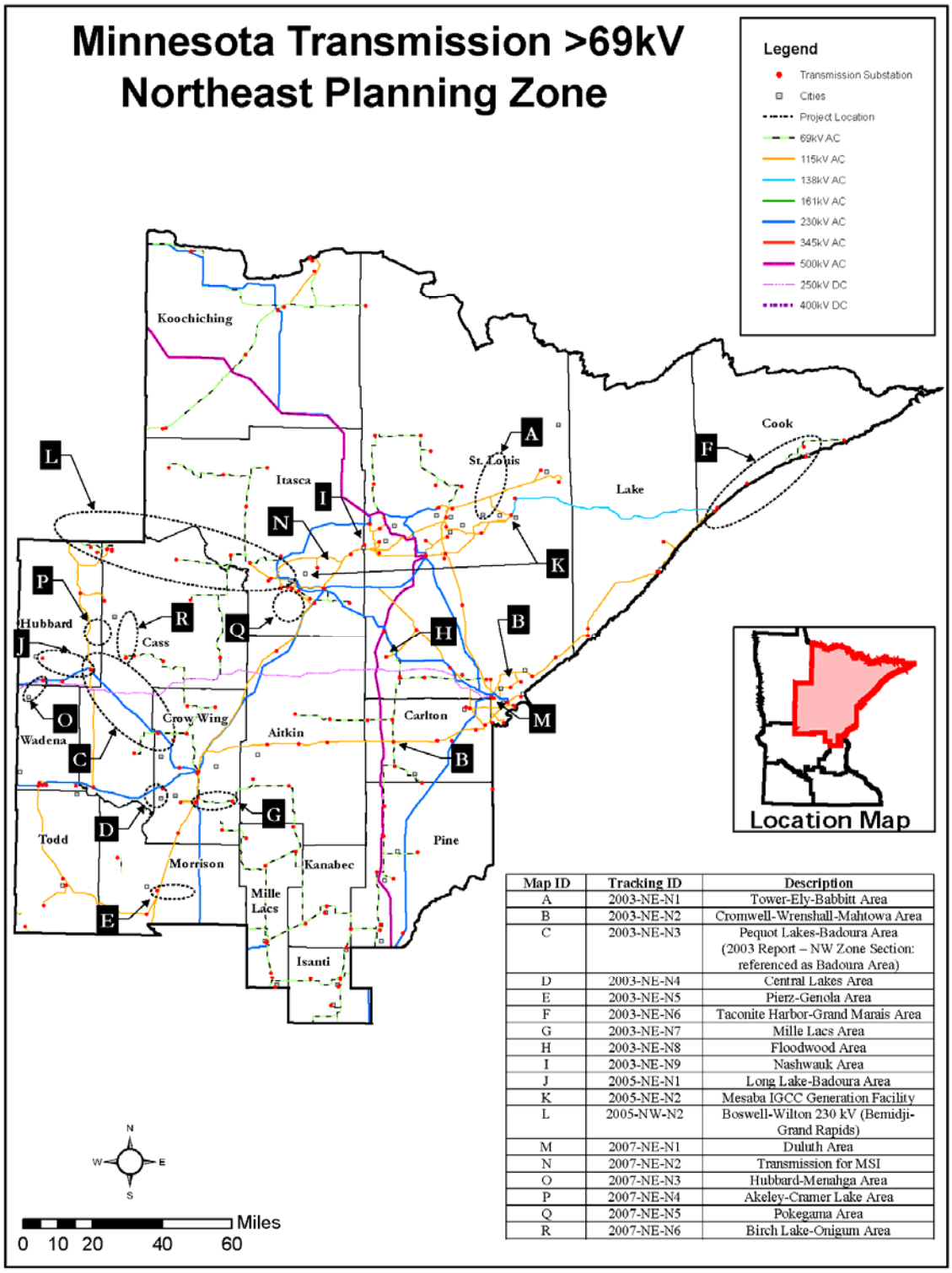
7.3 Northeast Zone

The following table provides a list of transmission needs identified in the Northeast Zone and the map following the table shows the location of each item in the table. Each transmission need is discussed in the sections following the map.

Northeast Zone

Tracking Number	Description	Projected In-Service Year	Need Driver	Section No.
2003-NE-N1	Tower-Ely-Babbit Area	2009	Low voltage and line overloads	7.3.2
2003-NE-N2	Cromwell-Wrenshall-Mahtowa Area	2012-2014	Low voltage	7.3.3
2003-NE-N3	Long Lake-Badoura-Pequot Lakes Area	2009-2010	Low voltage and line overloads	7.3.4
2003-NE-N4	Central Lakes Area	2008-2009	Overloads	7.3.5
2003-NE-N5	Pierz-Genola Area	2011	Low voltage and line overloads	7.3.6
2003-NE-N6	Taconite Harbor-Grand Marais Area	2015	Line overloads	7.3.7
2003-NE-N7	Mille Lacs Area	2008	Low voltage	7.3.8
2003-NE-N8	Floodwood Area	2012	Low voltage	7.3.9
2003-NE-N9	Nashwauk Area	2008-2009	Low voltage and line overloads	7.3.10
2005-NE-N1	Long Lake – Badoura Area	2009	Combined with 2003-NE-N3	7.3.4
2005-NE-N2	Mesaba IGCC Generation Facility		Generation interconnection	7.3.11
2007-NE-N1	Duluth Area 230 kV	2012	Low voltage and line overloads	7.3.12
2007-NE-N2	Minnesota Steel Industries Project	2012	New 300 MW load	7.3.13
2007-NE-N3	Hubbard-Menahaga Area	2010	Low Voltage	7.3.14
2007-NE-N4	Akeley-Cramer Lake Area	2009	Low voltage	7.3.15
2007-NE-N5	Pokegama Area	2012	Transmission to serve new distribution site	7.3.16
2007-NE-N6	Birch Lake – Onigum Area	2010	Low Voltage	7.3.17
	Other Zone-Specific Issues			7.3.18



Map ID	Tracking ID	Description
A	2003-NE-N1	Tower-Ely-Babbitt Area
B	2003-NE-N2	Cromwell-Wrenshall-Mahtowa Area
C	2003-NE-N3	Pequot Lakes-Badoura Area (2003 Report – NW Zone Section: referenced as Badoura Area)
D	2003-NE-N4	Central Lakes Area
E	2003-NE-N5	Pierz-Genola Area
F	2003-NE-N6	Taconite Harbor-Grand Marais Area
G	2003-NE-N7	Mille Lacs Area
H	2003-NE-N8	Floodwood Area
I	2003-NE-N9	Nashwauk Area
J	2005-NE-N1	Long Lake-Badoura Area
K	2005-NE-N2	Mesaba IGCC Generation Facility
L	2005-NW-N2	Boswell-Wilton 230 kV (Bemidji-Grand Rapids)
M	2007-NE-N1	Duluth Area
N	2007-NE-N2	Transmission for MSI
O	2007-NE-N3	Hubbard-Menahga Area
P	2007-NE-N4	Akeley-Cramer Lake Area
Q	2007-NE-N5	Pokegama Area
R	2007-NE-N6	Birch Lake-Onigum Area

7.3.1 Completed Projects

There is one inadequacy that was reported in the 2005 Biennial Report in the Northeast Zone that has been addressed – the inadequacy associated with Tracking Number 2003-NE-N10 (Hubbard – Badoura Area). This matter has been completed and will not be reported upon further.

Tracking Number	Utility	Description	Date Completed
2003-NE-N10	Great River Energy	A new 115 kV line between the Hubbard Substation and the Long Lake Substation was placed in service in 2005.	2005

7.3.2 Tower-Ely-Babbitt Area

Tracking Number. 2003-NE-N1

Utility. Minnesota Power and Great River Energy

Inadequacy. Near term post contingent voltage support is an issue in this area and longer term post contingent line overloads will also become an issue. These inadequacies were discussed fully in the 2005 Minnesota Biennial Transmission Projects Report in a separate certification document entitled *Biennial Transmission Projects Report, Certification of a High-Voltage Transmission Line, Tower Project* document.

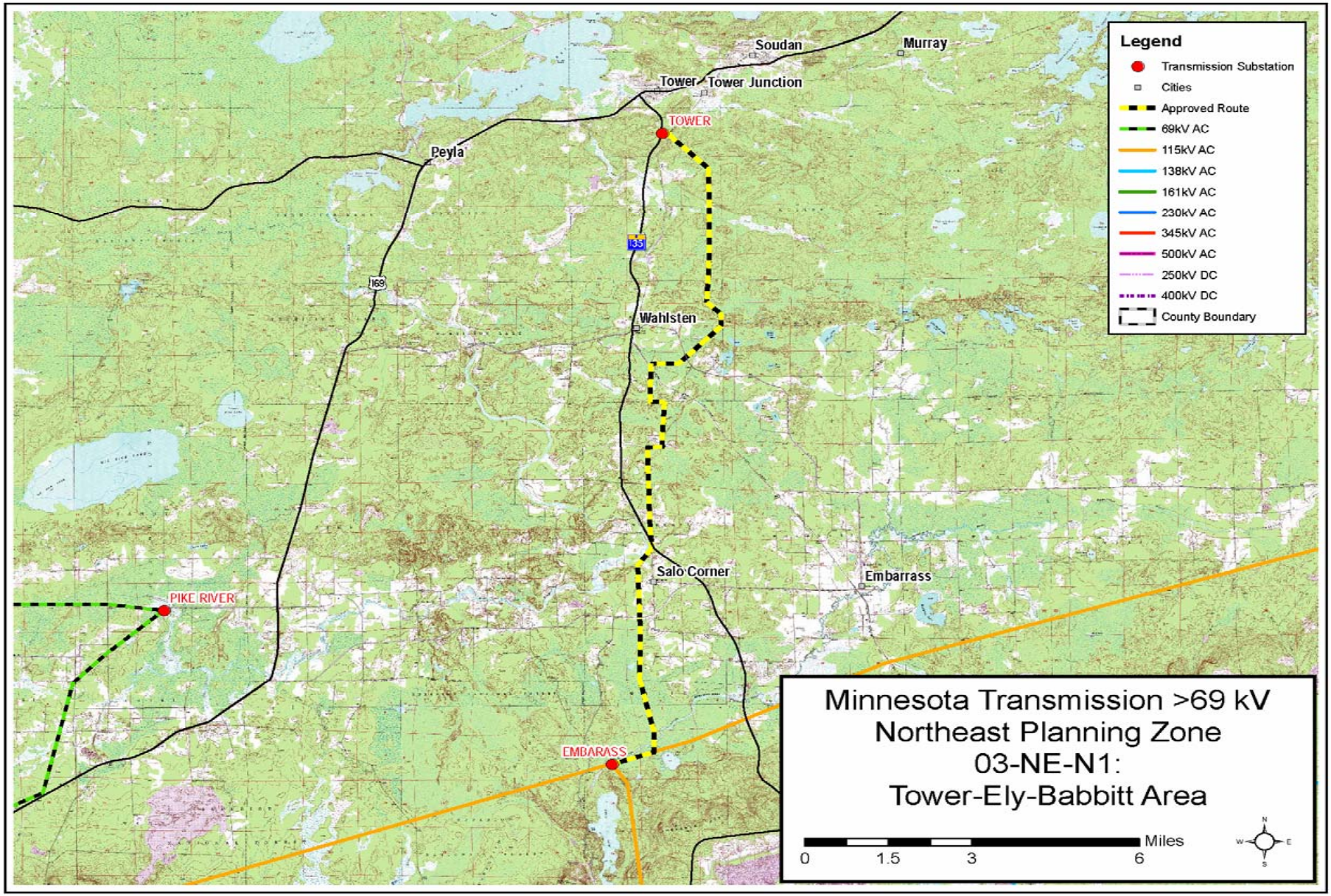
A map of the area is shown on the following page.

Alternatives. The alternatives were examined in the certification document.

Analysis. The Commission issued its order on May 25, 2006, certifying that the Tower Project is needed and is a priority electric transmission project. In December 2006, GRE and MP submitted a route application for this project and on July 12, 2007, the Commission issued a route permit.

Schedule. The utilities have started survey and right-of-way acquisition, and construction activities will begin in 2008. At this time it is anticipated that the project will be completed and in service during the fourth quarter of 2009.

PUC Docket Numbers. CN-05-867 (Certificate of Need)
TL-06-1624 (Route Permit)


Legend
Transmission Substation
Cities
Approved Route
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Soudan
Murray
Tower
Tower Junction
TOWER
Peyla
135
169
Wahlsten
Salo Corner
Embarrass
PIKE RIVER
EMBARASS
Minnesota Transmission >69 kV
Northeast Planning Zone
03-NE-N1:
Tower-Ely-Babbitt Area
Miles
0
1.5
3
6

7.3.3 Cromwell-Wrenshall-Mahtowa Area

Tracking Number. 2003-NE-N2

Utility. Minnesota Power

Inadequacy. The Cromwell-Wrenshall-Mahtowa area is supplied by a 90-mile 115 kV line running between 115 kV sources located at the Riverton substation near Brainerd and the Thompson substation located south of Duluth. Due to the distances between the two 115 kV sources and the total load served, the voltage in the Mahtowa and Wrenshall area is approaching unacceptable levels with a loss of the Thompson source. This pending inadequacy has also been recognized in the 2007 MAPP 10 year reliability assessment.

