

The Energy Resources and Conservation (ERC) loan program sponsored by the Rural Utilities Service (RUS) offers the distribution cooperative the ability to assist its customers in the financing of energy efficiency improvements in addition to projects such as high-efficiency air conditioners and off-peak space and water heating systems. The market-rate financing program allows customers to improve energy efficiency and reduce monthly electric energy bills and is available to both residential and commercial customers.

Support:

The ERC loan program provides a finance option to customers wanting to implement energy efficiency improvements. The distribution cooperative provides administrative support for loan processing and administration

Energy Savings: N/A Demand Savings: N/A

Stearns Electric Association

Description:

Stearns Electric Association sponsors the Stearns zero percent Interest Loan Program, an interest-free loan program to assist its members in financing the purchase of 92 percent efficient Marathon water heaters. The interest-free loan allows members to easily finance the high efficiency water heater purchase with no interest charge and incorporate the payment on the current electric bill.

Support:

Members are offered the payments on current electric bills. Payments are spread over two years, and the member is not charged a set-up fee.

Energy Savings: N/A Demand Savings: N/A

ELECTRICAL EVALUATION AND CONSULTATION

Member Cooperatives

Description:

The residential electrical evaluation and consultation program is targeted at customers who contact the distribution cooperative and express concern over their electrical usage. When a customer contacts a distribution cooperative representative, the representative reviews general appliance usage and costs with the customer. The review, which generally takes 15 minutes to complete, provides an overview of the customer's energy usage. The representative will also review a variety of means to conserve energy with the customer. If the representative determines that additional actions should be taken, the customer may be scheduled for an on-site audit. The audit will include:

- Energy bill analysis
- Customer education
- Building shell assessment
- Blower door test (in some cases)
- Mechanical and electrical equipment assessment
- Recommendations

Support:

The residential electrical evaluation and consultation program assists customers with energy usage concerns and provides the opportunity to instruct the customer on the benefits of energy conservation, energy efficient appliances, and energy saving new-home construction techniques. This program is also used to help educate builders, subcontractors, and electricians on energy efficient home construction and off-peak equipment installations.

Energy Savings: N/A Demand Savings: N/A

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ENERGY EDUCATION

Member Cooperatives

Description:

The distribution cooperative assists residential, commercial and industrial customers in the areas of energy reduction methods and techniques, and in the selection of energy efficient technologies or products through a variety of mediums including brochures, bill inserts, radio, newsletters, workshops, fairs, tradeshows, and one-on-one consultation. This general program captures a variety of services that the distribution cooperative provides including:

- Explaining to customers the benefits of purchasing energy efficient appliances including lighting, heating systems, ventilating, and air conditioners.
- Providing answers to customers' electric energy usage questions.
- Educating customers on how appliances, lighting, heating, cooling, and general usage habits affect their energy bill.
- Recommending energy reduction measures.
- Providing simple energy usage calculation tools and energy cost guidelines.

Support:

The distribution cooperative provides a variety of support mechanisms for Energy Education including:

- Energy education brochures
- Appliance energy usage and cost guides
- Energy education workshops

Energy Savings: N/A

Demand Savings: N/A

ENERGY STAR® CENTRAL AIR CONDITIONER REBATE PROGRAM

Member Cooperatives

Description:

Residential air conditioning is a critical load to GRE and its member cooperatives' effort to improve system load factor, reduce peak capacity requirements, and improve system efficiencies. The interruptible air conditioning program has greatly helped in these areas; however, not every customer wants their air conditioner to be cycled. The opportunity to improve system efficiencies and to also lower customer's cooling operating costs is available through the residential high efficiency air conditioner rebate program.

The distribution cooperative provided a $200 customer rebate or installing contractor rebate for air conditioners that have a Seasonal Energy Efficiency Ratio (SEER) of 12 or greater through 2003. This increased efficiency results in energy and demand savings during the critical summer period. Beginning in 2002, GRE provides an additional $50 incentive to the distribution cooperative for each new high-efficiency air conditioner installed with cycling option. This additional rebate can be used by the distribution cooperative to offset the additional cost of installing a load management receiver. Starting in 2004, the distribution cooperatives may offer $300 for each ENERGY STAR qualified air conditioner with a SEER of 13 or greater.

Support:

Distribution cooperative representatives meet with area HVAC dealers to discuss the details and qualifications of the residential high-efficiency air conditioner rebate program. The distribution cooperatives also promote the program through their various media and customer education opportunities, and administrate the verification of installation and distribution of a rebate to the customer or installing contractor.

Energy Savings: 200 kWh   Demand Savings: 1 kW

ENERGY STAR® APPLIANCE REBATE

Member Cooperatives

Description:

In addition to water heating, residential appliances are the largest energy users in a typical home – particularly refrigerators, dishwashers and clothes washers. There is an opportunity to save energy by promoting the use of high efficiency ENERGY STAR appliances. ENERGY STAR has identified dishwashers, refrigerators, and clothes washers as the most promising appliances for electric energy and demand savings. For this reason, GRE and its member cooperatives started a rebate program for ENERGY STAR rated appliances in 2003. This program was closely monitored and its success ensures that GRE's member cooperatives will continue the program during the next biennial.

Support:

GRE member cooperatives intend to continue educating customers and builders on ENERGY STAR and the value and benefits of high efficiency appliances through its various media and customer education opportunities. The cooperatives will also administrate the verification of installation and the distribution of a rebate to the customer.

Energy Savings:	Clothes Washer	550 kWh	Demand Savings: 0.06 kW
	Dishwashers	145 kWh	
	Refrigerators	56 kWh	

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ENERGY STAR® ROOM AIR CONDITIONER PROGRAM

Member Cooperatives

Description:

Residential air conditioning is a critical load to distribution cooperatives and GRE's effort to improve system load factor, reduce peak capacity requirements, and improve system efficiencies. The opportunity to achieve utility system benefits and lower customers' cooling operating costs is available through the ENERGY STAR Room Air Conditioning Program. Distribution cooperatives provide a rebate when a customer purchases an ENERGY STAR-rated room air conditioner. This increased efficiency results in energy and demand savings during the critical summer period.

Support:

Distribution cooperatives promote the program through various media and customer education opportunities. The room air conditioner must be ENERGY STAR rated to qualify for a rebate. The rebates are available to residential customers only. Requests by multi-unit residential building owners for entire building change out must be administered through the C&I-A Energy Grant program. Energy and demand savings are based on information from the ENERGY STAR website.

Energy Savings: 100 kWh | Demand Savings: 0.15 kW

Elk River Municipal Utilities

Description:

Customers who purchase ENERGY STAR rated room air conditioners will receive a rebate from ERMU to help offset the additional cost of purchasing a more energy efficient model. According to EPA, ENERGY STAR rated room air conditioners exceed minimum federal standards for energy consumed by at least 10 percent. Based on customer visits, ERMU believes it to be higher!

Support:

ERMU will rebate $30 for the purchase of an ENERGY STAR rated room air conditioner upon receipt of the ENERGY STAR Form and proof of purchase from customers of ERMU.

Energy Savings: 100 kWh | Demand Savings: 0.15kW

ENERGY WISE® HOME BUILDING PROGRAM

Cooperative Light & Power Association

Description:

New home construction program promotes energy-efficient design and construction through above-code performance standards. Homeowners qualify for rebates by meeting or exceeding thermal integrity, ventilation and heating and cooling performance.

Support:

By working with homeowners and builders to meet performance standards. Process includes plan review, two on-site inspections followed by a blower door test. Total rebate of up to $2,500 dependent upon performance.

Energy Savings: N/A | Demand Savings: N/A

Ground Source Heat Pump (GSHP) Program

Member Cooperatives

Description:

GSHPs have proven to be one of the most efficient space conditioning options and the potential for energy savings is significant. Acceptance of this technology continues to grow nationwide. GSHPs use the latent heat in the ground as a heat sink and a heat source. By utilizing a series of vertically or horizontally buried heavy-duty plastic pipes filled with a food-grade antifreeze solution as the heat transfer medium, GSHPs achieve significantly high efficiencies in both the cooling and heating mode. This high efficiency results in reduced kWh usage in the cooling season and can also significantly reduce the total energy used to heat a building when compared to fossil fuel heating systems. To date, Great River Energy through its 28 distribution cooperatives serves hundreds of residential GSHP systems and also is a member of the International Ground Source Heat Pump Association.

Support:

The potential for energy savings with ground source heat pumps is significant in both the summer and winter. GRE and its distribution cooperatives will continue to educate and promote the importance of energy efficiency when selecting a HVAC system for residential homes. GRE will continue as a member of the International Ground Source Heat Pump Association. GSHPs currently qualify for a $300 rebate.

Energy Savings: 14,000 kWh Demand Savings: 10 kW

Elk River Municipal Utilities

Description:

Customers who purchase ground source heat pump systems will receive a rebate from ERMU to help offset the additional cost of space conditioning with the most efficient!

Support:

ERMU will rebate $800 towards the purchase of an ENERGY STAR rated ground source heat pump system in residential applications upon proof of purchase from customers. Rebates for commercial installations will be considered on a case-by-case basis and will be calculated at $150 per ton if qualified.

Energy Savings: N/A Demand Savings: N/A

HIGH-EFFICIENCY WATER HEATER REBATE

Member Cooperatives

Description:

A customer who replaces an old inefficient electric water heater with a new high efficiency electric water heater receives a $100 rebate. Minimum acceptable water heater has R16 or greater insulation. Several cooperatives offer rebates including:

- McLeod Cooperative Power Association
- Nobles Cooperative Electric
- Stearns Electric Association

Support:

Water heaters that were replaced had an average efficiency factor of 0.82 or less. Half of the replacement water heaters had energy efficiency factors of 0.94; the other half had energy efficiency factors of 0.91 or more. Average savings is determined using the difference in energy efficiency improvement from 0.82 to 0.92, which is equivalent to a 10.87 percent energy savings on a water heater using 4,800 kWh per year. This savings of 522 kWh is calculated by multiplying 4,800 kWh by 10.87 percent. The consumer receives a $100 rebate after installing the water heater and providing proof of purchase and verification of the water heater's energy rating. The water heater does not have to be on a load management program to receive a rebate.

Energy Savings: 522 kWh Demand Savings: 0.03 kW

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INTERRUPTIBLE AIR CONDITIONING

Member Cooperatives and ERMU

Description:

The interruptible air conditioning program provides customers with an incentive to allow GRE to cycle (15 minute on, 15 minute off) or fully interrupt their central air conditioner, air source heat pumps and ground source heat pumps during periods of high peak demand during the summer season. The cycling provides approximately 1 kW of demand reduction per participant and approximately 100 kWh of energy savings per summer season. Air conditioning is a critical load to the GRE's and its member cooperatives efforts to improve system load factor, reduce peak capacity requirements and improve system efficiencies. The customer receives a reduced energy rate for air conditioning or a monthly credit on their energy bill during the summer months. Room air conditioners are not allowed unless they are hard-wired.

Support:
Air conditioning represents a very low load factor end use product. Interruptible air conditioning provides a tremendous potential to lower system peak demand and reduce customer energy consumption. The distribution cooperative provides a reduced electric rate or a monthly credit during the summer months. In addition, GRE will provides a $50 rebate to the distribution cooperative to help offset the cost of the load management receiver that must be installed with each interruptible air conditioner.

Energy Savings: 100 kWh Demand Savings: 1 kW

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OFF-PEAK SPACE HEATING - DUAL FUEL SPACE HEATING

Member Cooperatives

Description:
Dual fuel space heating systems are a combination of interruptible electric and non-electric space heating. Conventional electric (generally, baseboard or a plenum heater) is the primary heating system and fuel oil, natural gas, liquid propane, or in some cases wood is the secondary heating system. Both the primary and secondary heating system are sized for the entire heating load of the home. During periods of high electric demand, the interruptible electric heating system is shut off and the secondary heating system heats the home. Single thermostat control is encouraged for the highest level of customer comfort. Wood-fired furnaces and boilers as a

backup are allowed; however, it is highly discouraged because of their non-automatic nature. The dual fuel space-heating program helps the distribution cooperative and GRE improve load factor, reduce peak capacity requirements, and improve system efficiencies.

Support:

The distribution cooperative provides off-peak dual fuel sizing support for electrical contractors. The distribution cooperative also provides a reduced electric rate to customers using dual fuel space heating systems.

Energy Savings: 0 kWh | Demand Savings: 7.5 kW

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OFF-PEAK WATER HEATING - ELECTRIC THERMAL STORAGE (ETS) AND PEAK SHAVE WATER HEATING (PSWH)

Member Cooperatives and ERMU

Description:

An electric thermal storage (ETS) water heating system has sufficient storage capacity to supply the user's hot water needs over an extended "on-peak" period while the electrical supply is interrupted – typically from 7:00 AM to 11:00 PM each day. The program is targeted at customers who may choose electric water heating and is therefore designed to conserve both energy and capacity. Customers who choose ETS water heating must install a high efficiency water heater.

GRE member cooperatives and ERMU promote the installation of high efficiency off-peak water heaters. The customer typically has an 85-gallon water heater that provides enough hot water to use throughout the day when the electric heating elements are turned off.

Another option available to customers is the Peak Shave Water-Heating (PSWH) program. PSWHs are load managed during peak days that typically occur on the hottest and coldest days of the year. The water heater is shut off during these peak times for up to eight hours a day in some cases.

Water heating is the second largest user of energy in the average home; off-peak water heating programs are an excellent way to manage this end-use appliance and provide GRE and its members a strategy to improve system load factor, reduce peak capacity requirements, and improve system efficiencies.

Support:

Many consumers use electricity for water heating. One of the primary reasons is the ease of installation. As the building code continues to require tighter envelopes, we expect to see the demand for electric water heating to increase because of the flexibility that electric water heating offers in new construction. The distribution cooperatives also provide a reduced electric rate to customers using off-peak water heating systems.

Energy Savings: 300 kWh   Demand Savings: 1 kW

RESIDENTIAL – LOAD MANAGEMENT

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OFF-PEAK POOL HEATING AND ELECTRIC VEHICLES

Description:

Electrically heated swimming pools or electric vehicles such as fork lifts and golf carts that can be heated or charged during the nightly 8-hour Electric Thermal Storage charge time are eligible for a reduced electric rate from the distribution cooperative. The pool heater or electric vehicle must be metered as an ETS load and energized only during the nightly eight-hour ETS charge time. Both indoor and outdoor pools qualify with the recommendation that an insulated pool cover be used. Spas and hot tubs do not qualify. The electric vehicle must be able to operate "around-the-clock" from the nightly eight-hour ETS charge.

Support:

The distribution cooperative provides support for pool heater sizing and also helps electric contractors with feeder sizing for electric vehicle recharging systems.

Because both the pool heater and the electric vehicle use the ETS strategy, the distribution cooperative provides a reduced electric rate to customers.