Currently, voltage can be maintained by switching some of the area's load off the 115 kV system and serving it from the GRE Bear Creek 69 kV substation if the Thompson source is out of service. However, at current load growth levels, it is expected that Bear Creek will no longer be able to provide this support by the 2012 to 2014 timeframe. In addition, GRE serves loads in the area via a 69 kV system between Cromwell, Gowan and Four Corners. GRE also expects voltage issues for these loads by the 2011 timeframe if the Cromwell 69 kV source or the Four Corners 115 kV source is out of service (Floodwood Area Tracking Number 2003-NE-N8). MP and GRE are working together to determine if one project can address both these inadequacies.

A map of the area is shown on the following page.

Alternative Solutions. Three alternatives have been identified: (1) upgrade of existing lower voltage lines, (2) construction of a new 115 kV line, and (3) distributed generation.

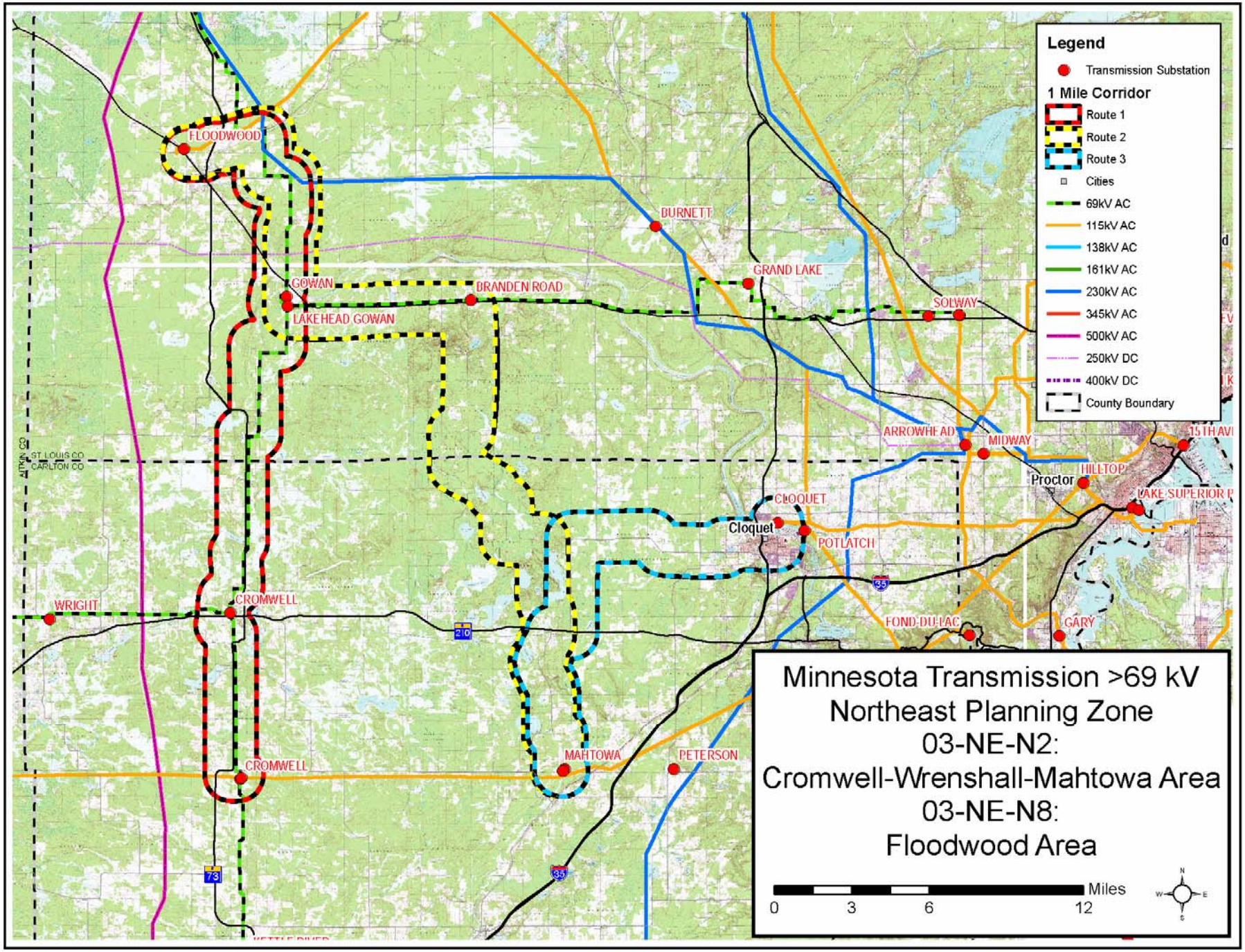
Analysis. Studies to determine the best method to improve the voltage situation in the area are ongoing. One alternative being considered is upgrading an existing GRE 69 kV line that runs between Cromwell and Floodwood as a double circuit 115/69 kV line. This alternative would likely address both the MP need in the Cromwell – Wrenshall – Mahtowa area and the GRE Floodwood area need.

One compounding factor affecting this area is the age and condition of the Riverton-Cromwell 115 kV line (MP line #13) that serves as one of the sources to the area. Surveys of this line have indicated that a significant portion of the transmission structures are approaching the end of their useful life. In order to rebuild this line, an extended maintenance outage may be required. The timing of this maintenance may have an impact on when a new source to the area should be constructed. This is because with one of the two existing sources out of service for an extended period of time an outage of the second source could result in the inability to provide adequate electric service to the areas customers during both the winter and summer seasons when load levels are at their highest.

A solution that solves two inadequacies (this one and the Floodwood area one) with one line would potentially have less environmental and social impacts depending on where it is located than two separate solutions. Making use of existing corridors and double-circuiting where practical with existing lines would also reduce environmental and social impacts. Distributed

generation has not been eliminated as an alternative; however, operational issues associated with distributed generation and cost of fuel will likely result in a generation alternative having both a reliability and economic disadvantage over a transmission solution. At this time, it appears that a new 115 kV line would provide the best solution both electrically and economically. However, no alternatives have been ruled out.

Schedule. If the utilities decide to pursue a new transmission line, a Certificate of Need and Route Permit will be required from the Public Utilities Commission. Because of the desire to find a solution that addresses both problem areas, and because the situation is not critical at the moment, the schedule has been extended from what was predicted in the 2005 Report. The utilities will continue to monitor the situation and evaluate options, but the present expectation is that a Certificate of Need may be filed as soon as 2008 or as late as 2010.


Legend
Transmission Substation
1 Mile Corridor
Route 1
Route 2
Route 3
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
FLOODWOOD
BURNETT
GRAND LAKE
GOWAN
BRANDEN ROAD
LAKEHEAD GOWAN
SOLWAY
ARROWHEAD
MIDWAY
HILLTOP
Proctor
CLOQUET
Cloquet
POTLATCH
WRIGHT
CROMWELL
CROMWELL
MAHTOWA
PETERSON
FOND DU LAC
GARY
ST LOUIS CO
CARLTON CO
Minnesota Transmission >69 kV
Northeast Planning Zone
03-NE-N2:
Cromwell-Wrenshall-Mahtowa Area
03-NE-N8:
Floodwood Area
Miles
0
3
6
12

7.3.4 Long Lake – Badoura – Pequot Lakes Area

Tracking Number. 2003-NE-N3

Utility. Minnesota Power and Great River Energy

Inadequacy. The problems are line overloading and voltage support in the area. These inadequacies were discussed fully in the 2005 Minnesota Biennial Transmission Projects Report in a separate certification document entitled *Biennial Transmission Projects Report, Certification of a High-Voltage Transmission Line, Badoura Project* document.

This Tracking Number has been combined with Tracking Number 2005-NE-N1 (Long Lake – Badoura) and Tracking Number 2005-NE-N1 will be eliminated.

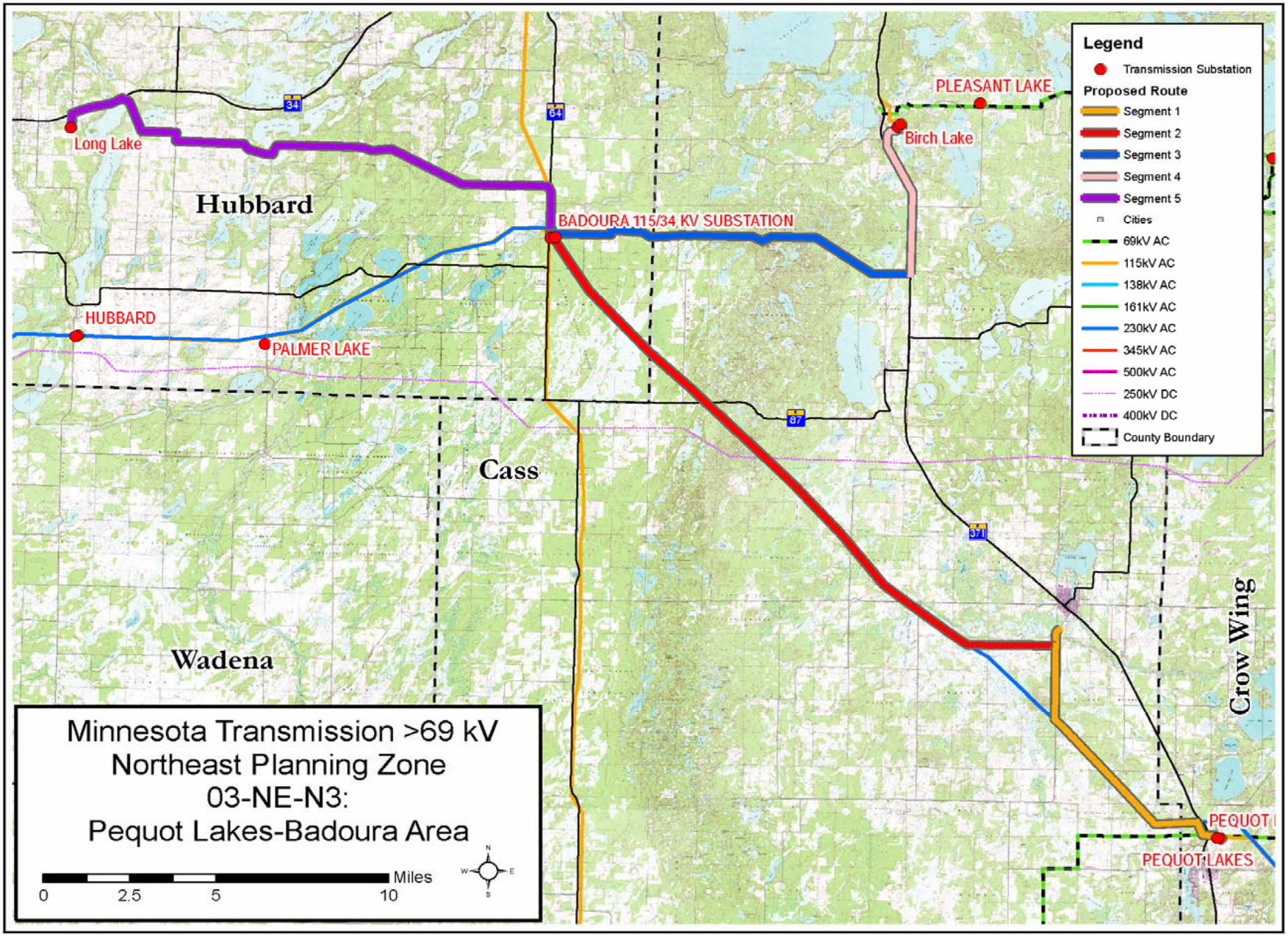
A map of the area is shown on the following page.

Alternatives. The alternatives were examined in the certification document.

Analysis. The Commission issued its order on May 25, 2006, certifying that the Badoura Project is needed and is a priority electric transmission project. In March 2007, GRE and MP submitted a route permit application for the Badoura Project and the matter is currently under review by the Commission.

Schedule. Once the route permit is granted, the utilities expect to start survey and right-of-way acquisition by the end of 2007 and construction activities are expected to begin in the fall of 2008. At this time it is anticipated that the Badoura to Long Lake and Badoura to Pine River portions of the project will be placed in service by spring 2009. The remaining portions of the project will be completed and placed in service in late 2009 or early 2010.