Energy Savings: 0 kWh Demand Savings: Customer specific

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OFF-PEAK SPACE HEATING - ELECTRIC THERMAL STORAGE (ETS)

Member Cooperatives

Description:

An electric thermal storage (ETS) space heating system is capable of providing 100 percent of a home's heating requirement by storing heat produced from electricity during an eight hour off-peak period, which occurs from 11:00 PM to 7:00 AM each day from September through April. The program is targeted at customers who may choose electric space heating and therefore designed to conserve both energy and capacity. A number of storage mediums can be used to store heat during off-peak periods; the most common are water and ceramic. There are three commercially available storage-heating configurations: central, room or dispersed, and slab. Customers receive a low off-peak rate in return for allowing GRE to control their systems each day between 7:00 AM and 11:00 PM. The residential ETS space-heating program helps the distribution cooperative and GRE improved load factor, reduce peak capacity requirements, and improve system efficiencies.

Support:

The distribution cooperative provides off-peak ETS sizing support for electrical contractors. GRE also stocks and distributes residential ETS space heating equipment that is made available to HVAC contractors within the service territory. The distribution cooperative also provides a reduced electric rate to customers using ETS space heating systems.

Energy Savings: 0 kWh Demand Savings: 7.5 kW

VOLUNTARY SUMMER LOAD REDUCTION PROGRAM

Member Cooperatives

Description:

Wait ‘till 8 is a voluntary program asking members to delay using electric appliances until 8:00 p.m. on peak summer days. This helps GRE’s load profile by decreasing the amount of energy used until a time when the load is expected to decrease. Participating cooperatives include:

- Arrowhead Electric Cooperative
- Cooperative Light & Power
- East Central Energy
- Lake Country Power
- Mille Lacs Electric Cooperative

Support:

Cooperatives work with local radio stations to provide public service announcements. They also advertise the program in their newsletters and in mailings to their members.

Energy Savings: N/A Demand Savings: N/A

Elk River Municipal Utilities

Description:

Beginning in 2000, ERMU launched a campaign to encourage customers to reduce electric usage whenever the temperature reached 90 and dew point exceeded 70F. It was called Wait Till Eight. Another summer voluntary load reduction program targeting air conditioners and using the same parameters was called Dial Up Five At Five. Neither program was widely accepted because of the voluntary nature and lack of public awareness. However, public education will continue in an attempt to increase the participation rate.

Support:

A program brochure was mailed to all accounts in 2000, and ads are continually placed in the local newspaper to inform customers of the pressing need to reduce summer peak load. Results as to effectiveness are sketchy at best, but a survey taken in 2003 indicates 67 percent of ERMU’s customers have heard of the program and 10 percent have initiated some sort of load reduction at peak times. Mailings will continue, and ads will be placed in the local newspaper to increase public awareness of the extreme need to reduce use of electricity on peak summer days.

Energy Savings: N/A Demand Savings: N/A

RESIDENTIAL – RENEWABLE

WELLSPRING WIND ENERGY PROGRAM®

Member Cooperatives

GRE resources include 18 megawatts of wind energy, including 6 megawatts from the Chandler Hills Wind Farm along the Buffalo Ridge in southwestern Minnesota. In addition, GRE purchases another 6 megawatts of wind energy from a recently completed project located in Dodge Center, Minnesota, and another 6 megawatts from a wind project in Jackson County, Minnesota. GRE was one of the nation's pioneers in providing a green pricing program. Through the Wellspring Wind Energy® Program, cooperative customers can designate that part or all of their electricity use be generated by the wind.

Support:

Wellspring is sold in 100 kWh blocks. More than 3,600 customers now choose the number of blocks they want to buy, from one block per month up to 100 percent of their electricity usage.

Energy Savings: N/A Demand Savings: N/A

RESIDENTIAL - OTHER

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FLUORESCENT BULB RECYCLING PROGRAM

Member Cooperatives

Description:

GRE and its member cooperatives support the recycling of fluorescent bulbs. The residential fluorescent bulb recycling program is designed to encourage residential customers to recycle fluorescent bulbs safely and properly. Each year, the distribution cooperative mails a sheet of ten $0.50 coupons to its residential customers. Customers can redeem the coupons when recycling fluorescent bulbs at participating area hardware stores. In addition, the distribution cooperative periodically publishes lamp recycling and other environmentally related information in its newsletter. This effort keeps the importance of proper lamp disposal in front of our customers.

Support:

The fluorescent bulb recycling program is in direct response to the statutory goals of M.S. 216B.241, Subdivision 5, which requires distribution cooperatives to encourage the use of energy efficient lighting. The distribution cooperative will continue to educate its customers on the merits of proper fluorescent bulb disposal through its various media and customer education opportunities. The distribution cooperative will also continue to support and administrate the coupon redemption program related to the recycling program.

Energy Savings: N/A Demand Savings: N/A

Goodhue County Cooperative Electric Association

Description:

Goodhue County Cooperative is a drop off point for county wide recycling program. Goodhue County Cooperative houses the bulbs and ballasts until the county picks them up to bring to a qualified recycling center. Each person in the county is eligible for ten free recycled bulbs per year under this program and the county bills participants for extra bulbs.

Support:

Goodhue County Cooperative has an area in their warehouse set aside for the recycling program. The warehouse person is the contact for the county.

Energy Savings: N/A Demand Savings: N/A

TREE SHADING

Elk River Municipal Utilities

Description:

Strategically sited shade trees can reduce residential air conditioning energy use by up to 25 percent. In order to get this message out and encourage customers to consider planting trees to help reduce their cooling bills and utility air conditioning energy and demand, ERMU launched the AC Tree Program in 2003. This program includes the distribution of a limited number of free trees to the people who first respond to and qualify to the program. Because these are large (15 ft.) deciduous trees, they should begin to provide shading benefits in a few short years. The benefit through consumer education increases the value of this program by a factor of many times.

Support:

ERMU will provide a large baled and burlaped tree to 150 qualifying customers who agree to plant it in a location that will help decrease their air conditioning use. Each prospect is screened via a site visit and agrees in writing to plant the tree according to recommendations set forth by the Department of Commerce.

Energy Savings: N/A Demand Savings: N/A

LOW-INCOME AND RENTER PROGRAMS – CONSERVATION

HABITAT FOR HUMANITY

Elk River Municipal Utilities

Description:

Sherburne County Habitat for Humanity is building a home in Elk River in 2004. ERMU will furnish ENERGY STAR appliances, upgraded insulation levels and improved construction techniques which have been shown to increase energy efficiencies.

Support:

ERMU will furnish the following energy conserving devices and upgrades: Heat recovery ventilator, ENERGY STAR appliances, add-on heat pump, DC furnace blower motor upgrade for gas furnace, off-peak water heating, high efficiency windows and door upgrade, insulation upgrade, and CFLs throughout.

Energy Savings: 3,350 Demand Savings: 3.0

LOW-INCOME & RENTER ENERGY EDUCATION

Lake Country Power

Description:

The distribution cooperative assisted the Leech Lake Band of Ojibwa in Cass Lake, Minnesota on April 15, 2003 at their first Energy Assistance & Weatherization Energy Fair coordinated by Chris Bedeau and Sally Morrison of Leech Lake Energy. The energy fair was designed for and attended by low-income residential homeowners and renters that utilize their energy assistance and weatherization programs. Lake Country Power, along with five other energy vendors, spent the day speaking to over 100 individuals who attended the energy fair on "Low Cost/No Cost" ways to save energy, weatherization techniques, vendor billing options, appliance efficiencies, home heating and cooling, and lighting options. Other agencies represented during the day were the Minnesota Department of Commerce, Bi-CAP Agency, Cass County Energy Assistance and Leech Lake Weatherization Program. Lake Country Power donated an "Energy Star" small kitchen appliance for the final drawing and provided Department of Commerce brochures & CD's on energy savings along with specific conservation methods and programs offered by Lake Country Power.