PUC Docket Numbers. CN-05-867 (Certificate of Need)
TL-07-76 (Route Permit)


Legend
Transmission Substation
Proposed Route
Segment 1
Segment 2
Segment 3
Segment 4
Segment 5
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
Long Lake
Hubbard
HUBBARD
PALMER LAKE
BADOURA 115/34 KV SUBSTATION
PLEASANT LAKE
Birch Lake
Cass
Wadena
Crow Wing
PEQUOT
PEQUOT LAKES
Minnesota Transmission >69 kV
Northeast Planning Zone
03-NE-N3:
Pequot Lakes-Badoura Area
Miles
0
2.5
5
10

7.3.5 Central Lakes Area

Tracking Number. 2003-NE-N4

Utility. Great River Energy

Inadequacy. The Central Lakes area is the area around Brainerd and west to the Baxter area. The need is due to an increasing demand for power causing a potential overload situation.

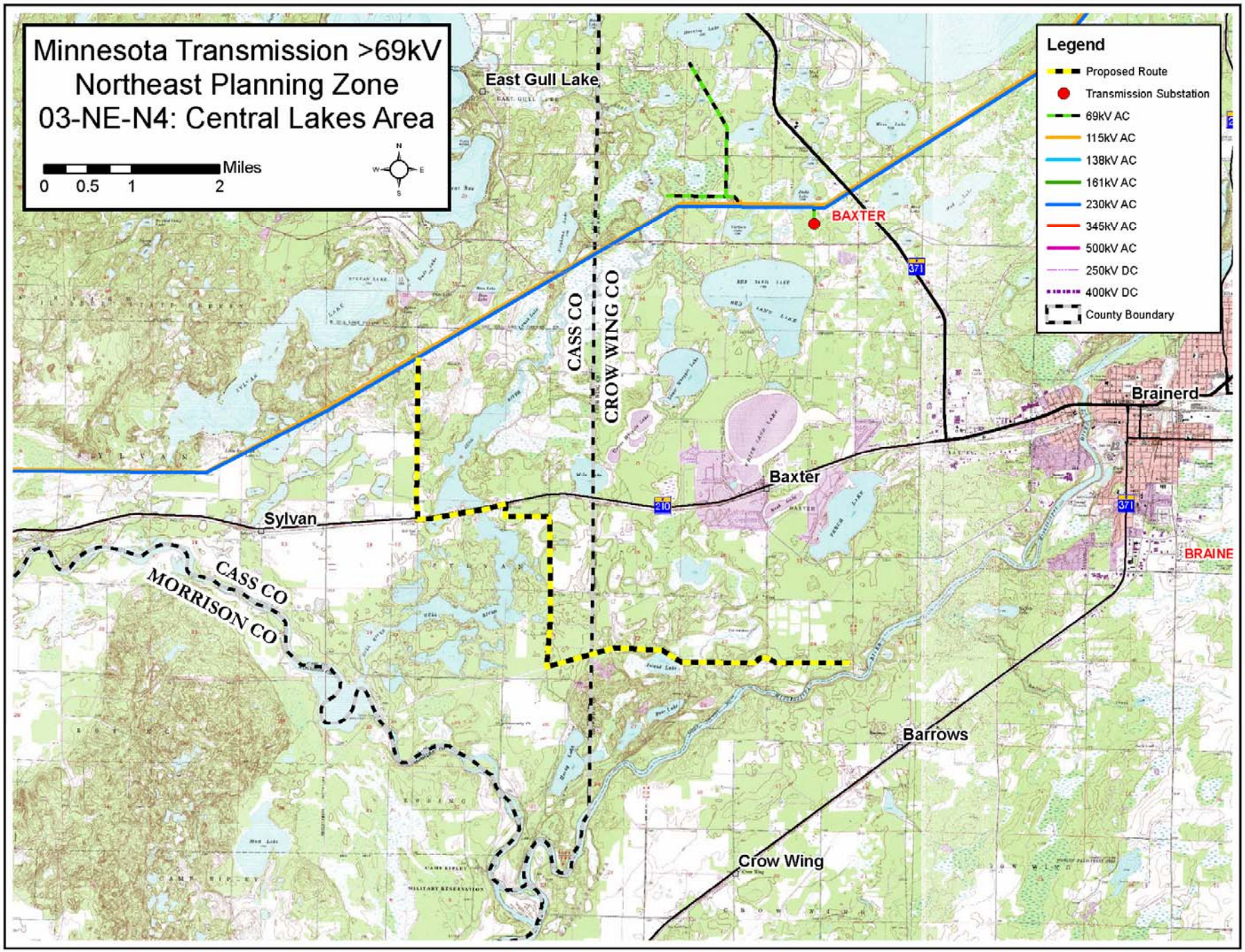
A map of the area is shown on the following page.

Alternatives. The utilities have continued to investigate the possibility of a new 115 kV line from the Southdale Substation to Minnesota Power's 115 kV line identified as 24 Line. The new line would create a looped 115 kV system with a third source being provided to the Brainerd substation from the west.

Analysis. A 115 kV loop will provide a long-term solution to the Central Lakes area and allow continued movement of load from the 34.5 kV system to the 115 kV system. Since this project may also be capable of providing support to the Brainerd Public Utilities electric system, Minnesota Power and GRE have also been seeking their input. The utilities are continuing to investigate various route options.

Due to the rapid growth in the Baxter-Brainerd area, distributed generation is not considered a viable solution. A transmission loop around Baxter and Brainerd is highly desired for reliability purposes in maintaining the local distribution substations in-service during contingency events. Distributed generation may not be on-line when reliability issues occur.

Schedule. GRE has held public meetings to discuss the proposed corridor to develop the route permit. The utilities hope to begin construction in the first half of 2008 and place the line inservice in late 2008 or early 2009.


Minnesota Transmission >69kV
Northeast Planning Zone
03-NE-N4: Central Lakes Area
Miles
0 0.5 1 2
N
W E
S
Legend
Proposed Route
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
East Gull Lake
BAXTER
CASS CO
CROW WING CO
371
Brainerd
Baxter
210
Sylvan
CASS CO
MORRISON CO
BRAINE
Barrows
Crow Wing

7.3.6 Pierz-Genola Area

Tracking Number. 2003-NE-N5

Utility. Great River Energy

Inadequacy. The Pierz-Genola system consists of a 34.5 kV system that ties the 115/34.5 kV sources between Blanchard and Little Falls together. It was reported in the 2003 Report that load growth in the area has reached the point where the system may overload and voltage violations may occur.

Alternatives. One short-term solution identified by Minnesota Power in 2005 is the construction of a new substation near Langola. Another short term solution is the conversion of the Crow Wing Power/Little Falls Substation to 115 kV.

Two long-term alternatives are: (1) the construction of a nine mile long 115 kV line from Little Falls to Genola, and (2) additional generation in the Buckman area.

Analysis. Minnesota Power has implemented one short-term solution – construction of a new 115/34.5 kV substation near Langola. This substation was placed in service in 2007. Great River Energy is continuing to monitor the performance of the new substation and its effect on the system in the area. GRE is also considering the Crow Wing/Little Falls Substation conversion since it involves a three mile long line rather than nine miles. At a later time the rest of the line could be upgraded from the substation to the Genola area for a more long-term solution.

In addition, Great River Energy is conducting a Long Range Plan that is considering options to address this matter.

Generation in the Buckman area continues to be a possible solution because it would place a voltage source in the middle of the system. However, it is uncertain whether generation would be able to resolve the voltage drop on the transmission lines, leading to continued voltage problems. Also, the generation would have to be on-line during transmission outages which is unlikely to occur due to the small size of the generation plant based on limited transmission outlet capacity.

Schedule. It still appears that an upgrade of the area electric system will be needed by 2011. It appears that a new line would be the best solution, and GRE will determine how to proceed upon completion of its Long Range Plan in 2008.

7.3.7 Taconite Harbor-Grand Marais Area

Tracking Number. 2003-NE-N6

Utility. Great River Energy

Inadequacy. The concern here is the overloading of a fifty mile long 69 kV line that runs along the North Shore. The load served by this line has been growing at a rate of approximately 3% per year and includes both GRE and SMMPA load. The voltage will be below acceptable levels without an upgrade sometime between 2006 and 2011.

A map of the area is shown on the following page.

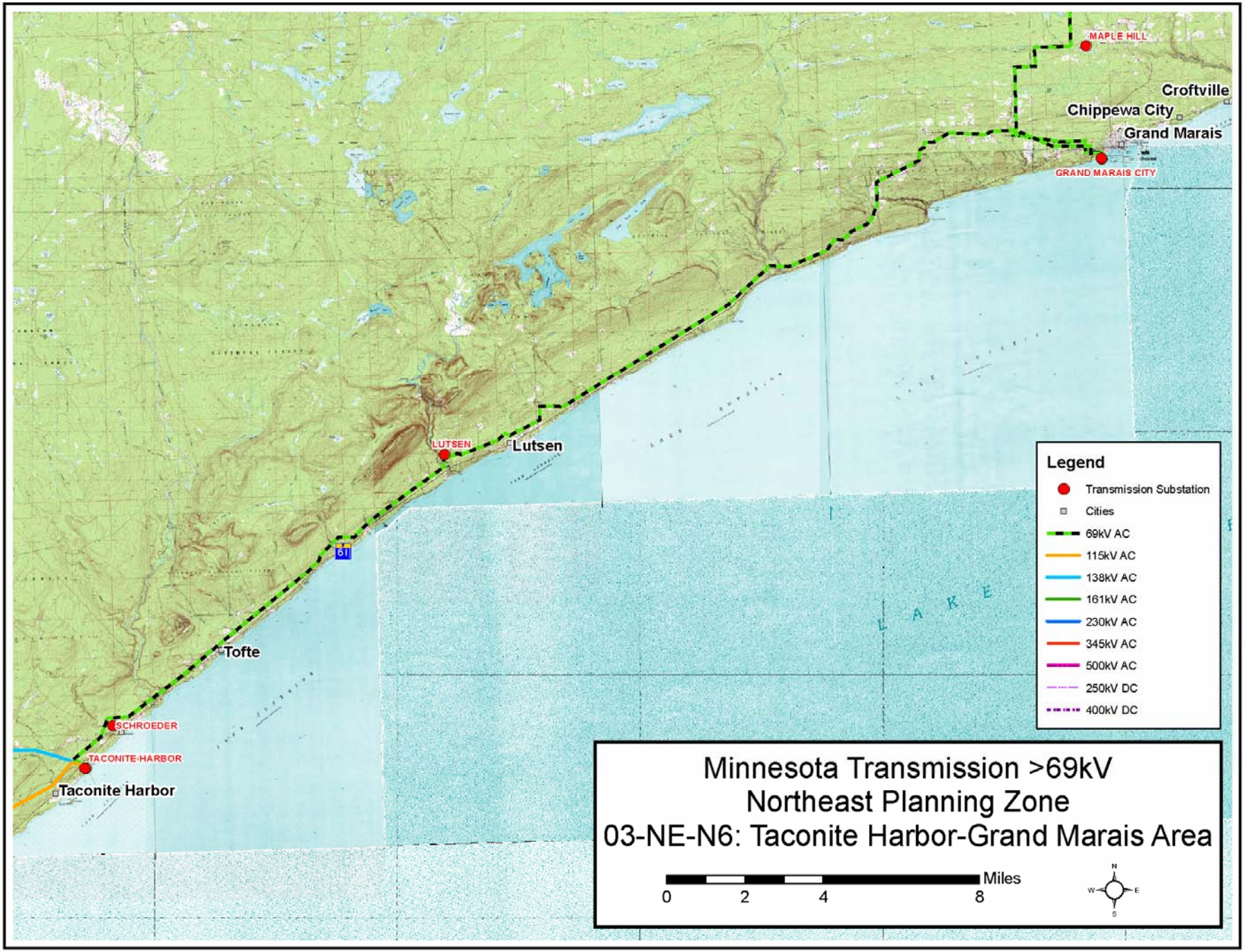
Alternatives. The utilities identified several alternatives in the 2003 Report, including construction of a new 115 kV line, rebuild and upgrade of the existing 69 kV line, installation of capacitors, and installation of additional generation.

Analysis. GRE is pursuing the addition of generation at the Colvill site. This generation consists of nine 2 MW diesel generators that will be made available on an emergency basis. These generators will become available in 2008. GRE also will be adding capacitors to the system to elevate the voltage in 2008.

GRE increased the thermal loading of the 69 kV line in 2005, and that upgrade is sufficient to ensure acceptable performance until the load approaches 28 MVA. GRE had a load of 25 MVA in 2007. GRE will continue to watch the load growth to determine when the 28 MVA level is approached, resulting in the need for further upgrades in the area.

With the generation being added to the system, GRE will be looking at opportunities to rebuild this 1950's vintage line. Any line rebuild will likely be built for future 115 kV operation.

Schedule. GRE does not expect the thermal load to approach 28 MVA until the 2010-2011 timeframe.


MAPLE HILL
Croftville
Chippewa City
Grand Marais
GRAND MARAIS CITY
LUTSEN
Lutsen
61
Tofte
SCHROEDER
TACONITE HARBOR
Taconite Harbor
LAKE SUPERIOR
Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Minnesota Transmission >69kV
Northeast Planning Zone
03-NE-N6: Taconite Harbor-Grand Marais Area
Miles
0
2
4
8
N
W
E
S

7.3.8 Mille Lacs Area

Tracking Number. 2003-NE-N7

Utility. Great River Energy

Inadequacy. The problems in the Lake Mille Lacs area are voltage support and line overloading. The situation was discussed in the Certificate of Need Application that was filed with the Public Utilities Commission on August 1, 2006. A Route Permit application was filed at the same time.

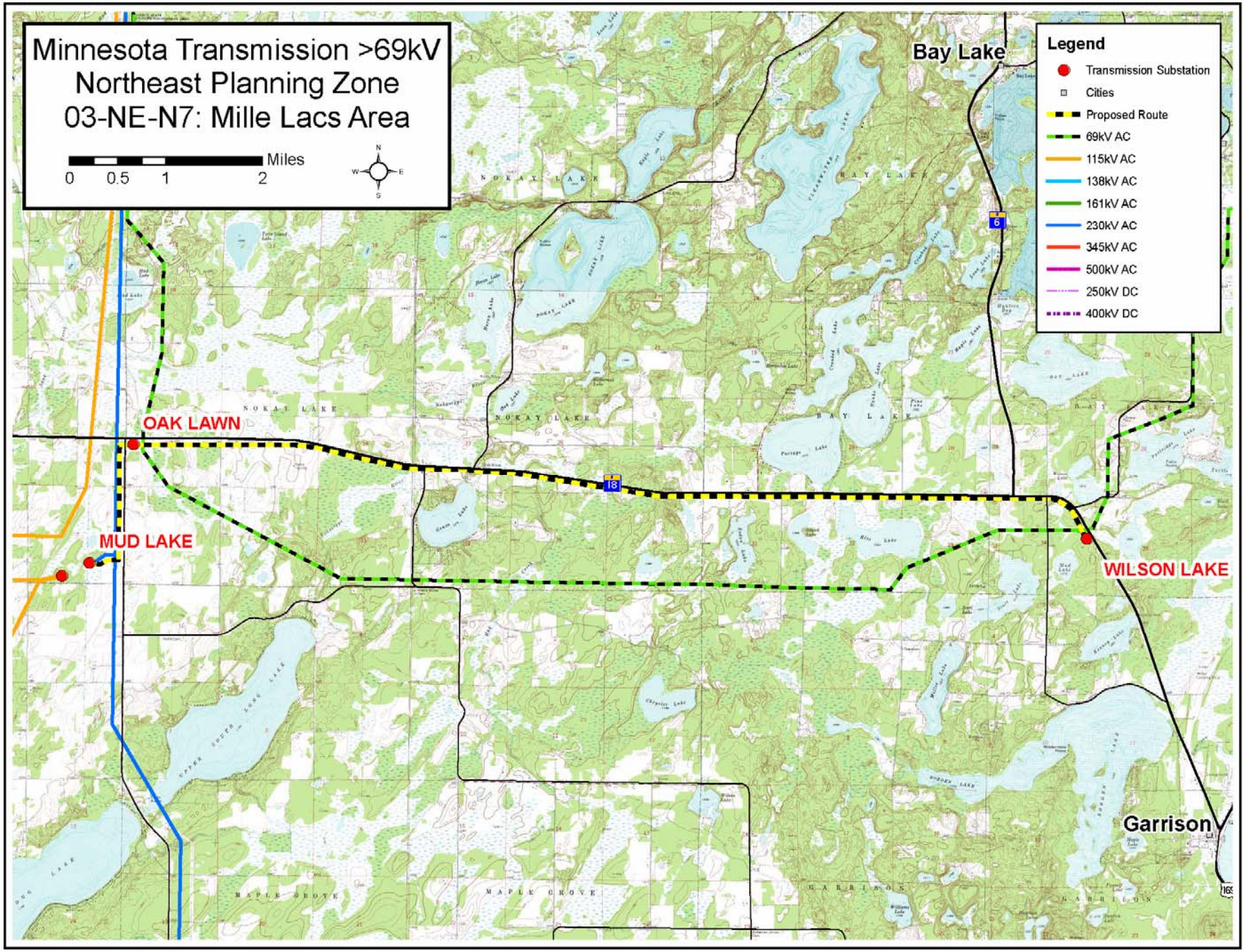
A map of the area is shown on the following page.

Alternatives. GRE reported in the 2005 Report that the best alternative was a new line from the Mud Lake Substation to the load center at Wilson Lake. The alternatives were examined in the Certificate of Need application and the Route Permit application.

Analysis. On February 12, 2007, the Minnesota Public Utilities Commission issued its Order granting Great River Energy a Certificate of Need for the Mud Lake-Wilson Lake 115 kV High Voltage Transmission Line and a separate Order granting a Route Permit.

Schedule. The utilities have started survey and right-of-way acquisition, and construction activities will begin in 2008. At this time it is anticipated that the project will be completed and in service during the fourth quarter of 2008.

PUC Docket Numbers. CN-06-367 (Certificate of Need)
TL-06-980 (Route Permit)


Minnesota Transmission >69kV
Northeast Planning Zone
03-NE-N7: Mille Lacs Area
Miles
0 0.5 1 2
N
W
E
S
Legend
Transmission Substation
Cities
Proposed Route
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Bay Lake
OAK LAWN
MUD LAKE
WILSON LAKE
Garrison
NOKAY LAKE
BAY LAKE
MAPLE GROVE
GARRISON
18
6

7.3.9 Floodwood Area

Tracking Number. 2003-NE-N8

Utility. Great River Energy

Inadequacy. The Floodwood Area consists of the load served between the Cromwell and Four Corners 115/69 kV sources. Basically, it is a looped 69 kV system with two long radials extending from the loop consisting of a 29.0 mile line ending at Palisade and 17.6 mile line ending at Cedar Valley. The Palisade radial serves a fairly large amount of load resulting in the fourth highest radial mile exposure on the system. The annual load growth in the area is projected to be approximately 2.0%. Improvements are needed by 2012.

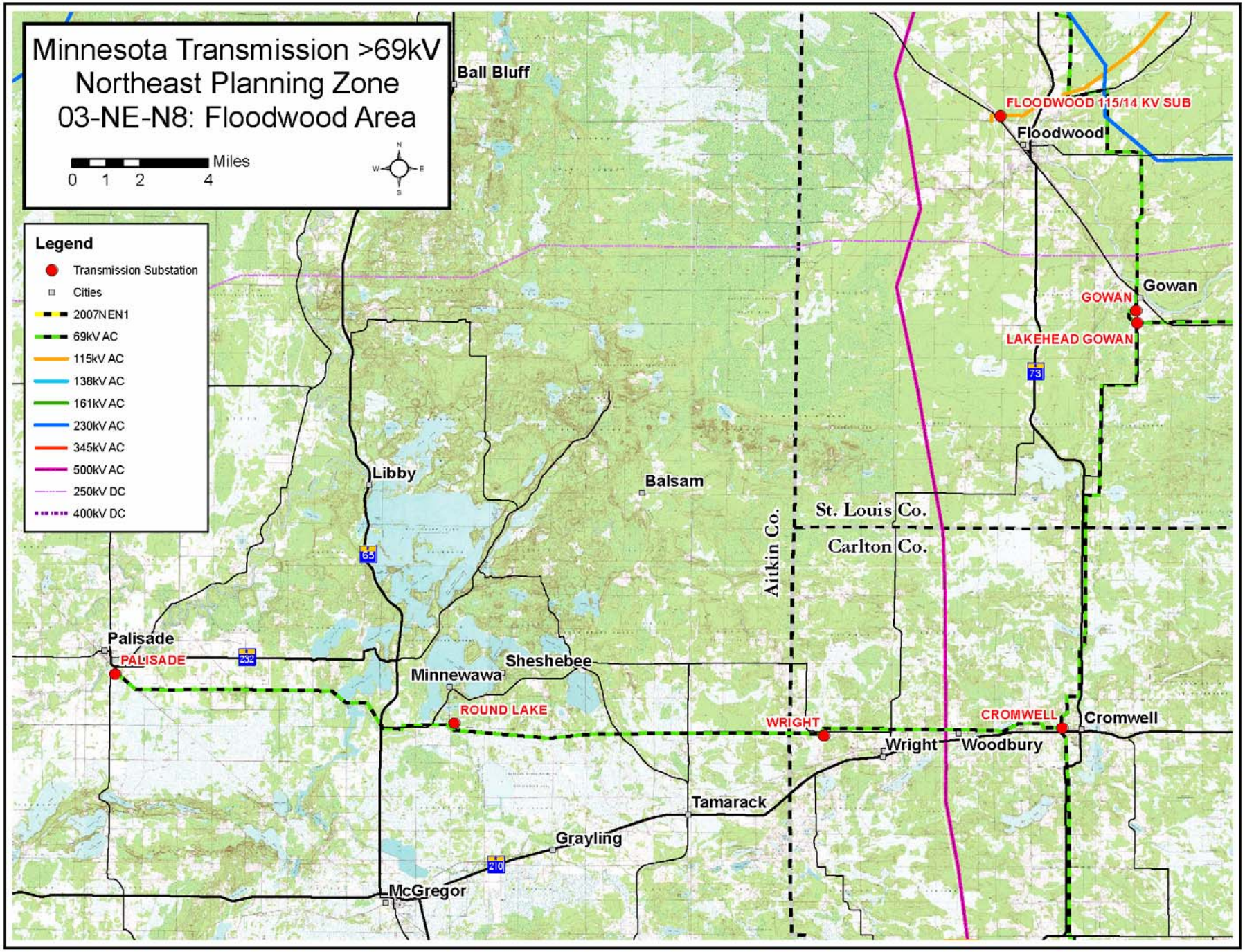
A map of the area is shown on the following page.

Alternatives. A new source needs to be established in the area. Many potential opportunities exist for bringing in a new source, but basically the options will consist of looking at lowering the radial line lengths. Also, some of the lines in the area are approaching age limitations and may be in need of rebuilding. In the 2005 Biennial Report Great River Energy identified four possible alternatives, each involving line upgrades and new transmission. These four alternatives are described in more detail in the 2005 Report and that description will not be repeated here. These remain the most viable alternatives, and GRE is working with Minnesota Power to examine the possibility of finding one solution that solves both this problem and the Cromwell situation (Tracking Number 2003-NE-N2).

Distributed generation has not been eliminated as an option but as reported in the Cromwell matter, distributed generation is likely to have reliability and economic disadvantages compared to the transmission options Distributed generation will not eliminate the long radial lines that exist. At this time, it appears that a new 115 kV line would provide the best solution both electrically and economically. However, no alternatives have been ruled out, and a number of alternatives will be addressed in any Certificate of Need application that is filed.

Analysis. GRE is working with Minnesota Power to develop a solution that will address both the Floodwood situation and the Cromwell-Wrenshall-Mahtowa situation. With continued load growth in the area, overloads on certain 69 kV lines and low voltage at certain substations are not expected to materialize until 2012.

Schedule. The utilities are working on a solution that addresses both the Floodwood and Cromwell situations and the present expectation is that a Certificate of Need may be filed as soon as 2008 or as late as 2010.


Minnesota Transmission >69kV
Northeast Planning Zone
03-NE-N8: Floodwood Area
Miles
0 1 2 4
Legend
Transmission Substation
Cities
2007NEN1
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Ball Bluff
FLOODWOOD 115/14 KV SUB
Floodwood
GOWAN
Gowan
LAKEHEAD GOWAN
73
Libby
Balsam
Aitkin Co.
St. Louis Co.
Carlton Co.
65
Palisade
PALISADE
Minnewawa
Sheshebee
ROUND LAKE
WRIGHT
CROMWELL
Cromwell
Wright
Woodbury
Tamarack
Grayling
210
McGregor

7.3.10 Nashwauk Area

Tracking Number. 2003-NE-N9

Utility. Great River Energy

Inadequacy. The load in the Nashwauk and Crooked Lake area has been growing and is predicted to continue to grow, perhaps at a rate of as much as 4% per year. It is estimated that only 1.4 MW of total load can be served from the Nashwauk and Crooked Lake substations, which is 47% of the 2001 summer peak and 36% of the 2001 winter peak. The load on the line between Nashwauk and Crooked Lake Tap was overloaded on occasion in 2006 and the tap to the Crooked Lake area will become overloaded by 2011. GRE has surveyed the line and determined that the line has a higher capability than previously thought, although a regulator is now the limit. The winter load is approaching the regulator capability.