Support:

The distribution cooperative provides a variety of support mechanisms for Energy Education including: energy education brochures; appliance energy usage and cost guides; energy education workshops; in-home energy audits and billing assistance.

Energy Savings: N/A Demand Savings: N/A

LOW-INCOME AIR CONDITIONER TUNE-UP

Member Cooperatives

Description:

Beginning in 2003, the distribution cooperatives offered an air conditioning tune-up to low-income customers. Some distribution cooperatives operated the program through a local Community Action Program (CAP) agency, others administered the program in-house. The CAP agency can help identify customers who would benefit from this service and also instruct local HVAC service vendors authorized to provide the tune-up under this program. The tune-up service will include:

- Cleaning condenser coil
- Checking freon level and pressures
- Checking indoor filter
- Testing all controls
- Blowing out drain line
- Visual inspection of entire system
- Educating homeowner on operation

Residential air conditioning is a critical load to the distribution cooperative and our wholesale electric provider's effort to improve system load factor, reduce peak capacity requirements, and improve system efficiencies. The low-income air conditioner tune-up program improves the air conditioners efficiency, which in turn lowers the customer's energy bill - according to a local CAP agency; tune-ups will reduce average residential air conditioning energy usage by approximately 10 percentt.

Support:

This program specifically addresses Minnesota Statute 216B.241, Subdivision 2, Part 3, which requires that a portion of the money spent on residential conservation improvement programs is devoted to programs that directly address the needs of low income and renters.

Energy Savings: 100 kWh Demand Savings: 0.3 kW

LOW-INCOME AIR CONDITIONER WITH CYCLING PROGRAM

Stearns Electric Association

Description:

Beginning in 2003, Stearns Electric Association cooperative provides low-income customers in cooperation with local EDA programs, rebates for standard and high efficiency air conditioning. Stearns Electric also provides free equipment for cycling air conditioners during the cooling season and incentives for construction costs. This program helps improve system load factor, reduce peak capacity requirements, and improve system efficiencies.

Support:

Cycled central air conditioning provides a tremendous potential to lower system peak demand. Stearns Electric provides a monthly credit during the summer to customers participating in the program.

Energy Savings: 100 kWh Demand Savings: 1 kW

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LOW-INCOME ENERGY AUDIT PROGRAM

BENCO Electric Cooperative

Description:

Through the local Community Action Program (CAP) agency Minnesota Valley Action Council, BENCO Electric Cooperative provides funds for energy audits to help total energy cost for low-income members. This includes the energy efficient Marathon Water heater program at little or no cost.

Support:

Provide funding to CAP agency.

Energy Savings: N/A Demand Savings: N/A

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Dakota Electric Association

Description:

Dakota Electric Association started the Residential Electric Conservation Program in 2002 to provide electric conservation materials and services for low-income customers. Potential customers will be identified from CAP Agency programs and referrals from other agencies and Dakota Electric. The overall goal of the project will be to reduce electrical consumption of targeted households in Dakota Electric's service area. See Dakota Electric's 2001 Annual Conservation Report page 40-41 filed November 30, 2001 for more details (Docket No. E111/M-01-1769).

Support:

Minnesota Statute 216B.241, Subdivision 2, Part 3, requires that "a portion of the money spent on residential conservation improvement programs is devoted to programs that directly address the needs of renters and low-income persons..." In addition, the PUC's December 26, 1996 Order in Docket No. E111/M-96-1192 requires that Dakota Electric initiate a program to address the needs of low-income customers.

Energy Savings: N/A Demand Savings: N/A

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South Central Electric Association

Description:

South Central Electric Association provides energy audits for low-income members through Minnesota Valley Action, its local CAP agency.

Support:

Administrative services and funding for the local CAP agency are provided by the cooperative.

Energy Savings: N/A Demand Savings: N/A

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LOW-INCOME PROGRAM

Agralite Electric Cooperative

Description:

Agralite Electric Cooperative helps Prairie Five and West Central Communities action agencies work with low-income families to improve housing and living conditions.

Support:

Twenty-one water heaters were donated to Prairie Five for installation in homes in the area where the water heater had failed. New energy-efficient water heaters were installed by licensed contractors.

Energy Savings: Customer specific Demand Savings: Customer specific

Connexus Energy

Description:

Connexus Energy provides cash incentives to low-income individuals to improve energy efficiency through lighting, heating and cooling.

Support:

The cooperative will provide either direct financing of equipment or reimburse the consumer for a portion of the cost in the form of a rebate.

Energy Savings: Customer specific Demand Savings: Customer specific

Cooperative Light & Power Association

Description:

Cooperative Light and Power is participating with local CAP agencies to assist with an energy conservation program. The local CAP agency is Arrowhead Economic Opportunity Agency.

Support:

This will be done through the CAP agencies.

Energy Savings: Customer specific Demand Savings: Customer specific

Elk River Municipal Utilities

Description:

Elk River Municipal Utilities will provide up to $5000 each to a limited number of low income families to upgrade their homes and older inefficient appliances. Equipment selection will be made and funding administered by Tri-County Action from a list of eligible low income customers of ERMU.

Support:

ERMU will make funds available to Tri-County Action of St. Cloud to be used to help low-income customers become more energy efficient. The total amount made available will depend on success of the other CIP Programs. A goal of 25 percent reduction in total energy consumption has been established for participants in the Program.

Energy Savings: Customer specific Demand Savings: Customer specific

Itasca-Mantrap Cooperative Electrical Association

Description:

Beginning in 2003, the distribution cooperative offered a low-income weatherization program. The program operated through a local CAP agency. The CAP agency can help identify customers who would benefit from weatherization under this program.

Support:

This program addresses requirements of Minnesota Statute 216B.241, Subdivision 2. Part 3, that a portion of the money spent on residential conservation improvement programs directly address the needs of the low income.

Energy Savings: Customer specific Demand Savings: Customer specific

Lake Region Electric Cooperative

Description:

Assist low-income members with energy conservation.

Support:

Direct grant to local CAP agencies.

Energy Savings: Customer specific Demand Savings: Customer specific

McLeod Cooperative Power Association

Description:

McLeod Cooperative Power Association donates funds to the local Community Action Program agency for weatherization audits, blower door test and weatherization/insulation improvements in low income family homes. The CAP agency pre-qualifies the homeowner as low income and evaluates the home for the energy efficiency improvements required. Recipients of the improvement projects are member owners of the electric cooperative. The CAP agency insulates the home which reduces energy loss by approximately 15 percent. A report of the project assessment and results are provided to McLeod. The CAP agency can also request from the co-op a new high- efficient water heater if the existing water heater is not operational. Funding is given to the CAP agency to do weatherization audits, client education, clean and tune of furnace, insulation of walls and attic, blower door testing, smoke detectors, ducts, etc. for low-income homeowners and renters in our service area.

Support:

Documentation from CAP agency on audits done for low income families did not quantify energy savings from weatherization measures. However, the CAP agency auditor did calculate the savings for their audit. The energy savings from furnace cleaning and addition of wall and attic insulation should be significant BTU savings. Education of one renter included use of most efficient source to heat the home (as last year they used cooking oven to heat the home at high cost and low efficiency).

Energy Savings: Customer specific Demand Savings: Customer specific

Meeker Cooperative Light & Power Association

Description:

Meeker Cooperative's Low-Income Program will provide annually, one storage water heating system to a low-income family. Meeker Cooperative will work with the local CAP agency (Heartland) to provide this installation to a family who receives service from Meeker Cooperative.