In addition, a new steel plant – called Minnesota Steel Industries – which will be a vertically integrated mining and steelmaking operation is proposed to be constructed near Nashwauk at the Butler mine site. This new plant could require as much as 300 MW of generation for its energy needs. A new Tracking Number (2007-NE-N2) has been assigned specifically for this new plant.

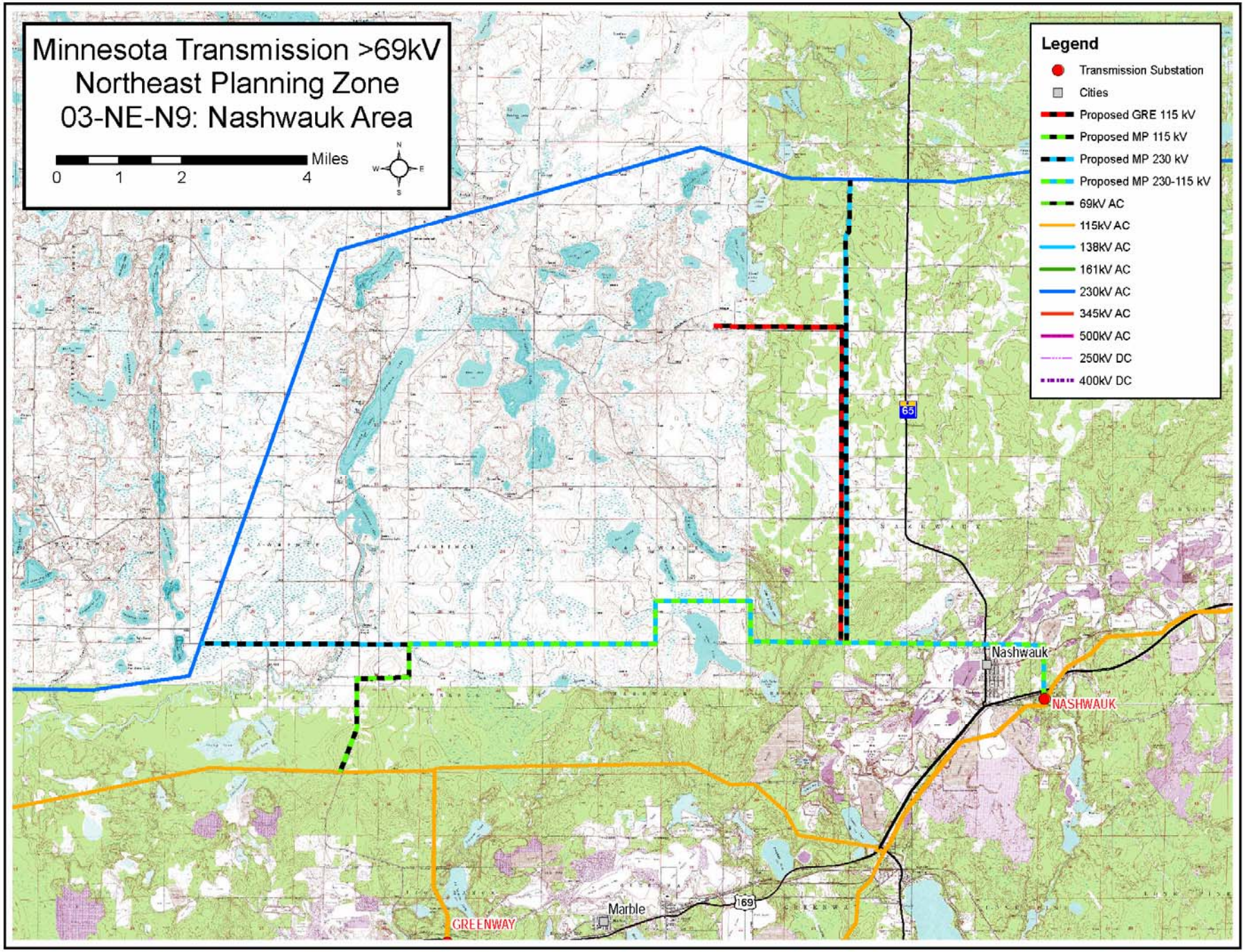
A map of the area is shown on the following page.

Alternatives. Three alternatives were identified in the 2005 Report and were under consideration to address the load serving issue in the Nashwauk area: (1) a new Shoal Lake 115 kV distribution substation west of the existing Nashwauk substation, (2) a new Lawrence Lake 115 kV distribution substation about five miles southwest of the Crooked Lake substation, and (3) additional generation. However, it now appears that any solution to the load growth concern will be resolved by addressing the larger issue of bringing a substantial amount of power to the new steel plant.

Analysis. A new Lawrence Lake distribution substation was the preferred alternative because it is located near the load center and the 115 kV line that would be required would be less than five miles long. However, now that the Minnesota Steel Industries (MSI) plant is becoming a reality, it is evident that lines larger than 115 kV will be required to accommodate the steel plant. The Shoal Lake alternative may be a better solution because the 115 kV corridor to Shoal Lake is common to a potential 230 kV corridor to serve MSI. Some cost savings can be realized if the 230 and 115 kV lines can be placed on a common tower. GRE and Lake Country Power are coordinating their planning activities with MSI and the City of Nashwauk. Further analysis will be reported under Tracking Number 2007-NE-N2.

Schedule. Minnesota Steel Industries expects to begin producing steel in 2009. The City of Nashwuak Public Utilities Commission applied for a routing permit for a new natural gas pipeline in March 2007. GRE anticipates that a decision on a new transmission line or lines will have to be made by the end of 2007 or early 2008. A route permit will be required from the Public Utilities Commission, and whether a certificate of need is required depends on the length of the proposed line or lines.

PUC Docket Number. GP-06-1481 (Natural Gas Pipeline)


Minnesota Transmission >69kV
Northeast Planning Zone
03-NE-N9: Nashwauk Area
Miles
0
1
2
4
N
W
E
S
Legend
Transmission Substation
Cities
Proposed GRE 115 kV
Proposed MP 115 kV
Proposed MP 230 kV
Proposed MP 230-115 kV
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
65
Nashwauk
NASHWAUK
Marble
169
GREENWAY

7.3.11 Mesaba IGCC Generation Facility

Tracking Number. 2005-NE-N2

Utility. Excelsior Energy, Inc.

Inadequacy. Excelsior Energy Inc. ("Excelsior"), an independent energy development company, is proposing to construct and operate the Mesaba Energy Project (the "Project"), an Integrated Coal Gasification Combined Cycle (IGCC) power plant to be located on the Iron Range. The initial Project would involve the construction of two phases of generation, each phase of which would nominally generate 600 megawatts of electricity.

Excelsior's site application identifies a preferred site for the Project in Itasca County north of Taconite, Minnesota, ("West Range Site") and an alternative site on Cleveland Cliff's property north of Hoyt Lakes, Minnesota ("East Range Site"). The Project must be interconnected with the transmission grid in order to provide an outlet for the power to be generated.

A map of the area is shown on the following page.

Alternatives. Excelsior has developed a number of 230 and 345 kV development concepts for the generator outlet facilities to deliver the output of both phases of generation from each Project site to the associated point of interconnection at either MP's Blackberry or Forbes 230 kV substation. Route applications have been submitted to construct a 8 mile double circuit 345 kV line (operated at 230 kV initially) from the generator to Blackberry Substation for the West Range site while two 345 kV generator outlet lines of 35-40 miles in length (initially operated at 230 kV) between the generator and Forbes Substation are proposed for the East Range site. To minimize the need for new right of way for the East Range site, Excelsior is proposing that these new generator outlet lines replace existing Minnesota Power 115 kV lines with new double circuit structures carrying both the existing 115 kV line and the 345 kV generator outlet line.

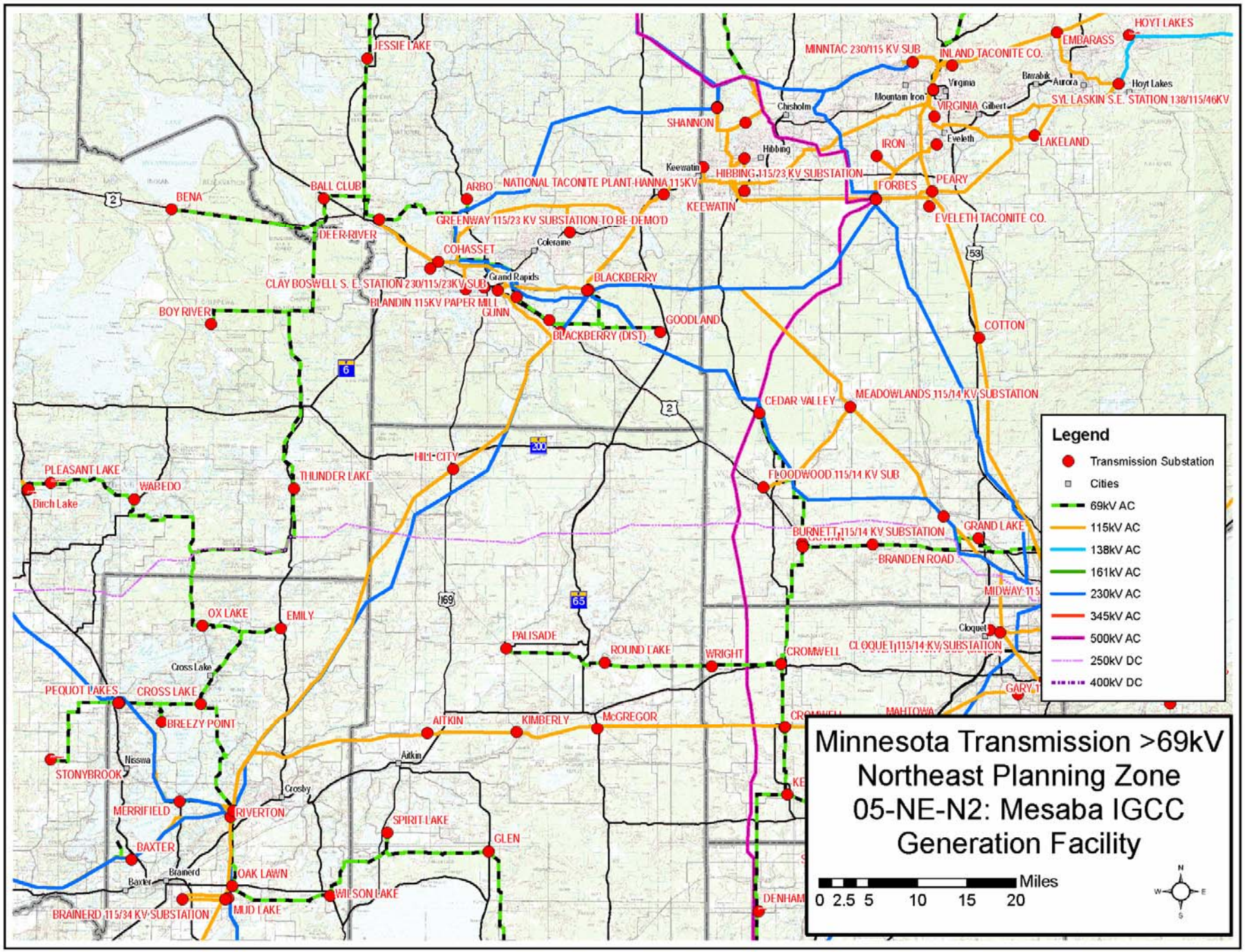
Analysis. Since both the local utility (Minnesota Power) where the potential plant sites are located and the principal proposed customer (Xcel Energy) for the generation output from the project are members of MISO, the MISO processes for generator interconnection and transmission delivery service must be followed. Excelsior submitted an interconnection request to MISO for the West Range site in May 2005 (designated by MISO as Project G519) and for the East Range site in October 2004 (MISO Project G477). Additional information about the MISO process is described in the 2005 Report for this matter.

The MISO generator interconnection process has been completed for both G519 and G477. A Large Generator Interconnection Agreement (LGIA) has been executed by the parties (Excelsior, Minnesota Power, and MISO) and reported to FERC for both possible sites. The LGIA for G519 (the Preferred Site) has identified the need and cost of the substation additions and modifications at the Blackberry Substation to accommodate the new generation outlet lines as well as a new 80 mile 230 kV line (Network Upgrade) between the Boswell to Riverton Substations.

The LGIA for G477 (the Alternate Site) identifies the need and cost of the substation additions and modifications at the Forbes Substation. No network upgrades are necessary for the Project to inject its output to the grid at this site.

Schedule. Work has begun on the route permit application for the new Network Upgrade line (between the Minnesota Power Boswell and Riverton substations) for the West Range Site, and an application is expected to be submitted to the PUC in early 2008. A Certificate of Need is not required since this transmission is associated with an Innovative Energy Project and exempted under special legislation for such projects. Minnesota Statutes § 216B.1694. The schedule for the generator outlet lines, Interconnection Facilities, and Network Upgrades is for these facilities to be complete in mid to late 2011. Excelsior plans to bring the first phase of the project online in July 2012.

PUC Docket Numbers. GS-06-668 (Site Permit and Route Permit)
M-05-1993 (approval of Power Purchase Agreement)


Minnesota Transmission >69kV
Northeast Planning Zone
05-NE-N2: Mesaba IGCC
Generation Facility
Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Miles
0 2.5 5 10 15 20
JESSIE LAKE
BENA
BALL CLUB
ARBO
NATIONAL TACONITE PLANT-HANNA 115KV
GREENWAY 115/23 KV SUBSTATION TO BE DEMO'D
DEER RIVER
COHASSET
CLAY BOSWELL S. E. STATION 230/115/23KV SUB
BLANDIN 115KV PAPER MILL
GUNN
BOY RIVER
BLACKBERRY
BLACKBERRY (DIST)
GOODLAND
MINNTAC 230/115 KV SUB
INLAND TACONITE CO.
SHANNON
HIBBING 115/23 KV SUBSTATION
KEEWATIN
IRON
FORBES
PEARY
EVELETH TACONITE CO.
HOYT LAKES
EMBARASS
SYL LASKIN S.E. STATION 138/115/46KV
LAKELAND
COTTON
CEDAR VALLEY
MEADOWLANDS 115/14 KV SUBSTATION
FLOODWOOD 115/14 KV SUB
BURNETT 115/14 KV SUBSTATION
GRAND LAKE
BRANDEN ROAD
CLOQUET 115/14 KV SUBSTATION
CROMWELL
WRIGHT
ROUND LAKE
PALISADE
HILL CITY
THUNDER LAKE
PLEASANT LAKE
WABEDO
Birch Lake
OX LAKE
EMILY
Cross Lake
PEQUOT LAKES
CROSS LAKE
BREEZY POINT
STONYBROOK
Nisswa
MERRIFIELD
RIVERTON
Crosby
BAXTER
Brainerd
Baxter
OAK LAWN
MUD LAKE
BRAINERD 115/34 KV SUBSTATION
SPIRIT LAKE
GLEN
WILSON LAKE
AITKIN
Aitkin
KIMBERLY
McGREGOR
DENHAM
MAHTOWA
Virginia
Mountain Iron
Chisholm
Hibbing
Eveleth
Gilbert
Keewatin
Coleraine
Grand Rapids
Cloquet
Hoyt Lakes
Babbitt
Aurora
2
6
53
65
169
200

7.3.12 Duluth Area 230 kV Project

Tracking Number. 2007-NE-N1

Utility. Minnesota Power

Inadequacy. During 2007 Minnesota Power experienced some difficulty scheduling maintenance outages in the Duluth area due to concerns associated with overloading of the Arrowhead and Hilltop Transformers as well as 230 kV line overloads. In the past, this has been managed by scheduling maintenance during light load periods; however, due to continued load growth, the number of days load is above levels that maintenance cannot be scheduled is increasing. In addition, line loading during certain combinations of contingencies results in heavy loading of the Duluth area 115 kV and 230 kV transmission system. This will soon reach critical levels as loads continue to grow.

A map of the area is shown on the following page.

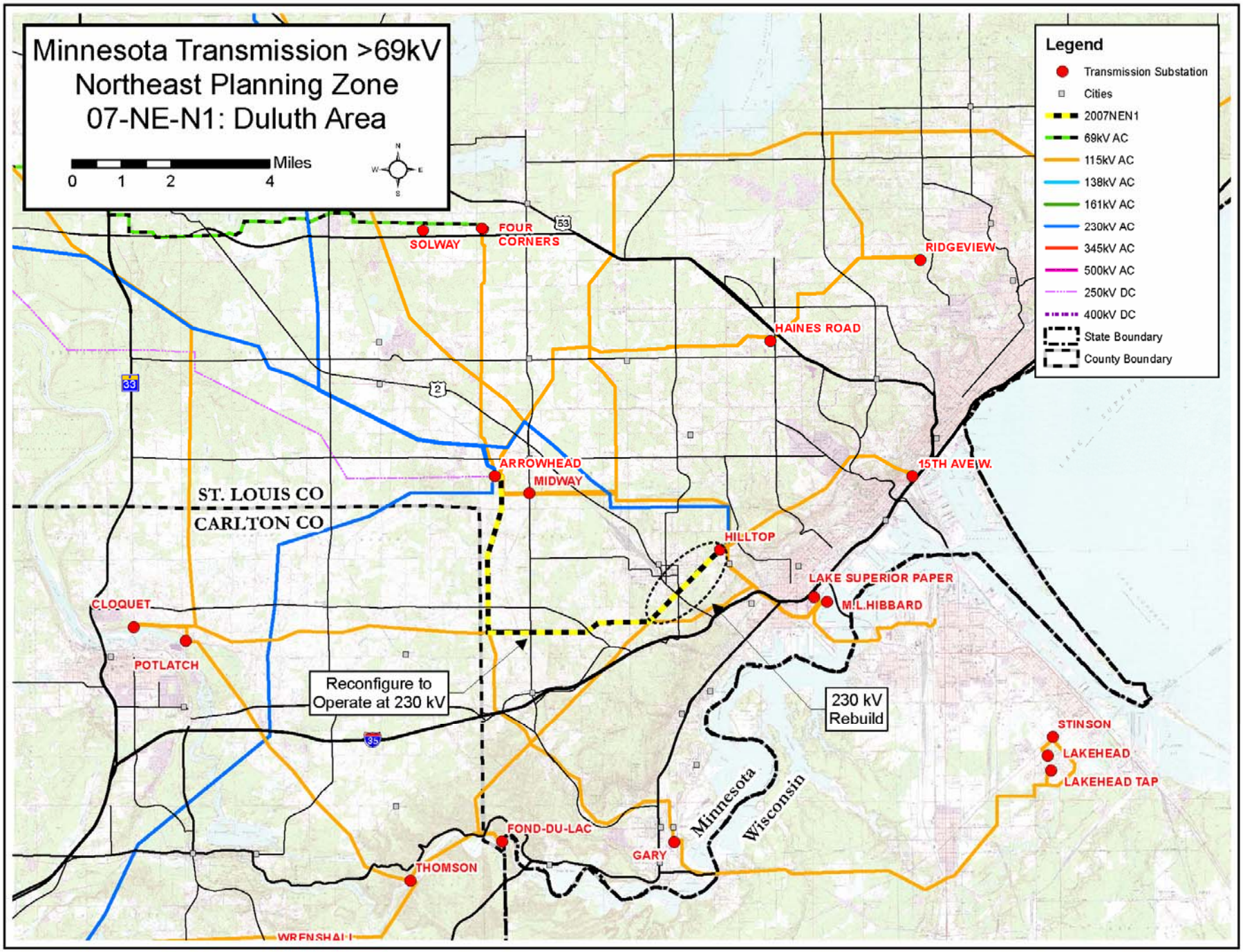
Alternatives. The only alternative under consideration is the rebuild of an existing 115 kV line to the Hilltop Substation to 230 kV capability.

Analysis. In 1993 Minnesota Power constructed a new 230 kV substation (the Hilltop Substation) in Duluth. This project involved the rebuilding of existing 115 kV lines for 230 kV operation in order to provide a single 230 kV source to the Hilltop Substation and upgrades of several unshielded 115 kV lines to improve reliability. As part of the application for the Hilltop project MP laid out long range plans which identified the future need for a second 230 kV source to the Hilltop substation once Duluth load dictated its need. The Commission recognized this future need and approved rebuilding of portions of the unshielded 115 kV lines as part of the Hilltop Project for future 230 kV operation.

Because Minnesota Power anticipated this future need, only approximately 3 miles of line construction will be required to provide a second 230 kV source to the Hilltop Substation. The majority of this construction will involve rebuilding an existing 115 kV line. Due to the configuration of the existing Duluth area transmission system and need to provide a second 230 kV source to the Hilltop Substation, no other alternative to this project will provide a cost effective or reasonable solution to this pending inadequacy. Other transmission alternatives would require longer 230 kV line construction and increase both social and economic impacts associated with construction of such a line, and distributed generation is not preferable from either a cost or operational standpoint to the preferred project.

Minnesota Power is continuing to monitor line loading, voltage support and load growth in the Duluth area.

Schedule. The decision on when this second circuit should be constructed will be determined by changes in line loading and voltage support. At this time it is expected that a Certificate of Need application would not be submitted before early 2010. However, this is subject to change if loads increase at rates greater than expected.


Minnesota Transmission >69kV
Northeast Planning Zone
07-NE-N1: Duluth Area
Miles
0 1 2 4
Legend
Transmission Substation
Cities
2007NEN1
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
State Boundary
County Boundary
SOLWAY
FOUR CORNERS
RIDGEVIEW
HAINES ROAD
ARROWHEAD
MIDWAY
15TH AVE W.
ST. LOUIS CO
CARLTON CO
HILLTOP
LAKE SUPERIOR PAPER
M.L.HIBBARD
CLOQUET
POTLATCH
Reconfigure to Operate at 230 kV
230 kV Rebuild
STINSON
LAKEHEAD
LAKEHEAD TAP
Minnesota
Wisconsin
FOND-DU-LAC
GARY
THOMSON
WRENSHALL

7.3.13 Minnesota Steel Industries Project

Tracking Number. 2007-NE-N2

Utility. Nashwauk Public Utilities Commission (NPUC)

Inadequacy. Minnesota Steel Industries (MSI) is proposing the construction of an iron ore mining and steel production facility to be located near Nashwauk MN. The majority of the proposed facility is located within the city of Nashwauk's service territory so the City would be the main electric service provider to MSI (a small amount of mining related load will be supplied by Minnesota Power). In order to deliver the approximately 300 MW needed for phase I of the MSI project, new transmission will be required and Minnesota Power will be the transmission provider.

A map of the area is shown on the following page.

Alternatives. Several alternatives to connect MSI to the transmission system were studied including a number of 230 kV lines and bringing 500 kV to the site from the Forbes Substation.

Analysis. Studies have shown that three 230 kV transmission lines provide the best alternative to deliver the electric power from the Minnesota Power system to the MSI facility. At this time, the preferred alternative for serving MSI will consist of looping the MP Boswell-Shannon line # 94 into the facility and constructing a new 15 mile 230 kV line from the MP Blackberry 230 kV Substation.

The looping of 94 line into the MSI Substation would be done via a west segment, creating a Boswell to MSI 230 kV line and a north segment creating an MSI-Shannon 230 kV line. These lines segments are routed on separate rights-of-way in order to reduce the likelihood that a single event (such as a severe storm with straight line winds) would result in loss of both of these 230 kV sources simultaneously.

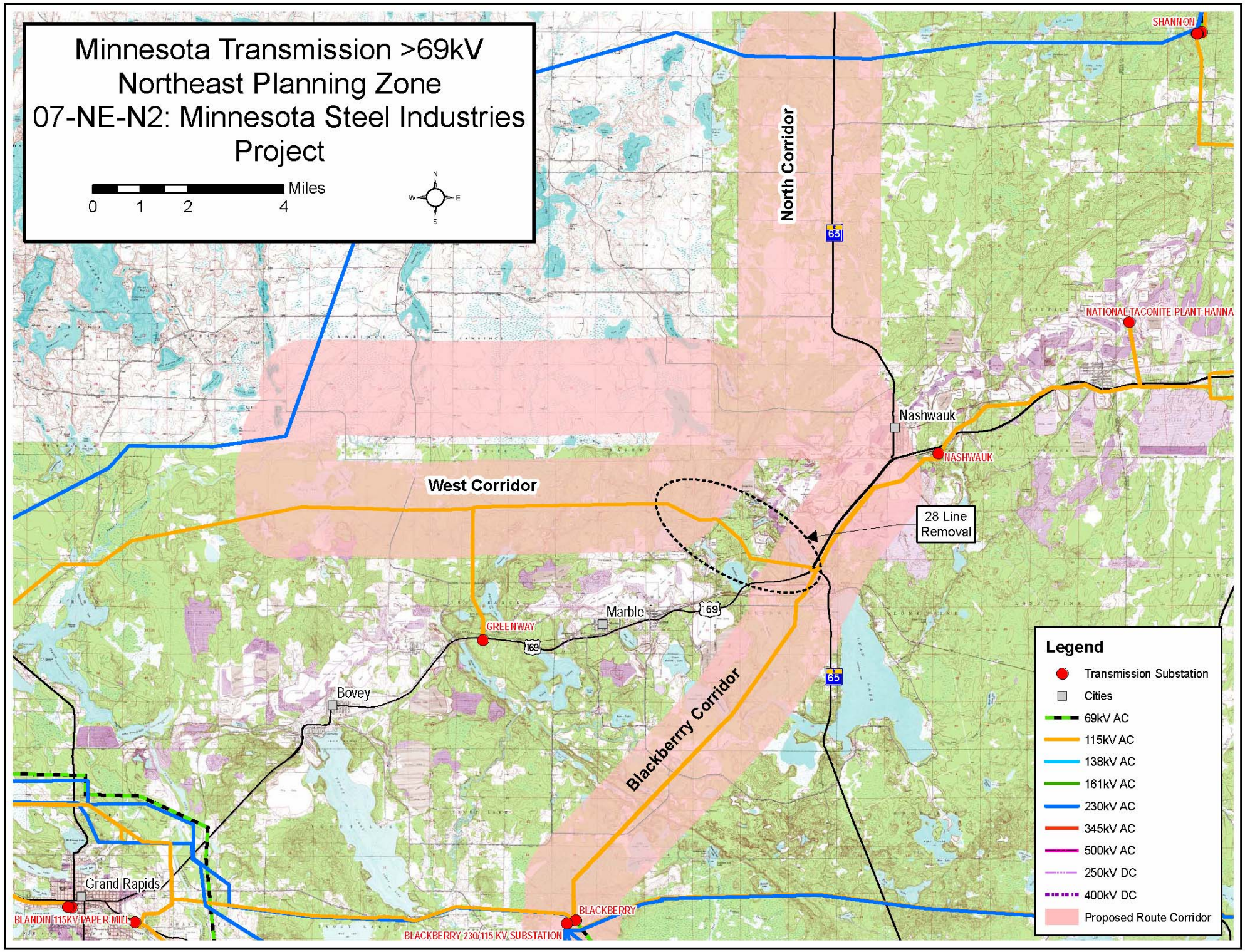
At this time, it is anticipated that a 230 kV line between the MP Blackberry Substation and MSI could use the right-of-way of an existing 115 kV line between MP's Blackberry Substation and NPUC's Substation. Studies indicate that sufficient right-of way width exists to support the removal of one 115 kV line and construction of the new 230 kV line, with one existing 115 kV line remaining.