Support:

This Storage Water Heating installation will not only increase the energy efficiency of the existing water heater, but will benefit the family with the resulting energy savings and reduction in the families monthly utility bill.

Energy Savings: Customer specific Demand Savings: Customer specific

Minnesota Valley Electric Cooperative

Description:

Provide financial assistance to low-income members for energy conservation measures.

Support:

MVEC wrote checks to the CAP Agencies in three counties where MVEC has their largest amount of members. The CAP Agencies were directed to spend the money as follows: 1) Member must be designated low-income by CAP Agency, 2) Money must be used for conservation electrical programs such as update appliances, insulation, window replacement, electric heat on off-peak programs or tune-ups for Central Air Conditioning. The CAP Agency will administer all funds and report back to MVEC how the money was spent.

Energy Savings: Customer specific | Demand Savings: Customer specific

LOW-INCOME REFRIGERATOR REPLACEMENT PROGRAM

Dakota Electric Association

Description:

The Low-Income Refrigerator Replacement is a new program that was offered in 2003 and provided a mechanism to replace old, inefficient refrigerators with a new ENERGY STAR® rated model for Dakota Electric customers identified as low-income. Potential customers will be identified from CAP Agency programs, referrals from other agencies, and referrals from Dakota Electric. The goal of this project will be to reduce electrical consumption of targeted households in Dakota County. The CAP Agency will administer this program. Customers who are eligible for this program will pay 25 percent of the new refrigerator cost. The new ENERGY STAR refrigerator is delivered to the customer's home; the old refrigerator is removed and recycled by the appliance dealer.

Support:

Dakota Electric replaced 10 units in 2003. Dakota Electric is recommending to the CAP Agency that the refrigerators should be 10 years old or older to qualify unless other circumstances warrant as determined by the CAP Agency.

Energy Savings: Customer specific | Demand Savings: Customer specific

LOW-INCOME WATER HEATER PROGRAM

Runestone Electric Association

Description:

Runestone Electric Association works with local CAP agencies to provide low-income members with high-efficient water heaters.

Support:

Runestone administers the program through the CAP agencies

Energy Savings: 300 kWh | Demand Savings: 1 kW

Stearns Electric Association

Description:

Beginning in 2002, Stearns Electric Association in cooperation with the St. Cloud EDA will offer to low-income home owners in the Westwood Edition of St. Cloud and other possible EDA projects in the Stearns service area, free, high efficiency water heaters. These free water heaters are the Marathon brand and rated at 92 percent efficient. Included with this equipment is a free low flow shower head, designed to save 7 gallons of hot water every 5 minutes of showering.

Support:

These water heaters will be delivered to the job site free of charge and will include free equipment to keep this energy load off any system electrical peak, and will include a free mixing valve, used to insure the homeowner has enough hot water daily and that they are able to have a safe operating temperature at all faucets in their home.

Energy Savings: 300 kWh

Demand Savings: 1 kW

RENTER ASSISTANCE PROGRAM

Meeker Cooperative Light & Power

Description:

Meeker Cooperative's Renter Assistance program will provide educational information and materials to help weatherize rental units.

Support:

Educational materials will consist of brochures that discuss conservation measures that can help reduce energy consumption. Meeker Cooperative employees will train and assist the renters in installing weatherization materials that will reduce their energy consumption and conservation measures that can help reduce their energy consumption. Renter Program – Lighting & AC Tune-Ups

Energy Savings: N/A

Demand Savings: N/A

RENTER PROGRAM – LIGHTING & AC TUNE UPS

Connexus Energy

Description:

Beginning in 2003, Connexus Energy offered renters and property owners, rebates for lighting retrofits and AC tune ups. The tune-up service includes: cleaning condenser coil, checking Freon level and pressures, checking indoor filter, testing all controls, blowing out drain line, visual inspection of entire system, educating homeowner on operation. The program also applies towards lighting upgrades or replacements.

Support:

This program specifically addresses Minnesota Statute 216B.241, Subdivision 2, Part 3, which requires that a portion of the money spent on residential conservation improvement programs is devoted to programs that directly address the needs of low-income and renters.

Energy Savings: N/A

Demand Savings: N/A

RENTERS – GRANT ALLOCATION

Connexus Energy

Description:

Provides renters or rental property owners the opportunities to upgrade lighting and space heating and cooling.

Support:

The renters grant allocation program provides resource exclusively for renters and rental property owners.

Energy Savings: N/A

Demand Savings: N/A

COMMERCIAL AND INDUSTRIAL PROGRAMS – CONSERVATION

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COMMERCIAL GROUND SOURCE HEAT PUMP (GSHP)

Member Cooperatives

Description:

GSHPs have proven to be one of the most efficient space conditioning options and the potential for energy savings is significant. Acceptance of this technology continues to grow nationwide. GSHPs use the latent heat in the ground as a heat sink and a heat source. By utilizing a series of vertically buried heavy-duty plastic pipes filled with a food-grade antifreeze solution as the heat transfer medium, GSHPs achieve significantly high efficiencies in both the cooling and heating mode. This high efficiency results in reducing kWh usage in the cooling season and can also significantly reduce the total energy used to heat a building when compared to other heating systems. To date, GRE through its 28 distribution cooperatives and ERMU serve schools, churches, and other commercial and industrial buildings heated and cooled with GSHPs.

Support:

The potential for energy savings with ground source heat pumps is significant in both the summer and winter. The GRE and its member cooperatives will continue to educate and promote the importance of energy efficiency when selecting a HVAC system for commercial and industrial buildings. GRE is a member of the International Ground Source Heat Pump Association.

Energy Savings: Customer specific

Demand Savings: Customer specific

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COMMERCIAL & INDUSTRIAL – AGRICULTURAL (C&I-A) – ENERGY GRANT PROGRAM

Member Cooperatives

Description:

The Commercial and Industrial – Agricultural (C&I-A) Energy Grant program provides cash incentives to qualified applicants for energy efficiency improvements to their business, farm, or industry. Interested customers must complete a grant application form, which describes the intended energy efficiency improvement measure and calculates the expected energy and demand savings. The individual member cooperative evaluates the proposal for viability, and cost effectiveness; those that rank the highest are awarded grants to help offset the cost of the project. Grant funds are typically used for installing high efficient lighting, motors, and adjustable speed drives, refrigeration compressors, air conditioning, and other energy conserving equipment.

Beginning in 2002, the program also included a New Construction Rebate for Lighting and Motors and adjustable speed drives (ASDs). The grant program requires a demand and energy savings worksheet to be completed. The new construction lighting and motor rebate is a simple form that provides a rebate on a per fixture basis or on the horsepower rating of the motor for new construction only.

Beginning in 2004, the program includes rebates for C&I Cooling and lighting retrofit applications and vending miser. Although cooperative's members could previously complete a grant application to calculate a grant for these technologies, now members may utilize an easy-application rebate form.

Support:

The Commercial and Industrial – Agriculture Energy Grant program provides an incentive to customers contemplating energy efficiency improvements. The program assists customers in reaching their payback requirements while lowering energy and demand requirements. The distribution cooperative actively solicits grant opportunities and helps the customer in determining demand and energy savings potential.