Portions of the existing MP 115 kV Line #28 will need to be relocated as part of this project. This is because Line #28 crosses the "pit Area" where MSI will be mining ore. GRE also has a load serving project in the vicinity (Nashwauk Area 2003-NE-N9) and MP, NPUC, and GRE have been working together to determine if there are opportunities to reroute #28 in a manner that would address both GRE's need and MP's need to relocate the portion of #28 located in the MSI "pit area" in a manner that would reduce overall new right-of-way required and line construction cost.

At this time it is not known where NPUC will obtain the power to serve MSI. Depending on where it is sourced, additional transmission may be required to deliver the power from the power

supply sources into and through the MP transmission system. This analysis will be completed by MISO once NPUC chooses a supplier and a transmission service request is made.

Schedule. The transmission associated with the MSI project will only be constructed if the project moves forward. A Certificate of Need may be required for the transmission associated with this project and a route permit application will be required. It is anticipated that a route permit application will be filed with the Commission in late 2007, provided the project remains on schedule. The most recent schedule provided to the utilities by MSI indicates that operations will commence in April 2010.


Minnesota Transmission >69kV
Northeast Planning Zone
07-NE-N2: Minnesota Steel Industries Project
Miles
0 1 2 4
N
W E
S
North Corridor
West Corridor
Blackberrry Corridor
28 Line Removal
SHANNON
NATIONAL TACONITE PLANT-HANNA
Nashwauk
NASHWAUK
GREENWAY
Marble
Bovey
Grand Rapids
BLANDIN 115KV PAPER MILL
BLACKBERRY
BLACKBERRY 230/115 KV SUBSTATION
65
169
Legend
Transmission Substation
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Proposed Route Corridor

7.3.14 Hubbard-Menahga Area

Tracking Number. 2007-NE-N3

Utility. Great River Energy

Inadequacy. The 34.5 kV system between Hubbard and Verndale is incapable of supporting the voltage on contingency for the projected load by 2010.

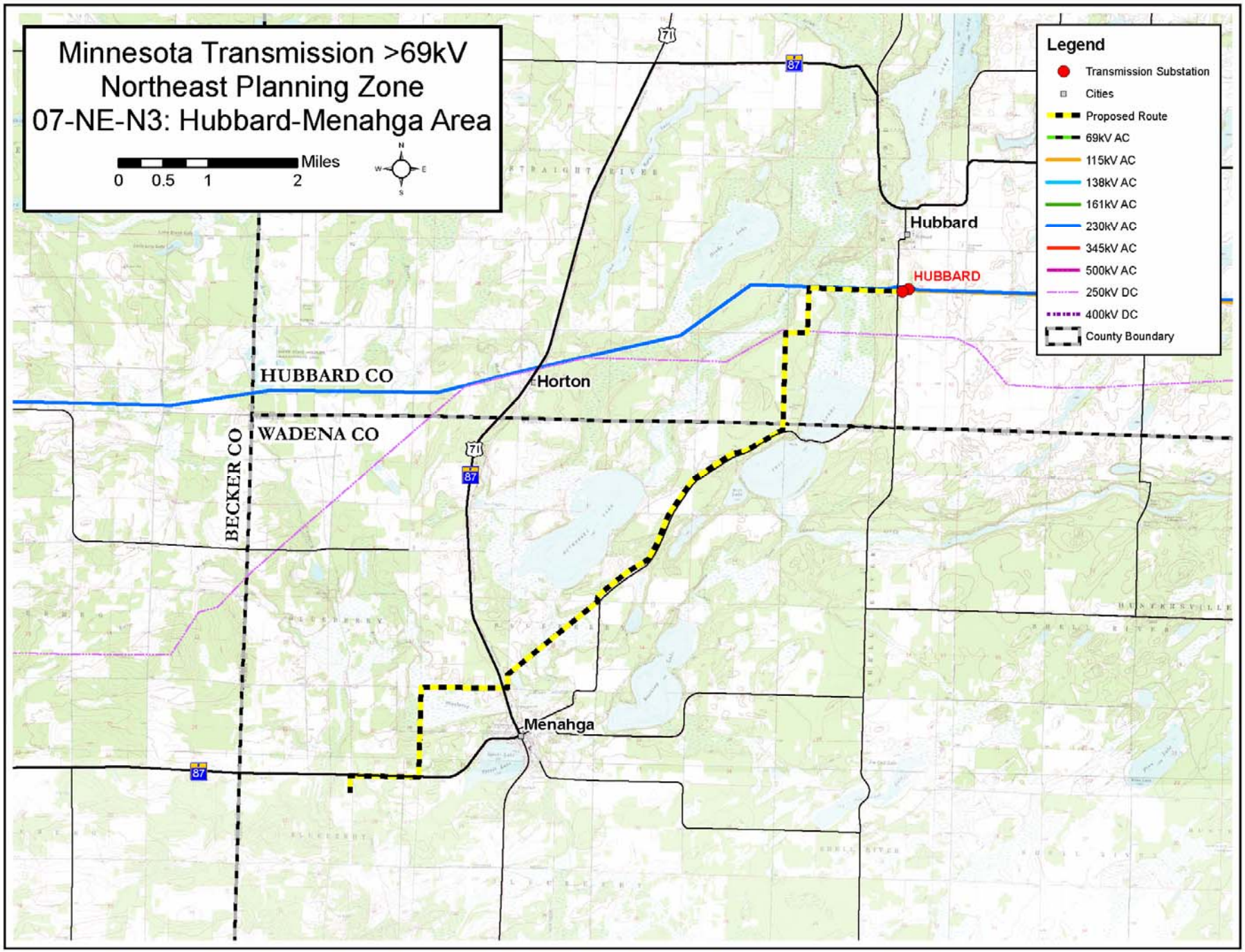
A map of the area is shown on the following page.

Alternatives. GRE had planned to construct a 34.5 kV line from Hubbard to Menahga. However, due to the potential of ethanol loads on the southern end of the system, a larger line should be developed for meeting potential larger loads in the area. The Hubbard-Menahga 115 kV line would be the start of a Hubbard-Menahga-Wadena/Compton-Wing River 115 kV line.

This area also has some wind potential. The existing 34.5 kV system, due to capacity limitations, would not provide the needs if a large windfarm were to develop in the area. The start of a 115 kV line between Hubbard and Wing River would provide the appropriate capability.

Analysis. The Menahga area sees low voltages on the loss of the Hubbard-Twin Lake 34.5 kV line. Historical load levels indicate that low voltage is already a problem if this critical contingency were to occur. MP is installing a 2.4 MVAR capacitor at Sebeka Regulator Station, which should be complete early in 2008, and this will push the voltage issues out a few years, depending on load growth.

Schedule. GRE is assessing this system as part of its Long Range Planning study, which is schedule to be completed in 2008. GRE may elect to proceed with this line in 2008. A Certificate of Need will be required if the line is longer than 10 miles.


Minnesota Transmission >69kV
Northeast Planning Zone
07-NE-N3: Hubbard-Menahga Area
Miles
0 0.5 1 2
Legend
Transmission Substation
Cities
Proposed Route
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
County Boundary
HUBBARD
Hubbard
HUBBARD CO
WADENA CO
BECKER CO
Horton
Menahga
71
87

7.3.15 Akeley – Cramer Lake Area

Tracking Number. 2007-NE-N4

Utility. Great River Energy

Inadequacy. The 34.5 kV system between Akeley and Birch Lake is incapable of supporting the voltage on contingency and Itasca – Mantrap needs a new load delivery point east of Akeley. Existing distribution feeders from Nevis cannot reliably serve the load growth.

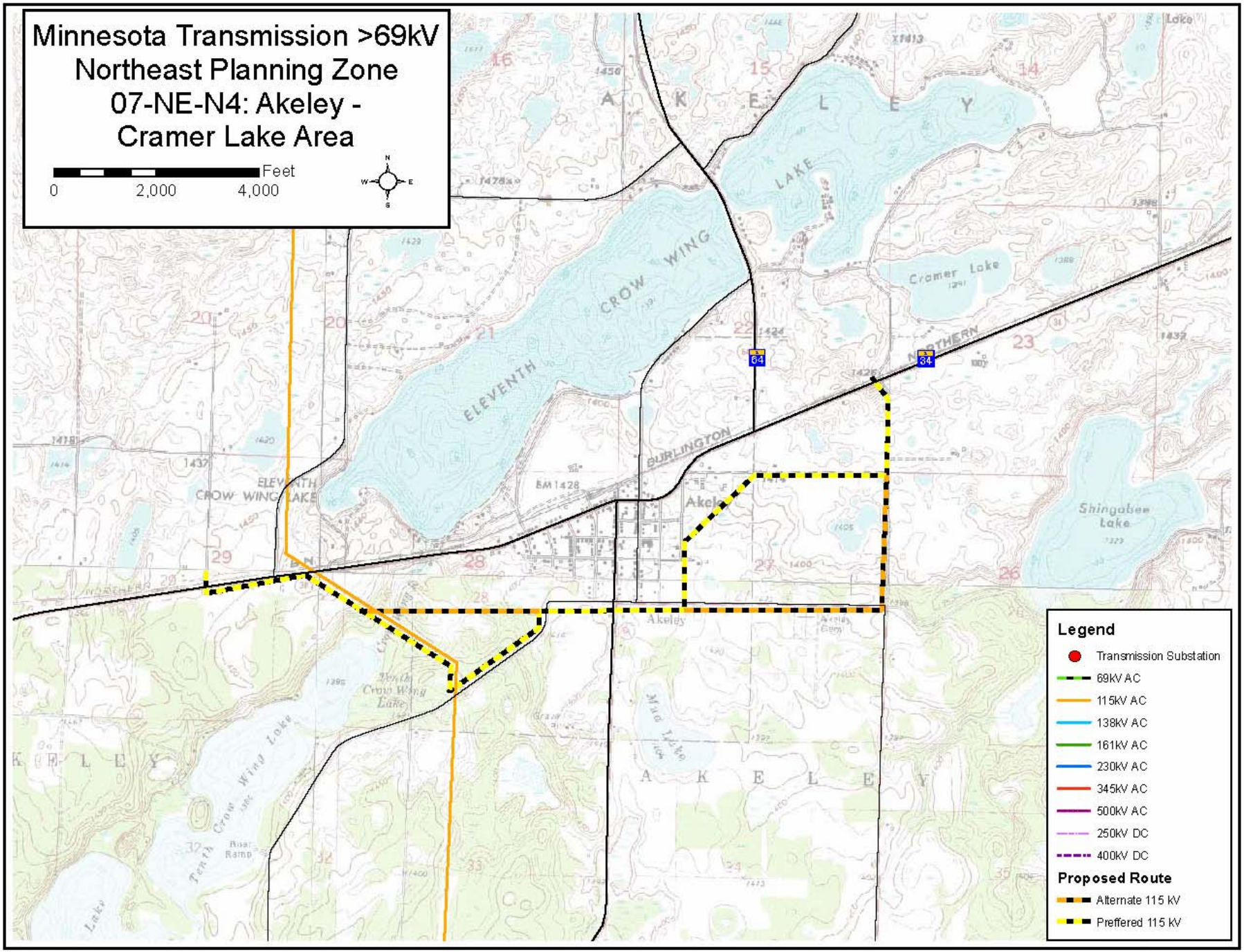
A map of the area is shown on the following page.