Energy Savings: Customer specific

Demand Savings: Customer specific

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COMMERCIAL AND INDUSTRIAL ELECTRICAL EVALUATION AND CONSULTATION

Member Cooperatives

Description:

The commercial and industrial electrical evaluation and consultation is targeted at the distribution cooperatives' larger commercial and industrial customers who have high electric energy requirements. A distribution cooperative representative meets with the customer on-site to review general electric usage patterns of the business. The customer's electric usage patterns may be available through a web-based load profiling service that our wholesale electric provider has made available to the distribution cooperative. The review, which generally takes one hour, includes suggestions on ways to conserve energy and details of our energy efficiency grant program. If the representative determines that additional actions should be taken, the customer may be scheduled for an on-site audit. The audit will include:

- Energy bill analysis
- Lighting and motor load review
- Customer education
- Building shell assessment
- Mechanical and electrical equipment assessment
- Recommendations

If the distribution cooperative representative determines that a more detailed audit is required, an independent auditing firm may be hired. The costs for a more detailed audit are generally shared between the customer and the distribution cooperative.

Support:

The commercial and industrial electrical evaluation and consultation program provides the distribution cooperative the opportunity to assist large energy-use customers become more energy efficient in their business. By interviewing, reviewing equipment specifications, and on site observation, the distribution cooperative representative can assist the customer identify cost-effective energy saving opportunities. In many of these cases, the energy savings measures that have been identified qualify for the energy efficiency grant program that the distribution cooperative offers.

Energy Savings: N/A Demand Savings: N/A

COMMERCIAL LIGHTING

Elk River Municipal Utilities

Description:

ERMU provides incentives to commercial accounts to retrofit or convert existing T12 fluorescent lighting to T8 or T5 technology with an incentive equivalent to $0.30 per watt reduced (an average of $16.00 per 4 lamp fixture). Even though the program was started in 1999 and is promoted through customer visits, participation continues to be very low. An increase from $0.10 per watt-reduced to $0.30 per watt reduced in 2002 helped increase customer interest, but it is still difficult to attract program participants because the payback is usually 2 or more years even with the incentive.

Support:

Beginning in 2002, ERMU tripled the existing incentive to $0.30 per watt reduced for retrofit or conversion from T12 to T8 or more efficient technology. The Program was also expanded to include replacing high intensity discharge lamps with clustered fluorescent, and LED signs using the same $0.30 per watt reduced. Occupancy sensors were also added at $10 each. More needs to be done to expand the program, so more emphasis will be placed on getting the message out to the right people in 2004.

Energy Savings: Customer specific   Demand Savings: Customer Specific

LED TRAFFIC LIGHT PROJECT

Elk River Municipal Utilities

Description:

ERMU converted traffic lights at 18 intersections from incandescent to LED technology. The main objective in doing so is to conserve energy -- LEDs consume approximately one-tenth the energy compared to incandescent bulbs. A secondary objective in doing so is to reduce maintenance -- incandescent bulbs typically last six to 12 months while LEDs are projected to last 10 years. Experience to date supports at least five years.

Support:

Each intersection has 18 traffic lights and each traffic light has three traffic lamps. The incandescent bulbs used in the red and green lamps are 150 watt while the yellow uses a 116 watt lamp. Red LEDs are rated at 15 watts, green LEDs are rated at 18 watts, and yellow LEDs are rated at 25 watts. Traffic arrows and walk/don't walk lamps were also changed out to LEDs. Currently, all 324 traffic lights consume about 50,000 kWhs per year while there incandescent counterparts would consume 450,000 kWh per year. That's a savings of 400,000 kWh per year.

Energy Savings: 1,235 kWh　　　　Demand Savings: 0.09 to 0.13 kW

STREET AND SECURITY LIGHTING

Member Cooperatives

Description:

The street and security lighting program ensures that only energy efficient high-pressure sodium (HPS) lighting equipment is installed. In new installations, HPS is the accepted standard. Conversion to HPS in older mercury vapor lighting systems occurs at the time of failure or at the customer's request.

Support:

The street and security lighting program responds in part to the statutory goals of M.S. 216B.241, Subdivision 5, which requires distribution cooperatives to encourage the use of energy efficient lighting.

Energy Savings: 292 kWh　　　　Demand Savings: 0.08 kW

VENDING MISER

Dakota Electric Association

Description:

The Vending Miser is an intelligent device that is an economical way to control vending machines, which significantly reduces energy consumption without compromising the vending product. Utilizing a passive infrared sensor, Vending Miser powers down a vending machine when the area around it is unoccupied and automatically repowers the vending machine when the area is reoccupied. The unit also monitors the ambient temperature while the vending machine is powered down and automatically powers up at the appropriate intervals to ensure that the vending product stays cold.

Support:

The Vending Miser will reduce energy consumption up to 70% depending on the application. Research by Bayview Technologies based on 40 installations showed that the average savings was 49 percent. The vending miser is ideal for schools, office buildings and government buildings.

Energy Savings: 1,250 Demand Savings: 0.4 kW

COMMERCIAL AND INDUSTRIAL PROGRAMS – LOAD MANAGEMENT

COMMERCIAL & INDUSTRIAL DEMAND CONTROLLER PROGRAM

Dakota Electric Association

Description:

A digital demand controller (DDC) is a compact relay box with sophisticated programming and data acquisition capabilities. It can be installed in most commercial building electrical rooms. Wiring is usually low voltage. The demand controller is programmed and operates to reduce peak demand and energy consumption. A DDC will work for most commercial accounts, but is most applicable to mid-size and small commercial accounts that typically do not have energy management systems. Convenience stores are a prime application for the DDC. For commercial applications, the DDC can reduce a customer's billing demand 5 to 200 kW and reduce energy consumption by up to 5 percent. Convenience stores typically save 10 to 20 kW with energy savings up to 5 percent.

Support:

Dakota Electric will promote the DDCs to commercial customers. Dakota Electric will offer a $25 per kW rebate for qualifying installations. The maximum rebate is $500 per customer installation.

Energy Savings: N/A　　　　Demand Savings: N/A

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INTERRUPTIBLE COMMERCIAL AND INDUSTRIAL LOADS

Member Cooperatives

Description:

The interruptible commercial and industrial loads program provides a reduced electric rate to C&I customers that can reduce their demand by a minimum of 25 kW during high peak demand periods. Customers are billed for their maximum demand and total kWh similar to other general service C&I customers. In addition, coincidental demand charges are applied to the customer's load that occurs coincident to GRE monthly billing peaks. During these periods, the customer is automatically alerted and reduces their demand completely or to a predetermined demand level. This program provides a strategy to improve system load factor, reduce peak capacity requirements, and improve system efficiencies.

Support:

Promoting the interruptible commercial and industrial loads program provides a large opportunity to reduce peak capacity requirements that improve system load factor and system efficiencies. Due to the complexity of the program from both a customer and an electric provider's perspective, the distribution cooperatives spends considerable time with each interested customer explaining the program in detail and answering questions.

Energy Savings: 0 kWh　　　　Demand Savings: Customer specific

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INTERRUPTIBLE IRRIGATION

Member Cooperatives

Description:

Interruptible commercial irrigation systems – generally agricultural, turf growers or golf courses can be interrupted once per day for up to four hours. Since most irrigation systems must be restarted manually, GRE makes every effort to only schedule irrigation control during extremely high peak demand periods and if possible at consistent times. This makes the manual restart of the systems easier for the irrigation operator. This program provides a strategy to improve system load factor, reduce peak capacity requirements, and improve system efficiencies.

Support:

The distribution cooperative's primary support is to review the benefits of interruptible irrigation with customers prior to system installation. By educating and recruiting customers to the program the distribution cooperative and our wholesale electric provider reduces peak capacity requirements and improves system load factor. Due to the complexity of the program from both a customer and an electric provider's perspective, the distribution cooperative spends considerable time with each interested customer explaining the program in detail.

Energy Savings: 0 kWh   Demand Savings: Customer specific

POWER FACTOR CORRECTION PROGRAM

East Central Energy

East Central Energy will launch a program in 2002-03 that encourages its largest customers to improve their power factor. Currently, East Central Energy and most other Minnesota electric utilities require their large commercial and industrial customers to maintain a power factor of 90 percent or higher.

Support:

In 2002, ECE adopted revised retail rate schedules that imposed power factor penalties. Poor power factor means electric utilities need to generate excess capacity to compensate for the difference, which wastes energy. In 2002, East Central Energy began installing the first of 150 new interval meters on all accounts with summer peak demands in excess of 250 kW. In 2003, the program was expanded to include all commercial customers with summer peak demands in excess of 50 kW.

The new interval meters enable cooperative staff to gain a better understanding of business customer load profiles and to troubleshoot problems with electrical equipment that may be contributing to poor power factor. Through revised rate schedules and a grant program, the cooperative expects to boost overall power factor to 90% or higher.

Following installation of these meters, cooperative staff will begin gathering data to analyze customer-specific power factor, identify customers who need power factor correction, develop proposals for capacitor banks and switchable capacitors, and through an affiliation with Energy Alternatives, Inc., provide a turnkey service to install capacitor banks at these customer locations, and finance the installations upon request.

Energy Savings: N/A Demand Savings: N/A

COMMERCIAL AND INDUSTRIAL PROGRAMS – RENEWABLE

BIODIESEL PROJECT

Dakota Electric Association

Description:

Building on existing research, the University of Minnesota's Center for Diesel Research will evaluate soy-based biodiesel fuels for reducing the impact of exhaust emissions from generators on air quality. After identifying the types and configurations of engines used for electric peak shaving in Minnesota, and selecting biodiesel blend levels and emissions controls for use with those engines, a laboratory evaluation will be conducted to determine the influence of using biodiesel on emissions. A demonstration site will be selected and the change in emissions will be measured under real-world conditions.

Support:

Dakota Electric is providing $25,000 in 2002 and $25,000 is 2003 for this project.

Energy Savings: N/A Demand Savings: N/A

BIOMASS GRANT

Great River Energy and BENCO Electric Cooperative

Description:

GRE developed a Biomass Grant Program to encourage the development of biomass distributed generation resources in its service territory specifically for farmer-owned anaerobic digesters. Anaerobic digesters are containers that hold manure at a given operating temperature for a period of time that is long enough to allow a steady-state growth of bacteria that produces methane. Anaerobic digesters reduce farm odor and produce gas that is used to fuel electric generators.

As a waste-to-energy power plant, GRE's Elk River Station diverts about 270,000 tons of municipal solid waste annually from community, producing enough electricity for approximately 30,000 homes. Elk River Station was classified as a renewable resource in 2003 legislative session. This moves GRE closer to making a "good faith effort" to generate 10 percent of our electricity from renewables by 2015, as urged by state energy legislation passed in 2001.

GRE implemented a special Biomass Grant Program to encourage the development of additional renewable energy technologies using biomass resources. Anaerobic digesters show much potential for mitigating the environmental hazards of dairy and swine feedlots while producing renewable energy.

Support:

GRE awarded the first $100,000 biomass grant to Northern Plains Dairy, a member of BENCO Electric. BENCO Electric Cooperative provided program delivery support to the dairy. Northern Plains Dairy is a 3,000-cow dairy located just south of St. Peter. The dairy supplies milk for the Davisco Foods cheese operation.

The grant will be used for an anaerobic digester system that uses methane gas from cow manure to fuel two electric generators. The dairy expects to consistently produce 280 kilowatts of electricity that will be used for its operations.

Energy Savings: N/A

Demand Savings: N/A

East Central Energy

Description:

East Central Energy was the first cooperative in Minnesota to successfully pioneer the use of biomass (cow manure) to generate electricity. The Haubenschild Farms anaerobic digester at Princeton, generates approximately 135 kW of electric energy around the clock with a 98.7 percent reliability. The project generates nearly 100,000 kilowatt-hours per month; 40 percent of the electricity is used on the farm, while East Central Energy purchases all excess energy for re-sale to other customers who wish to pay a premium for renewable energy. The project has received nationwide notoriety and is an award-winning example for other dairy and livestock producers.

Support:

East Central Energy has agreed to purchase all excess energy from these digester projects at the full retail rate the customers can qualify for; in this instance, 7.3 cents per kilowatt-hour. While ECE markets a portion of this energy to other customers at an incremental premium of 1.29 cents per kilowatt-hour, the difference is included in CIP participant incentives.

Energy Savings: N/A Demand Savings: N/A

CUSTOMER-OWNED WIND FARMS

Member Cooperatives

Several GRE distribution cooperatives purchase energy and capacity from customer-owned wind generation systems less than 40 kW which qualify under Minnesota Statute 216b. These cooperatives include:

- BENCO Electric
- Federated Rural Electric Association
- Goodhue County Cooperative Electric Association
- Kandiyohi Power Cooperative
- Nobles Cooperative Electric
- Redwood Electric Cooperative
- South Central Electric Cooperative
- Stearns Electric Association

- Steele-Waseca Cooperative Electric

The consumer purchases energy for their own facility at the applicable retail rate per the rate schedule from the co-op. The co-op in turn purchases the excess output of the wind generator at the applicable retail rate for that consumer.

Support:

The co-ops offer information to the members about the program rates and guidance on where to find more information about installing their own wind systems.

Energy Savings: N/A Demand Savings: N/A

LANDFILL GAS TO ELECTRIC PROJECT

Elk River Municipal Utilities

Description:

Elk River Municipal Utilities installed 550 kW of engine driven generation at the Elk River landfill in 1999. This $550,000 facility was powered by an engine-generator which ran on landfill gas (methane). In 2002, that system was replaced by a larger facility to increase reliability and to utilize increased methane production. This new 2,400 kW plant which went on line in October 2002, also has an education wing for visitors.

Support:

Elk River Municipal Utilities has increased the capacity of the landfill gas generator to 2,400 kW at a cost of $2,860,000 beginning fourth quarter 2002. During 2003, this plant proved to be very reliable and produced 20 million kWh or 15 percent of Elk River's needs by utilizing a resource which would otherwise be wasted. ERMU believes that costs associated with building, maintaining and operating this new landfill gas to electric facility should qualify as CIP expense.

Energy Savings: N/A Demand Savings: N/A

STIRLING ENGINE

Description:

In 2004, an ENX 55, an external combustion engine utilizing Stirling Engine technology is scheduled for installation at the Haubenschild Farm in Princeton. The fuel-fired ENX 55 can operate on a number of fuel sources including low-pressure, low-BTU and poor quality fuels. At the Haubenschild Farm the ENX 55 will operate on biogas from an anaerobic digester.

The Stirling Engine technology requires fewer moving parts and therefore requires less downtime, lower maintenance and lower operating costs.

This is a collaborative effort between GRE, EPRI and Haubenschild Farm. The ENX 55 will be accompanied by a 2kW fuel cell and supported by the University of Minnesota Agriculture Extension Service Department in response to the Legislative Commission on Minnesota Resources project *Advancing Utilization of Manure Methane Digester Electrical Generation.*

Support:

Great River Energy will provide a grant.

Energy Savings: N/A

Demand Savings: N/A

MISCELLANEOUS

DEPRECIATION OF DSM PLANT

Dakota Electric Association

Description:

This program includes the annual depreciation expense for all of Dakota Electric's DSM plant and equipment.

Support:

Administrative Support is provided by the cooperative.