Alternatives. Service at 34.5 kV is not appropriate. Akeley 115 kV offers the only other transmission source to area. The radial line is expected to be about 4.5 miles in length.

Analysis. The 115 kV radial tap to Cramer Lake will be the start of a 115 kV loop to Walker and the Birch Lake – Onigum line identified in 2007-NE-N6.

Great River Energy cannot assume that generation connected to the distribution system will resolve Itasca – Mantrap feeder issues. Due to safety concerns of residential based generation to electrical crews and the fact that household generators probably would not be used unless there was an outage to the home, residential distributed generation will not be considered as an option. If Itasca – Mantrap were to connect to the existing 34.5 kV system, the generation would have to match the load of the new distribution substation so that the load would look like it is not there. With the rapid growth in the area and no guarantee that distributed generation is running when needed, distributed generation is not considered a viable option.

Schedule. The Itasca – Mantrap need is for 2009 installation.


Minnesota Transmission >69kV
Northeast Planning Zone
07-NE-N4: Akeley -
Cramer Lake Area
Feet
0
2,000
4,000
Legend
Transmission Substation
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Proposed Route
Alternate 115 kV
Preffered 115 kV
CROW WING
ELEVENTH
BURLINGTON
NORTHERN
Cramer Lake
Shingobee Lake
Akeley
64
34

7.3.16 Pokegama Area

Tracking Number. 2007-NE-N5

Utility. Great River Energy

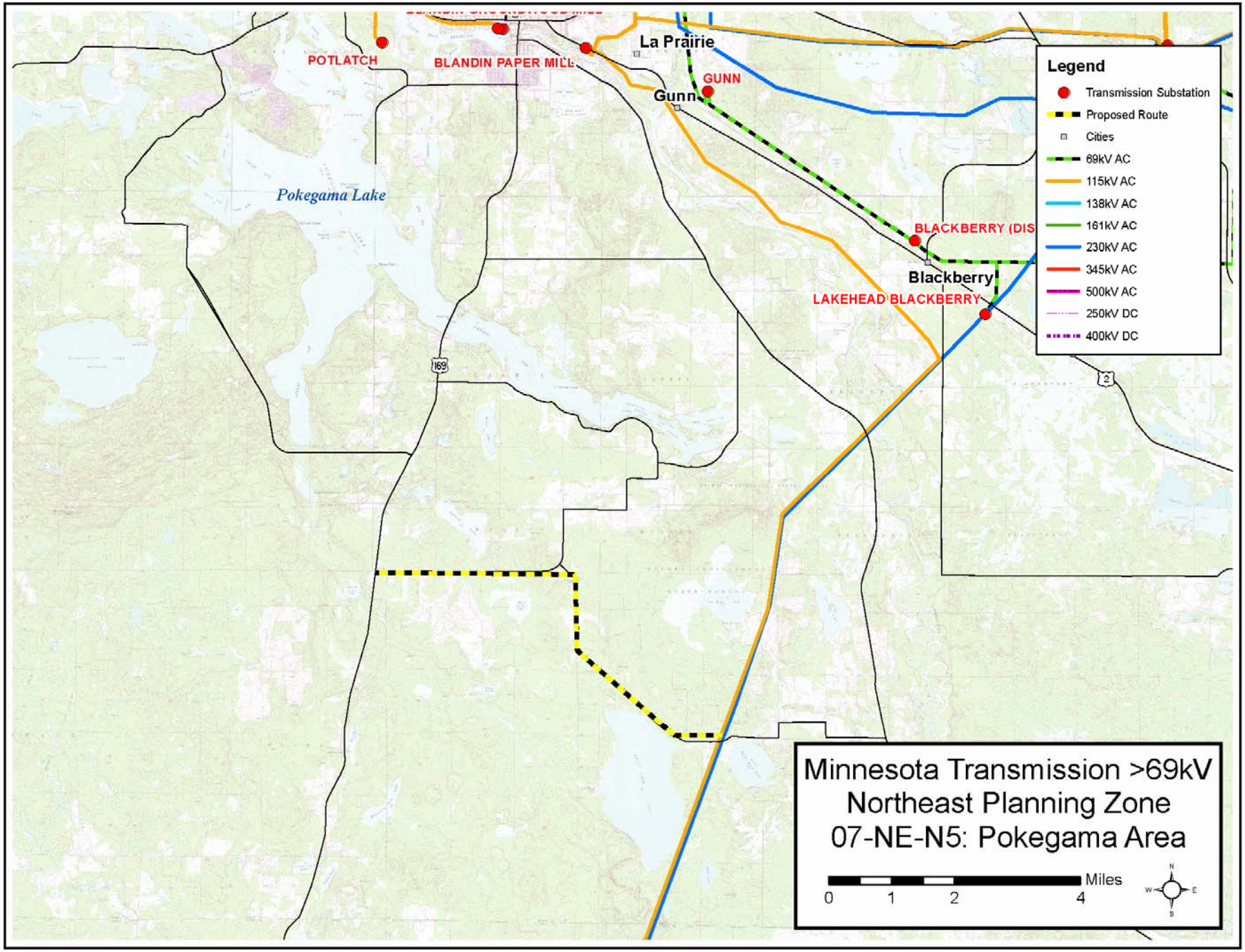
Inadequacy. Lake Country Power needs new distribution service on the south side of Pokegama Lake near Grand Rapids, MN. Existing distribution feeders cannot reliably serve the load growth.

A map of the area is shown on the following page.

Alternatives. Grand Rapids-Hill City 115 kV offers the only transmission source to area. The load delivery point is expected to be about 8.5 miles from the existing 115 kV line on HWY 169.

Analysis. This is the least cost distribution plan in the Lake Country Power analysis. GRE is obligated to provide a transmission line to the new distribution site whereby the Grand Rapids – Hill City line is the nearest and only viable transmission line to interconnect.

Schedule. Lake Country Power is going to need this new distribution service in 2010. A decision will need to be made by late 2008 on whether to proceed. A Certificate of Need will be required if the line is over ten miles in length but it is unlikely that any new line would be that long.


POTLATCH
BLANDIN PAPER MILL
La Prairie
GUNN
Gunn
Pokegama Lake
BLACKBERRY (DIS
Blackberry
LAKEHEAD BLACKBERRY
169
2
Legend
Transmission Substation
Proposed Route
Cities
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Minnesota Transmission >69kV
Northeast Planning Zone
07-NE-N5: Pokegama Area
Miles
0
1
2
4
N
W
E
S

7.3.17 Birch Lake-Onigum Area

Tracking Number. 2007-NE-N6

Utility. Great River Energy

Inadequacy. The 34.5 kV system between Akeley and Birch Lake is incapable of supporting the voltage on contingency for the projected load by 2010.

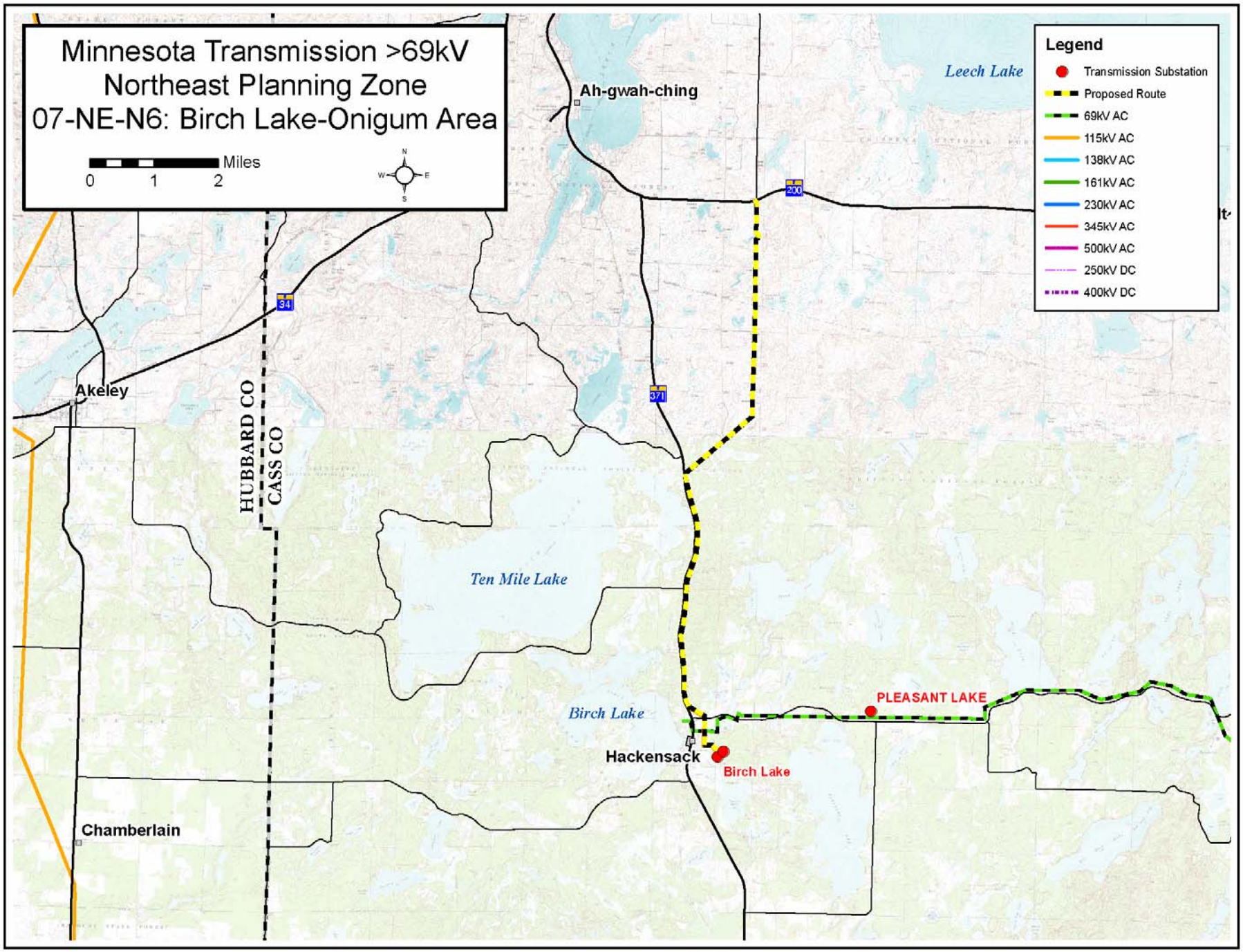
A map of the area is shown on the following page.

Alternatives. The Onigum load is out of phase with the rest of Lake Country Power loads and conversion to 115 kV would be desirable. GRE is considering constructing about 9.8 miles of 115 kV line using existing 34.5 kV and HWY 371 corridor. This line construction would be the start of a source to Walker.

Distributed baseload generation may be a consideration for this area, however with the potential load growth between Akeley and Hackensack which includes the growing Walker area, a 115 kV system will need to be built eventually to accommodate all of the load potential.

Analysis. Both Great River Energy and Minnesota Power serve load in the area and are coordinating analysis through the GRE Long Range Plan. GRE is studying whether a larger Walker 115 kV loop is needed or if the Onigum load removal from the 34.5 kV system to a 115 kV system has a favorable impact on improving the Walker 34.5 kV voltage issues.

Schedule. GRE and MP will be assessing this system in GRE's Long Range Planning study. A decision will need to be made by late 2008 to ensure a 2010 completion. A Certificate of Need filed if any proposed new Onigum line exceeds 10 miles.


Minnesota Transmission >69kV
Northeast Planning Zone
07-NE-N6: Birch Lake-Onigum Area
Miles
0 1 2
Legend
Transmission Substation
Proposed Route
69kV AC
115kV AC
138kV AC
161kV AC
230kV AC
345kV AC
500kV AC
250kV DC
400kV DC
Leech Lake
Ah-gwah-ching
200
34
371
Akeley
HUBBARD CO
CASS CO
Ten Mile Lake
Birch Lake
PLEASANT LAKE
Hackensack
Birch Lake
Chamberlain

7.3.18 Other Zone-Specific Issues

The addition of other large industrial loads in addition to MSI could trigger the need for transmission additions not covered in this Biennial Report. The utilities serving the area are aware that companies are in the process of conducting feasibility studies for expansion of existing operations or addition of new operations that could impact the NE Zone. Until these companies' plans are finalized, the utilities do not have the information necessary to determine what additional transmission may be required to serve these loads if they do occur.