Energy Savings: N/A Demand Savings: N/A

Stearns Electric Association

Description:

This program includes the annual depreciation expense for all Stearns Electric's DSM plant and equipment. All dollars associated with this program are in program delivery and will affect participants in all DSM programs.

Support:

Administrative Support is provided by the cooperative.

Energy Savings: N/A Demand Savings: N/A

DISTRIBUTION AUTOMATION

Dakota Electric Association

Description:

The distribution automation program initiated by Dakota Electric is motivated by the need for more efficient utilization of existing plant and resources and building added customer value for the use of electricity. GRE's member cooperatives have united around a uniform load management policy that calls for GRE to direct a coordinated load management system for the benefit of all the member cooperatives. See Dakota Electric's 2001 Annual Conservation Report page 69 filed November 30, 2001 for more details (Docket No. E111/M-01-1769).

Support:

Administrative Support is provided by the cooperative.

Energy Savings: N/A Demand Savings: N/A

DSM POTENTIAL ASSESSMENT

Description:

In 2003 GRE retained EPRI and Global Energy Partners to conduct an Assessment of Energy Efficiency Potential for the service area covering its 28 member cooperatives. The purpose of the assessment was to provide a comprehensive and thorough study to be used in the development of GRE's Conservation Improvement Program (CIP) and the Integrated Resource Plan (IRP) per the regulatory requirements of the Minnesota Public Utilities Commission.

Support:
GRE supported this collaborative project with EPRI funds.

Energy Savings: N/A Demand Savings: N/A

ENERGY MANAGEMENT DATABASE

Dakota Electric Association

Description:
Dakota Electric's energy management database includes all of the internal labor and maintenance costs associated with tracking information on the customers and installed equipment for CIP program participants.

Support:
Administrative support is provided by the cooperative.

Energy Savings: N/A Demand Savings: N/A

ENERGY MANAGEMENT (EM) MAINTENANCE

Meeker Cooperative Light & Power Association

Description:
Meeker Cooperative must maintain its energy management (EM) system to ensure reliability for those cooperative members participating in the programs. Maintenance is also required to ensure the EM control equipment can provide the control necessary during peak times.

Support:

Maintenance audits have been preformed since the EM system was installed. These audits have proven the EM equipment to be reliable in the past, however the existing system is aging and recent audits have found failure rates that support the continued use of these audits and the EM maintenance program.

Energy Savings: N/A Demand Savings: N/A

LOAD MANAGEMENT MASTER CONTROLLER

Great River Energy

Description:

GRE will install a load management master controller in 2004. The new master controller will replace two separate systems allowing GRE more flexibility and consistency in controlling member system service territory. The updated controller and related transmitter equipment will also allow GRE member coops to utilize more modern load management receiver switch technology.

Support:

GRE is purchasing the new load management master controller and coordinates for all and performs load management operations for most member co-ops from the new central load management controller.

Energy Savings: N/A Demand Savings: N/A

PHILLIPS COMMUNITY ENERGY COOPERATIVE

Great River Energy

Description:

The Phillips Community Energy Cooperative delivers energy-related services and conservation to its members. Members from within the Phillips community may join the co-op for $1 and receive an "energy efficiency" kit. This kit includes: two compact fluorescent light bulbs, one low-flow shower head, and a 5-pack interior window insulation kit. Members outside the Phillips community may join for an annual fee of $20 and will receive a quarterly newsletter and may receive assistance in organizing neighborhood awareness of energy conservation and buying groups to purchase energy efficient products.

Support:
GRE provided a grant to the Philips Community Energy Cooperative.

Energy Savings: N/A Demand Savings: N/A

PROGRAM EVALUATION

Dakota Electric Association

Description:
Dakota Electric has been tracking member attitudes with a perception research survey for a number of years. A random sample of approximately 500 members is contacted and asked to give its response to a number of issues. From this research, Dakota Electric Association is able to track acceptance of programs and service from year to year.

Support:
This annual survey is vitally important in tracking customer attitudes, program awareness, and assisting in the focus of informational efforts.

Energy Savings: N/A Demand Savings: N/A

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REGULATORY COMMISSION – CIP PROJECTS

Dakota Electric Association

Description:
This program includes the cost of preparing and supporting the annual Dakota Electric Association CIP reporting and GRE CIP reporting. All costs associated with performing required cost/benefit analyses on programs are also included here.

Support:

Administrative support is provided by the cooperative.

Energy Savings: N/A | Demand Savings: N/A

RESEARCH AND DEVELOPMENT

Connexus Energy

Description:

Integrate a fuel cell into the distribution system where capacity levels are being reached or destination is remote making for poor power quality.

Support:

Work with a fuel cell manufacturer in a partnership relationship to maximize end results.

Energy Savings: N/A | Demand Savings: N/A

East Central Energy

Description:

In 2002, the cooperative retained RKS Research & Consulting to conduct 20-minute telephone interviews involving the energy decision-makers at the cooperative's largest commercial and industrial customers who represent approximately 20 percent of the cooperatives electrical load. Project goals included: gauge the impact of the current economic climate on East Central Energy business customers and assess the outlook going forward, including prospects for growth and future electric energy usage, determine the participation level in energy conservation programs and evaluate their effectiveness, determine the level of interest in new energy-saving products and services.

Support:

On a comparative basis, East Central Energy business customers rate their utility higher than the national and Midwestern average and many consider the co-op to be very close to the ideal energy provider. East Central Energy will utilize this research in targeting its communication programs and business customer seminars to helping customers understand the economics of energy conservation programs and thereby encourage further participation. While there seems to be a great deal of interest in energy conservation among commercial and industrial customers, more than half of those surveyed (56 percent) could not estimate the cost savings from these initiatives.

This project represents indirect costs exclusively with no direct kW or kWh savings; however, the research will play a key role in helping the cooperative to customize its energy conservation program offerings to business customers in the future.

Energy Savings: N/A Demand Savings: N/A

Lake Region Electric Cooperative

Description:

Energy Efficient Model Home Project and Methane Digester.

Support:

Lake Region Electric Cooperative is investigating and implementing a model home project to demonstrate state-of-the-art energy efficient technologies for new residential construction. The co-op is investigating the possibility of a methane digester at an agricultural site (large dairy) for possible renewable distributed generation.

Energy Savings: N/A Demand Savings: N/A

McLeod Cooperative Power Association

Description:

Cooperative staff served on the Carver County Methane Task Force to study the viability of a methane bio-digester for use on hog farm and studied the economic viability of a digester for one particular farm site. Committee changed to Odor Mitigation Task Force after it was determined that the methane bio-digester was not an economically feasible option. However, this was an excellent learning experience in renewable energy.

Support:

Training and education of staff on bio-digester technology and renewable fuels options for customers.

Energy Savings: N/A Demand Savings: N/A

Meeker Cooperative

Description:

Meeker Cooperative is testing a 5-ton commercial, two-stage compressor ASHP with a SEER of 15. The ASHP is manufactured by YORK, which describes its product as state-of-the-art regarding energy efficiency.

Support:

The York manufacturing representative is monitoring the installation and operation of the ASHP. Administrative support is provided by the cooperative.

Energy Savings: N/A Demand Savings: N/A

Minnesota Valley Electric Cooperative

Description:

Minnesota Valley Electric Cooperative is providing labor for research of new load management hardware and supporting a pilot project for a new load management program.

Support:

Administrative support is provided by the cooperative.

Energy Savings: N/A Demand Savings: N/A

Stearns Electric Association

Description:

Stearns Electric Association will promote the use of new technologies to customers, the energy savings of new types of heating, lighting, motors and space cooling.

Support:

Administrative support is provided by the cooperative.

Energy Savings: N/A Demand Savings: N/A